

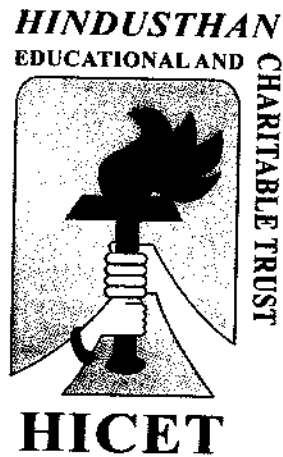
***HINDUSTHAN COLLEGE OF ENGINEERING AND TECHNOLOGY***

**(An Autonomous Institution Affiliated to Anna University, Chennai)**

**(Approved by AICTE, New Delhi, Accredited by NAAC with 'A' Grade)**

**Coimbatore - 641 032.**

**B.TECH. INFORMATION TECHNOLOGY**



**CHOICE BASED CREDIT SYSTEM**

**Revised Curriculum and Syllabus for the Odd semester**

**Academic year 2023-24**

**(Academic Council Meeting held on 19.06.2023)**

# **CURRICULUM R2022**



**DETAILS OF CHANGES CARRIED OUT IN CURRICULUM & SYLLABUS**

**CBCS PATTERN**

**UNDERGRADUATE PROGRAMMES**

**B.TECH. INFORMATION TECHNOLOGY (UG)**

**REGULATION-2022**

For the students admitted during the academic year 2023-2024 and onwards

**SEMESTER I**

S. No	Course Code	Course Title	Category	L	T	P	C	TCP	CIA	ESE	Total
<b>THEORY</b>											
1.	22MA1101	Matrices and Calculus	BSC	3	1	0	4	4	40	60	100
<b>THEORY WITH LAB COMPONENT</b>											
3.	22CY1151	Chemistry for Circuit Engineers	BSC	2	0	2	3	4	50	50	100
4.	22CS1151	Problem solving using C programming	ESC	2	0	2	3	4	50	50	100
5.	22IT1152	Introduction to Web Application Development	ESC	2	0	2	3	4	50	50	100
<b>EEC COURSES (SE/AE)</b>											
6.	22HE1072	Entrepreneurship & Innovation	AEC	1	0	0	1	1	100	0	100
<b>MANDATORY COURSE</b>											
<b>TOTAL</b>											
				17	1	8	18	26	580	320	900

**SEMESTER II**

S. No	Course Code	Course Title	Category	L	T	P	C	TCP	CIA	ESE	Total
<b>THEORY</b>											
1.	22MA2103	Differential Equations And Linear Algebra	BSC	3	1	0	4	4	40	60	100
2.	22PH2101	Basics of Material Science	BSC	2	0	0	2	3	40	60	100
<b>THEORY WITH LAB COMPONENT</b>											
3.	22HE2151	Effective Technical Communication	HSC	2	0	2	3	4	50	50	100

4.	22PH2151	Physics for Circuit Engineering	BSC	2	0	2	3	4	50	50	100
5.	22IT2251	Python programming and Practices	PCC/ICC	2	0	2	3	4	50	50	100
6.	22IT2253	Dynamic Web Design	PCC	2	0	2	2	4	50	50	100
<b>PRACTICAL</b>											
7.	22ME2001	Engineering Practices	ESC	0	0	4	2	2	60	40	100
<b>EEC COURSES (SE/AE)</b>											
8.	22HE2071	Design Thinking	AEC	2	0	0	2	2	100	0	100
9.	22HE2072	Soft Skills and Aptitude 1	SEC	1	0	0	1	1	100	0	100
<b>MANDATORY COURSE</b>											
10.	22MC2094/ 22MC2095	தமிழ்நும் தொழில்நுட்பநும் / Tamils And Technology	MC	2	0	0	1	2	100	0	100
11.	22MC2093	NCC */NSS / YRC / Sports / Clubs / Society Service - Enrollment (Common)	MC	All students shall enroll, on admission, in anyone of the personality and character development programmes and undergo training for about 80 hours							
<b>TOTAL</b>				<b>17</b>	<b>1</b>	<b>14</b>	<b>23</b>	<b>32</b>	<b>640</b>	<b>360</b>	<b>1000</b>

### SEMESTER III

S. No	Course Code	Course Title	Category	L	T	P	C	TCP	CIA	ESE	Total
<b>THEORY</b>											
1.	22MA3101	Applied Statistics and Queuing Theory	BSC	3	1	0	4	4	40	60	100
2.	22IT3201	Data Structures	PCC	3	0	0	3	4	40	60	100
3.	22IT3202	Operating System	PCC	3	0	0	4	4	40	60	100
4.	22IT3203	Digital Principles and Computer Organization	ESC	3	0	0	3	3	40	60	100
<b>THEORY WITH LAB COMPONENT</b>											
5.	22IT3251	Java Programming	PCC	2	0	2	4	4	50	50	100
<b>PRACTICAL</b>											
6.	22IT3001	Operating System Laboratory	PCC	0	0	4	2	4	60	40	100
7.	22IT3002	Digital Principles and Computer Organization Laboratory	ESC	0	0	4	2	4	60	40	100
<b>EEC COURSES (SE/AE)</b>											
8.	22HE3071	Soft Skills -2 (Common)	SEC	1	0	0	1	1	100	0	100
9.	22IT3003	Data Structures Laboratory	AEC	0	0	4	2	4	60	40	100
<b>MANDATORY COURSE</b>											
10.	22MC3191	Essence of Indian Traditional Knowledge	MC	2	0	0	0	2	40	60	100
<b>TOTAL</b>				<b>15</b>	<b>3</b>	<b>14</b>	<b>25</b>	<b>32</b>	<b>490</b>	<b>410</b>	<b>900</b>

**SEMESTER IV**

S. No	Course Code	Course Title	Category	L	T	P	CT	CP	CIA	ESE	Total	
<b>THEORY</b>												
1.	22HE4101	IPR and Start-ups	HSC	2	0	0	2	2	40	60	100	
2.	22IT4201	Design and Analysis of Algorithms	PCC	3	0	0	3	3	40	60	100	
3.	22IT4202	Advanced Java Programming	PCC	3	0	0	3	3	40	60	100	
4.	22IT4203	Operating System	PCC	3	0	0	4	4	40	60	100	
<b>THEORY WITH LAB COMPONENT</b>												
5.	22IT4251	Web Framework	PCC	2	0	2	3	4	50	50	100	
6.	22IT4252	Database Management System	PCC	2	0	2	3	4	50	50	100	
<b>PRACTICAL</b>												
7.	22IT4001	Operating System Laboratory	PCC	0	0	4	2	4	60	40	100	
8.	22IT4002	Advanced Java Laboratory	PCC	0	0	4	2	4	60	40	100	
<b>EEC COURSES (SE/AE)</b>												
9.	22HE4071	Soft Skills -III	SEC	1	0	0	1	1	100	0	100	
<b>MANDATORY COURSE</b>												
10.		Indian Constitution	MC	2	0	0	0	2	40	60	100	
				<b>TOTAL</b>	<b>16</b>	<b>0</b>	<b>12</b>	<b>23</b>	<b>29</b>	<b>480</b>	<b>420</b>	<b>900</b>
<p>* Two weeks internship carries 1 credit and it will be done during Semester III summer vacation and same will be evaluated in Semester IV.                      If students unable to undergo in semester III, then the Internship I offered in the semester IV can be clubbed with Internship II (Total: 4 weeks-2 credits)</p>												

**SEMESTER V**

S. No	Course Code	Course Title	Category	L	T	P	CT	CP	CIA	ESE	Total
<b>THEORY</b>											
1.	22IT5201	Artificial Intelligence & Machine Learning	PCC	3	1	0	4	4	40	60	100
2.	22IT5202	Computer Networks	PCC	3	0	0	3	3	40	60	100
3.	22IT53XX	Professional Elective-1	PEC	3	0	0	3	3	40	60	100
4.	22IT53XX	Professional Elective-2	PEC	3	0	0	3	3	40	60	100
5.	22IT53XX	Professional Elective-3	PEC	3	0	0	3	3	40	60	100
<b>THEORY WITH LAB COMPONENT</b>											
6.	22IT5251	Artificial Intelligence & Machine Learning	PCC/ICC	2	0	2	3	4	50	50	100
<b>PRACTICAL</b>											
7.	22IT5001	Networks Laboratory	PCC	0	0	4	2	4	60	40	100

EEC COURSES (SE/AE)											
8.	22HE5071	Soft Skills -4/ Foreign languages	SEC	1	0	0	1	1	100	0	100
<b>TOTAL</b>				<b>18</b>	<b>1</b>	<b>6</b>	<b>22</b>	<b>25</b>	<b>410</b>	<b>390</b>	<b>800</b>

#### SEMESTER VI

S. No	Course Code	Course Title	Category	L	T	P	C	TCP	CIA	ESE	Total
<b>THEORY</b>											
1.	22IT6201	Foundation of Data Science	PCC	3	0	0	3	3	40	60	100
2.	22HE6101	Professional Ethics	HSC	3	0	0	3	3	40	60	100
3.	22IT63XX	Professional Elective - 4	PEC/ ICC	3	0	0	3	3	40	60	100
4.	22IT63XX	Professional Elective-5	PEC/ ICC	3	0	0	3	3	40	60	100
5.	22XX64XX	Open Elective – 1*	OEC	3	0	0	3	3	40	60	100
6.	22XX64XX	Open Elective – 2*	OEC	3	0	0	3	3	40	60	100
7.	22CY6101	Environmental Science	ESC	2	0	0	2	3	40	60	100
<b>PRACTICAL</b>											
8.	22IT6001	Data Science Laboratory	PCC	0	0	4	2	4	60	40	100
<b>EEC COURSES (SE/AE)</b>											
9.	22HE6071	Soft Skills – 5	SEC	2	0	0	2	2	100	0	100
<b>TOTAL</b>				<b>22</b>	<b>0</b>	<b>4</b>	<b>24</b>	<b>27</b>	<b>440</b>	<b>460</b>	<b>900</b>

#### SEMESTER VII

S. No	Course Code	Course Title	Category	L	T	P	C	TCP	CIA	ESE	Total
<b>THEORY</b>											
1.	22IT7201	Cryptography and Network Security	PCC	3	0	0	3	3	40	60	100
2.	22IT7202	Data Warehousing and Data Mining	PCC	3	1	0	4	4	40	60	100
3.	22IT73XX	Professional Elective-6	PEC	3	0	0	3	3	40	60	100
4.	22XX74XX	Open Elective – 3*	OEC	3	0	0	3	3	40	60	100
5.	22XX74XX	Open Elective – 4*	OEC	3	0	0	3	3	40	60	100
<b>PRACTICAL</b>											
6.	22IT7001	Cryptography and Network Security Laboratory	PCC	0	0	4	2	4	60	40	100
<b>EEC COURSES (SE/AE)</b>											
7.	22IT7701	Internship - II*	SEC	0	0	0	2	2	100	0	100
<b>TOTAL</b>				<b>15</b>	<b>1</b>	<b>4</b>	<b>20</b>	<b>22</b>	<b>360</b>	<b>340</b>	<b>700</b>

\* - Two weeks internship carries 1 credit and it will be done during Semester VI summer vacation/placement training and same will be evaluated in Semester VII.

**SEMESTER VIII**

S. No	Course Code	Course Title	Category	L	T	P	C	TCP	CIA	ESE	Total
<b>EEC COURSES (SE/AE)</b>											
1.	22IT8901	Project Work/Granted Patent	SEC	0	0	20	10	20	100	100	200
<b>TOTAL</b>				<b>0</b>	<b>0</b>	<b>20</b>	<b>10</b>	<b>20</b>	<b>100</b>	<b>100</b>	<b>200</b>

**Note:**

- \*As per the AICTE guideline, in Semesters I, II, III & IV NCC one credit subject is added as Value Added Course with Extra Credit. Further, the students who enrolled his/her name in HICET NCC and Air Wing are eligible to undergo this subject. The earned extra credits printed in the Consolidated Mark sheet as per the regulation.
- NCC course level 1 & Level 2 will be added in the list of open elective subjects in the appropriate semester. Further, the students' who have opted NCC subjects in Semester I, II, III & IV are eligible to undergo NCC Open Elective Subjects.
- The above-mentioned NCC Courses will be offered to the students who are going to be admitted in the Academic Year 2021 – 22.

**OPEN ELECTIVE I AND II (EMERGING TECHNOLOGIES)**

To be offered for the students other than CSE, IT, AI&ML, ECE & BIOMEDICAL

S. NO.	COURSE CODE	COURSE TITLE	CATE GORY	PERIODS PER WEEK			TOTAL CONTACT PERIODS	CREDITS
				L	T	P		
1	22AI6451	Artificial Intelligence and Machine Learning Fundamentals	OEC	2	0	2	4	3
2	22CS6451	Blockchain Technology	OEC	2	0	2	4	3
3	22EC6451	Cyber security	OEC	2	0	2	4	3
4	22EC6452	IoT Concepts and Applications	OEC	2	0	2	4	3
5	22IT6451	Data Science and Analytics	OEC	2	0	2	4	3
6	22BM6451	Augmented and Virtual Reality	OEC	2	0	2	4	3

**OPEN ELECTIVE I AND II**

To be offered for the students other than AUTO, AERO, AGRI, MECH, MCTS, CIVIL, EEE, CHEMICAL, FOOD TECH, E&I

S. NO.	COURSE CODE	COURSE TITLE	CATE GORY	PERIODS PER WEEK			TOTAL CONTACT PERIODS	CREDITS
				L	T	P		
1	22AE6401	Space Science	OEC	3	0	0	3	3
2	22MT6401	Introduction to Industrial Engineering	OEC	3	0	0	3	3
3	22MT6402	Industrial Safety and Environment	OEC	3	0	0	3	3
4	22CE6401	Climate Change and its Impact	OEC	3	0	0	3	3
5	22CE6402	Environment and Social Impact Assessment	OEC	3	0	0	3	3
6	22ME6401	Renewable Energy System	OEC	3	0	0	3	3

7	22ME6402	Additive Manufacturing systems	OEC	3	0	0	3	3
8	22EI6401	Introduction to Industrial Instrumentation and Control	OEC	3	0	0	3	3
9	22EI6402	Graphical Programming using Virtual Instrumentation	OEC	3	0	0	3	3
10	22AU6401	Fundamentals of Automobile Engineering	OEC	3	0	0	3	3
11	22AU6402	Automotive Vehicle Safety	OEC	3	0	0	3	3
12	22EE6401	Digital Marketing	OEC	3	0	0	3	3
13	22EE6402	Research Methodology	OEC	3	0	0	3	3
14	22FT6401	Traditional Foods	OEC	3	0	0	3	3
15	22AG6401	Urban Agriculture and Organic Farming	OEC	3	0	0	3	3
16	22CH6401	Biomass and Biorefinery	OEC	3	0	0	3	3

**Note:** Non-Circuit Departments can add one Open Elective course in the above list to offer for the circuit branches

### OPEN ELECTIVE III

Students shall choose any one of the open elective courses such that the course content or title not belong to their own programme.

(Note: Each programme in our institution is expected to provide one course only)

S. NO.	COURSE CODE	COURSE TITLE	CATE GORY	PERIODS PER WEEK			TOTAL CONTACT PERIODS	CREDITS
				L	T	P		
1	22IT7401	Disaster Management	OEC	3	0	0	3	3

### OPEN ELECTIVE IV

S. NO.	COURSE CODE	COURSE TITLE	CATE GORY	PERIODS PER WEEK			TOTAL CONTACT PERIODS	CREDITS
				L	T	P		
1	22LS7401	General studies for competitive examinations	OEC	3	0	0	3	3
2	22LS7402	Human Rights, Women Rights and Gender equity	OEC	3	0	0	3	3
3	22LS7403	Indian ethos and Human values	OEC	3	0	0	3	3
4	22LS7404	Financial independence and management	OEC	3	0	0	3	3
5	22LS7405	Yoga for Human Excellence	OEC	3	0	0	3	3
6	22LS7406	Democracy and Good Governance	OEC	3	0	0	3	3
7	22LS7407	NCC Level - II	OEC	3	0	0	3	3



**PROFESSIONAL ELECTIVE COURSES: VERTICALS**

Vertical I Data Science	Vertical II Full Stack Development for IT	Vertical III Cloud Computing and Data Centre Technologies	Vertical IV Internet of things	Vertical IV Cyber Security and Data Privacy	Vertical V Creative Media	Vertical VI Emerging Technologies
22IT5301 Exploratory Data Analysis	22IT5304 Cloud Computing	22IT5307 Security and Privacy in Cloud	22IT5310 Fundamentals of IoT & Cloud	22IT5310 Ethical Hacking	22IT5313 Multimedia Data Compression and Storage	22IT5316 Augmented Reality
22IT5302 Recommender Systems	22 IT5305 App Development	22IT5308 Virtualization	22IT5311 IoT Architectures and Protocols	22IT5311 Digital and Mobile Forensics	22IT5314 Multimedia and Animation	22IT5317 Robotic Process Automation
22IT5303 Computer Vision	22IT5306 Cloud Services Management	22IT5309 Stream Processing	22IT5312 Architecting Smart IoT Devices	22IT5312 Social Network Security	22IT5315 Video Creation and Editing	22IT5318 Neural Networks and Deep Learning
22IT6301 Text and Speech Analysis	22IT6303 Dev-ops	22IT6305 Data Warehousing	22IT6307 Fog Computing & Energy Management In IoT Devices	22IT6307 Modern Cryptography	22IT6309 UI and UX Design	22IT6311 Cyber security
22IT6302 Big Data Analytics	22IT6304 Software Testing and Automation	22IT6306 Storage Technologies	22IT6308 IoT cloud and data analytics	22IT6308 Engineering Secure software systems	22IT6310 Digital marketing	22IT6312 Quantum Computing
22IT7301 Image and video analytics	22IT7302 Web Application Security	22IT7303 Software Defined Networks	22IT7304 IOT Security	22IT7304 Network and Information Security	22IT7305 Visual Effects	22IT7306 Cryptocurrency and Block chain Technologies

Students are permitted to choose all Professional Electives from a particular vertical or from different verticals.

**PROFESSIONAL ELECTIVE COURSES: VERTICALS**

**Details of Vertical I: Data Science**

S. NO.	COURSE CODE	COURSE TITLE	CATE GORY	PERIODS PER WEEK			TOTAL CONTACT PERIODS	CREDITS
				L	T	P		
1.	22IT5301	Exploratory Data Analysis	PEC	3	0	0	3	3
2.	22IT5302	Recommender Systems	PEC	3	0	0	3	3
3.	22IT5303	Computer Vision	PEC	3	0	0	3	3
4.	22IT6301	Text and Speech Analysis	PEC	3	0	0	3	3
5.	22IT6302	Big Data Analytics	PEC	3	0	0	3	3
6.	22IT7301	Image and video analytics	PEC	3	0	0	3	3

**Details of Vertical II: Full Stack Development for IT**

S. NO.	COURSE CODE	COURSE TITLE	CATE GORY	PERIODS PER WEEK			TOTAL CONTACT PERIODS	CREDITS
				L	T	P		
1.	22IT5304	Cloud Computing	PEC	3	0	0	3	3
2.	22IT5305	App Development	PEC	3	0	0	3	3
3.	22IT5306	Cloud ServicesManagement	PEC	3	0	0	3	3
4.	22IT6303	Dev-ops	PEC	3	0	0	3	3
5.	22IT6304	Software Testing and Automation	PEC	3	0	0	3	3
6.	22IT7302	Web Application Security	PEC	3	0	0	3	3

**Details of Vertical III: Cloud Computing and Data Centre Technologies**

S. NO.	COURSE CODE	COURSE TITLE	CATE GORY	PERIODS PER WEEK			TOTAL CONTACT PERIODS	CREDITS
				L	T	P		
1.	22IT5307	Security and Privacy inCloud	PEC	3	0	0	3	3
2.	22IT5308	Virtualization	PEC	3	0	0	3	3
3.	22IT5309	Stream Processing	PEC	3	0	0	3	3
4.	22IT6305	Data Warehousing	PEC	3	0	0	3	3
5.	22IT6306	Storage Technologies	PEC	3	0	0	3	3
6.	22IT7303	Software Defined Networks	PEC	3	0	0	3	3

**Details of Vertical IV: Internet of Things**

S. NO.	COURSE CODE	COURSE TITLE	CATE GORY	PERIODS PER WEEK			TOTAL CONTACT PERIODS	CREDITS
				L	T	P		
1.	22IT5310	Fundamentals of IoT & Cloud	PEC	3	0	0	3	3
2.	22IT5311	IoT Architectures and Protocols	PEC	3	0	0	3	3
3.	22IT5312	Architecting Smart IoT Devices	PEC	3	0	0	3	3
4.	22IT6307	Fog Computing & Energy Management In Iot Devices	PEC	3	0	0	3	3
5.	22IT6308	IoT cloud and data analytics	PEC	3	0	0	3	3
6.	22IT7304	IOT Security	PEC	3	0	0	3	3

### Details of Vertical V: Creative Media

S. NO.	COURSE CODE	COURSE TITLE	CATEGORY	PERIODS PER WEEK			TOTAL CONTACT PERIODS	CREDITS
				L	T	P		
1.	22IT5313	Multimedia Data Compression and Storage	PEC	3	0	0	3	3
2.	22IT5314	Multimedia and Animation	PEC	3	0	0	3	3
3.	22IT5315	Video Creation and Editing	PEC	3	0	0	3	3
4.	22IT6309	UI and UX Design	PEC	3	0	0	3	3
5.	22IT6310	Digital marketing	PEC	3	0	0	3	3
6.	22IT7305	Visual Effects	PEC	3	0	0	3	3

### Details of Vertical VI: Emerging Technologies

S. NO.	COURSE CODE	COURSE TITLE	CATEGORY	PERIODS PER WEEK			TOTAL CONTACT PERIODS	CREDITS
				L	T	P		
1.	22IT5316	Augmented Reality	PEC	3	0	0	3	3
2.	22IT5317	Robotic Process Automation	PEC	3	0	0	3	3
3.	22IT5318	Cognitive Science and Deep Learning	PEC	3	0	0	3	3
4.	22IT6311	Cyber security	PEC	3	0	0	3	3
5.	22IT6312	Quantum Computing	PEC	3	0	0	3	3
6.	22IT7306	Cryptocurrency and Blockchain Technologies	PEC	3	0	0	3	3

#### Enrollment for B.E. / B. TECH. (HONOURS) / Minor Degree (optional)

A student can also optionally register for additional courses (18 credits) and become eligible for the award of B.E. / B. Tech. (Honours) or Minor Degree. For B.E. / B. Tech. (Honours), a student shall register for the additional courses (18 credits) from semester V onwards. These courses shall be from the same vertical or a combination of different verticals of the same programme of study only. For minor degree, a student shall register for the additional courses (18 credits) from semester V onwards. All these courses have to be in a particular vertical from any one of the other programmes.

Clause 4.10 of Regulation 2022 is applicable for the Enrolment of B.E. / B. TECH. (HONOURS) / Minor Degree (Optional).

#### VERTICALS FOR MINOR DEGREE

- Heads are requested to provide one vertical from their program to offer for other program students to register for additional courses (18 Credits) to become eligible for the B.E./B.Tech. Minor Degree.

Note: Each programme should provide verticals for minor degree

S. NO.	COURSE CODE	COURSE TITLE	CATEGORY	PERIODS PER WEEK			TOTAL CONTACT PERIODS	CREDITS
				L	T	P		
1.	22IT5601	Sem 5: Introduction to Database System	MDC	3	0	0	3	3
2.	22IT6601	Sem 6: Fundamentals of Data Science	MDC	3	0	0	3	3
3.	22IT6602	Sem 6: Artificial Intelligence and Expert Systems	MDC	3	0	0	3	3
4.	22IT7601	Sem 7: Data Exploration and Visualization	MDC	3	0	0	3	3
5.	22IT7602	Sem 7: Business Intelligence	MDC	3	0	0	3	3
6.	22IT8601	Sem 8: Cyber Security	MDC	3	0	0	3	3

\*MDC – Minor Degree Course

In addition to the above the following additional courses for Minor Degree can also be given to the student's common to all the branches.

Vertical I Fintech and Block Chain	Vertical II Entrepreneurship	Vertical III Environment and Sustainability
Financial Management	Foundations of Entrepreneurship	Sustainable infrastructure Development
Fundamentals of Investment	Team Building & Leadership Management for Business	Sustainable Agriculture and Environmental Management
Banking, Financial Services and Insurance	Creativity & Innovation in Entrepreneurship	Sustainable Bio Materials
Introduction to Blockchain and its Applications	Principles of Marketing Management for Business	Materials for Energy Sustainability
Fintech Personal Finance and Payments	Human Resource Management for Entrepreneurs	Green Technology
Introduction to Fintech	Financing New Business Ventures	Environmental Quality Monitoring and Analysis

### B Tech (Hons) Information Technology with Specialization in Artificial Intelligence and Machine Learning

S.No.	Course Code	Course Title	Category	Periods per Week				TCP	CIA	ESE	Total
				L	T	P	C				
1.	22IT5203	Foundations of Machine Learning	PC	3	0	0	3	4	40	60	100

2.	22IT6203	Knowledge Engineering	PC	3	0	0	3	4	40	60	100
3.	22IT6204	Soft Computing	PC	3	0	0	3	4	40	60	100
4.	22IT7203	Optimization Techniques	PC	3	0	0	3	4	40	60	100
5.	22IT7204	Deep Learning	PC	3	0	0	3	4	40	60	100
6.	22IT8201	Game theory	PC	3	0	0	3	4	40	60	100

### B Tech (Hons) Information Technology with Specialization in Cyber Security

S.No.	Course Code	Course Title	Category	Periods per Week				TCP	CIA	ESE	Total
				L	T	P	C				
1.	22IT5204	Ethical Hacking	PC	3	0	0	3	3	40	60	100
2.	22IT6205	Digital and Mobile Forensics	PC	3	0	0	3	3	40	60	100
3.	22IT6206	Social Network Security	PC	3	0	0	3	3	40	60	100
4.	22IT7206	Engineering Secure Software Systems	PC	3	0	0	3	3	40	60	100
5.	22IT7207	Cryptocurrency and Blockchain Technologies	PC	3	0	0	3	3	40	60	100
6.	22IT8202	Network Security	PC	3	0	0	3	3	40	60	100

### B Tech (Hons) Information Technology with Specialization in BlockChain Technology

S.No.	Course Code	Course Title	Category	Periods per Week				TCP	CIA	ESE	Total
				L	T	P	C				
1.	22IT5205	Fundamentals of Blockchain Technology	PC	3	0	0	3	3	40	60	100
2.	22IT6207	Blockchain Architecture and Design	PC	3	0	0	3	3	40	60	100
3.	22IT6208	Building Private Blockchain	PC	3	0	0	3	3	40	60	100
4.	22IT7208	Blockchain Business Models	PC	3	0	0	3	3	40	60	100
5.	22IT7209	Blockchain and IoT	PC	3	0	0	3	3	40	60	100
6.	22IT8203	Blockchain and AI	PC	3	0	0	3	3	40	60	100

Note: Each programme should provide verticals for Honours degree

**SEMESTER-WISE CREDIT DISTRIBUTION**

<b>B.E. / B.TECH. PROGRAMMES</b>										
<b>S.No.</b>	<b>Course Area</b>	<b>Credits per Semester</b>								<b>Total Credits</b>
		<b>I</b>	<b>II</b>	<b>III</b>	<b>IV</b>	<b>V</b>	<b>VI</b>	<b>VII</b>	<b>VIII</b>	
1	HSC	3	3	-	2	-	3	-	-	11
2	BSC	7	9	4	-	-	-	-	-	23
3	ESC	6	2	5	-	-	2	-	-	15
4	PCC	-	5	13	20	12	5	9	-	61
5	PEC	-	-	-	-	9	6	3	-	18
6	OEC	-	-	-	-	-	6	6	-	12
7	EEC	3	3	3	1	1	2	2	10	25
8	MCC	✓	✓	-	-	-	-	-	-	-
<b>Total</b>		<b>19</b>	<b>22</b>	<b>25</b>	<b>23</b>	<b>22</b>	<b>24</b>	<b>20</b>	<b>10</b>	<b>165</b>

**CREDIT DISTRIBUTION R2022**

<b>Semester</b>	<b>I</b>	<b>II</b>	<b>III</b>	<b>IV</b>	<b>V</b>	<b>VI</b>	<b>VII</b>	<b>VIII</b>	<b>Total</b>
<b>Credits</b>	19	22	25	23	22	24	20	10	165

*M. S. Babu*  
**Chairman BoS**  
**Chairman - BoS**  
**IT - HICET**

*[Signature]*  
**Dean Academics**  
**Dean (Academics)**  
**HICET**

*[Signature]*  
**Principal**



**SYLLABUS REVISION DETAILS FOR THE REGULATION 22 – ACADEMIC YEAR 2023-24 ODD SEMESTER**

S.NO	COURSE CODE/COURSE NAME	SUGGESTION BY EXPERTS	EXISTING CONTENT ( IN THE AY2022-23 ODD)	REVISED CONTENT( FOR AY 2023-24 ODD)	TYPE OF REVISION DELETION/ NSERTION/ MODIFICAT ION	PERCENT AGE OF REVISION
1	22HE1151 - ENGLISH FOR ENGINEERS	All units for odd sem and even sem syllabi must include reading parts.	<p><b>UNIT –I</b> <b>Language Proficiency:</b> Types of Sentences, Functional Units, Framing question. <b>Writing:</b> process description, Writing Checklist. <b>Vocabulary</b> – words on environment. <b>Practical Component: Listening-</b> Watching short videos and answer the questions, <b>Speaking-</b> Self introduction ,formal &amp; semi-formal</p> <p><b>UNIT –II</b> <b>Language Proficiency:</b> Tenses, Adjectives and adverbs. <b>Writing:</b> Formal letters (letters conveying positive and negative news), Formal and informal email writing (using emoticons, abbreviations&amp; acronyms), reading comprehension. <b>Vocabulary</b>– words on entertainment. <b>Practical Component: Listening-</b>Comprehensions based on TED talks<b>Speaking-</b> Narrating a short story or an event happened in their life</p>	<p><b>UNIT –I</b> <b>Language Proficiency:</b> Types of Sentences, Functional Units, Framing question. <b>Writing:</b> process description, Writing Checklist. <b>Vocabulary</b> – words on environment. <b>Practical Component: Listening-</b> Watching short videos and answer the questions, <b>Speaking-</b> Self introduction ,formal &amp; semi-formal,<b>Reading-</b> Purpose of Reading - Churning &amp; Assimilation, Interpreting Ideas - Interpreting Graphs in <i>Technical Writing</i>.</p> <p><b>UNIT –II</b> <b>Language Proficiency:</b> Tenses, Adjectives and adverbs. <b>Writing:</b> Formal letters (letters conveying positive and negative news), Formal and informal email writing (using emoticons, abbreviations&amp; acronyms), reading comprehension. <b>Vocabulary</b>– words on entertainment. <b>Practical Component: Listening-</b>Comprehensions based on TED talks<b>Speaking-</b> Narrating a short story or an event happened in their life <b>Reading</b> - Skimming – Scanning –</p>	Reading components added in each unit.	20%

**SYLLABUS REVISION DETAILS FOR THE REGULATION 22 – ACADEMIC YEAR 2023-24 ODD SEMESTER**

22HE1151 - ENGLISH FOR ENGINEERS			Reading: Scientific Texts – Literary Texts .		
	<b>UNIT –III</b> <b>Language Proficiency:</b> Prepositions, phrasal verbs. <b>Writing:</b> Formal thanks giving, Congratulating, warning and apologizing letters, cloze test. <b>Vocabulary</b> – words on tools. <b>Practical Component: Listening-</b> Listen to songs and answer the questions <b>Speaking-</b> Just a minute		<b>UNIT –III</b> <b>Language Proficiency:</b> Prepositions, phrasal verbs. <b>Writing:</b> Formal thanks giving, Congratulating, warning and apologizing letters, cloze test. <b>Vocabulary</b> – words on tools. <b>Practical Component: Listening-</b> Listen to songs and answer the questions <b>Speaking-</b> Just a minute <b>Reading-</b> Reading feature articles (from newspapers and magazines) -Reading to identify point of view and perspective (opinion pieces, editorials etc.)		
	<b>UNIT –IV</b> <b>Language Proficiency:</b> Subject verb concord, Prefixes & suffixes. <b>Writing:</b> Preparing agenda & minutes, writing an event report. <b>Vocabulary</b> – words on engineering process. <b>Practical Component: Listening-</b> Comprehensions based on Talk of orators or interview shows <b>Speaking-</b> Presentation on a general topic with ppt.		<b>UNIT –IV</b> <b>Language Proficiency:</b> Subject verb concord, Prefixes & suffixes. <b>Writing:</b> Preparing agenda & minutes, writing an event report. <b>Vocabulary</b> – words on engineering process. <b>Practical Component: Listening-</b> Comprehensions based on Talk of orators or interview shows <b>Speaking-</b> Presentation on a general topic with ppt. <b>Reading-</b> Reading Comprehension - Techniques for Good Comprehension - - Sequencing of Sentences.		
<b>UNIT –IV</b> <b>Language Proficiency:</b> Modal Auxiliaries, Active & passive voice, <b>Writing:</b> Project report (proposal & progress) ,sequencing of sentences <b>Vocabulary</b> –words on engineering		<b>UNIT V</b> <b>Language Proficiency:</b> Modal Auxiliaries, Active & passive voice, <b>Writing:</b> Project report (proposal & progress) ,sequencing of sentences			





**Hindusthan College of Engineering and Technology**  
(An Autonomous Institution, Affiliated to Anna University, Chennai  
Approved by AICTE, New Delhi & Accredited by NAAC with 'A' Grade)  
Valley Campus, Pollachi Highways, Coimbatore, Tamilnadu.



**SYLLABUS REVISION DETAILS FOR THE REGULATION 22 – ACADEMIC YEAR 2023-24 ODD SEMESTER**

	<b>22HE1151 - ENGLISH FOR ENGINEERS</b>		material <b>Practical Component: Listening-</b> Listening-Comprehensions based on Nat Geo/Discovery channel videos <b>Speaking-</b> Preparing posters and presenting as a team.	<b>Vocabulary</b> –words on engineering material <b>Practical Component: Listening-</b> Listening- Comprehensions based on Nat Geo/Discovery channel videos <b>Speaking-</b> Preparing posters and presenting as a team. <b>Reading-</b> Biographies, travelogues, technical blogs.		
--	-----------------------------------------	--	------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------	-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------	--	--

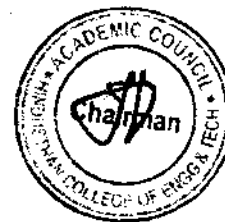
  
**Chairman BoS**

Chairman - BoS  
IT - HICET

  
**Dean Academics**

**Dean (Academics)**  
**HICET**

  
**Principal**



67

# **SYLLABUS**



**SEMESTER I**

Programme	Course Code	Name of the Course	L	T	P	C
B.Tech IT	22MA1101	<b>MATRICES AND CALCULUS</b> (Common to all Branches)	3	1	0	4

- Course Objective
1. Construct the characteristic polynomial of a matrix and use it to identify eigenvalues and Eigenvectors
  2. To impart the knowledge of sequences and series.
  3. Analyse and discuss the maxima and minima of the functions of several variables.
  4. Evaluate the multiple integrals and apply in solving problems.
  5. Apply vector differential operator for vector function and theorems to solve engineering problems.

Unit	Description	Instructional Hours
<b>Matrices</b>		
I	Eigen values and Eigen vectors – Properties of Eigen values and Eigen vectors (without proof) - Cayley - Hamilton Theorem (excluding proof) - Reduction of a quadratic form to canonical form by orthogonal transformation.	12
<b>Single Variate Calculus</b>		
II	Rolle's Theorem–Lagrange's Mean Value Theorem–Maxima and Minima–Taylor's and Maclaurin's Series.	12
<b>Functions of Several Variables</b>		
III	Partial derivatives–Total derivative, Jacobian, Maxima, minima and saddle points; Method of Lagrange multipliers.	12
<b>Integral Calculus</b>		
IV	Double integrals in Cartesian coordinates–Area enclosed by plane curves (excluding surface area)– Triple integrals in Cartesian co-ordinates – Volume of solids (Sphere, Ellipsoid, Tetrahedron) using Cartesian co-ordinates.	12
<b>Vector Calculus</b>		
V	Gradient, divergence and curl; Green's theorem, Stoke's and Gauss divergence theorem(statement only) for cubes only.	12
<b>Total Instructional Hours</b>		<b>60</b>

- Course Outcome
- CO1: Compute Eigen values and Eigen vectors of the given matrix and transform given quadratic form into canonical form.
- CO2: Apply the concept of differentiation to identify the maximum and minimum values of curve.
- CO3: Compute partial derivatives of function of several variables and write Taylor's series for functions with two variables.
- CO4: Evaluate multiple integral and its applications in finding area, volume.
- CO5: Apply the concept of vector calculus in two and three-dimensional spaces.

**TEXTBOOKS:**

- T1: G.B. Thomas and R.L. Finney, "Calculus and Analytical Geometry", 9<sup>th</sup> Edition Addison Wesley Publishing company, 2016.
- T2: Erwin Kreyszig, "Advanced Engineering Mathematics", John Wiley & Sons, 2019.
- T3: K.P. Uma and S. Padma, "Engineering Mathematics I (Matrices and Calculus)", Pearson Ltd, 2022.

**REFERENCE BOOKS:**

- R1 - Jerrold E. Marsden, Anthony Tromba, "Vector Calculus", W.H. Freeman, 2003
- R2 - Strauss M.J, G.L. Bradley and K.J. Smith, "Multi variable calculus", Prentice Hall, 2002.
- R3 - Veerarajan T, "Engineering Mathematics", McGraw Hill Education (India) Pvt Ltd, New Delhi, 2016.



*M. Sabarwal*  
 Chairman, Board of Studies  
 Chairman - BOS  
 IT - HICET

*[Signature]*  
 Dean - Academics  
 Dean (Academics)  
 HICET

- Course Objective
1. To improve the communicative proficiency of learners
  2. To help learners use language effectively in professional writing
  3. To advance the skill of maintaining the suitable to of communication.
  4. To introduce the professional life skills.
  5. To impart official communication etiquette.

Unit	Description	Instructional Hours
I	<p><b>Language Proficiency:</b> Types of Sentences, Functional Units, Framing question.  <b>Writing:</b> process description, Writing Checklist.</p> <p><b>Vocabulary</b> – words on environment.  <b>Practical Component: Listening-</b> Watching short videos and answer the questions,  <b>Reading-</b> Purpose of Reading - Churning &amp; Assimilation, Interpreting Ideas - Interpreting Graphs in Technical Writing.  <b>Language Proficiency:</b> Tenses, Adjectives and adverbs.  <b>Writing:</b> Formal letters (letters conveying positive and negative news), Formal and informal email writing (using emoticons, abbreviations&amp; acronyms), reading comprehension.</p>	7+2
II	<p><b>Vocabulary</b>– words on entertainment.  <b>Practical Component: Listening-</b>Comprehensions based on TED talks  <b>Speaking-</b> Narrating a short story or an event happened in their life  <b>Reading -</b> Skimming – Scanning – Reading: Scientific Texts – Literary Texts  <b>Language Proficiency:</b> Prepositions, phrasal verbs.  <b>Writing:</b> Formal thanks giving, Congratulating, warning and apologizing letters, cloze test.</p>	7+2
III	<p><b>Vocabulary</b> – words on tools.  <b>Practical Component: Listening-</b>Listen to songs and answer the questions  <b>Speaking-</b>Just a minute  <b>Reading-</b> Reading feature articles (from newspapers and magazines) -Reading to identify point of view and perspective (opinion pieces, editorials etc.)  <b>Language Proficiency:</b> Subject verb concord, Prefixes &amp; suffixes.  <b>Writing:</b> Preparing agenda &amp;minutes, writing an event report.</p>	5+4
IV	<p><b>Vocabulary</b>– words on engineering process.  <b>Practical Component: Listening-</b> Comprehensions based on Talk of orators or interview shows  <b>Speaking-</b>Presentation on a general topic with ppt.  <b>Reading-</b> Reading Comprehension - Techniques for Good Comprehension - - Sequencing of Sentences.  <b>Language Proficiency:</b> Modal Auxiliaries, Active &amp; passive voice,  <b>Writing:</b> Project report(proposal &amp; progress),sequencing of sentences</p>	5+4
V	<p><b>Vocabulary</b>–words on engineering material.  <b>Practical Component: Listening-</b> Listening- Comprehensions base on Nat Geo/Discoverychannel videos  <b>Speaking-</b> Preparing posters and presenting as a team.  <b>Reading-</b> Biographies, travelogues, technical blogs.</p>	6+3
<b>Total Instructional Hours</b>		<b>45</b>

Course Outcome

CO1: To communicate in a professional forum  
CO2: To speak or write a content in the proficient language  
CO3: To maintain and use appropriate tone of the communication.  
CO4: To read, write and present in a professional way.  
CO5: To follow the etiquettes informal communication.

  
Chairman, Board of Studies

**Chairman - BoS  
IT - HICET**



3

  
Dean-Academics

**Dean (Academics)  
HICET**

**TEXT BOOKS:**

T1- Norman Whit by, "Business Benchmark - Pre - intermediate to Intermediate", Cambridge University Press, 2016.

T2- Raymond Murphy, "Essential English Grammar", Cambridge University Press, 2019.

**REFERENCE BOOKS:**

R1- Meenakshi Raman and Sangeetha Sharma. "Technical Communication- Principles and Practice", Oxford University Press, 2009

R2- Raymond Murphy, "English Grammar in Use"-4<sup>th</sup> edition Cambridge University Press, 2004.

R3- Kamalesh Sadanan "A Foundation Course for the Speakers of Tamil-Part-I & II", Orient Blackswan, 2010.



*Mr. Soban*  
Chairman, Board of Studies

**Chairman - BoS  
IT - HICET**

*[Signature]*  
Dean - Academics

**Dean (Academics)  
HICET**

Programme	Course Code	Name of the Course	L	T	P	C
B.Tech IT	22CY1151	CHEMISTRY FOR CIRCUIT ENGINEERING (ECE, EEE, EIE, BME, CSE, IT, AIML)	2	0	2	3

The learner should be able to

Course Objective

1. Acquire knowledge on the concepts of chemistry involved in day today life.
2. Identify the water related problems and water treatment techniques.
3. Enhance the fundamental knowledge on electro chemistry and the mechanism of corrosion and its control.
4. Gain knowledge on the nuclear energy source and batteries.
5. Extend the knowledge on the concepts of spectroscopy and its applications.

Unit

Description

Instructional Hours

I	<b>CHEMISTRY IN EVERYDAY LIFE</b> Chemicals in food – Food colors – Artificial sweeteners – Food preservatives. Soaps and Detergents – Soaps – Types of Soap – Detergents – Types of detergents. Drugs – Classification of drugs - Therapeutic Action of Different Classes of Drugs. Chemicals in Cosmetics – Creams – Talcum powders- Deodorants – Perfumes. Plastics – Thermoplastics- Preparation, properties and uses of PVC, Teflon and Thermo setting plastics - Preparation, properties and uses of Polyester and Polyurethane.	6
II	<b>WATER TECHNOLOGY</b> Impurities in Water, Hardness of Water, Boiler feed Water – Boiler troubles -Sludge and scale formation, Caustic embrittlement, priming and foaming, boiler corrosion- -Softening Methods (Zeolite & Ion-Exchange Methods)- Desalination of Brackish Water - Reverse Osmosis, Potable water and treatment. Estimation of total, permanent and temporary hardness of water by EDTA. Determination of Dissolved Oxygen in sewage water by Winkler's method. Estimation of alkalinity of water sample by indicator method.	6+9=15
III	<b>ELECTROCHEMISTRY AND CORROSION</b> Electro chemical cells – reversible and irreversible cells - EMF- Single electrode potential – Nernst equation (derivation only) – Conductometric titrations. Chemical corrosion – Pilling – Bedworth rule – electro chemical corrosion – different types –galvanic corrosion – differential aeration corrosion – corrosion control – sacrificial anode and impressed cathodic current methods. Conductometric titration of strong acid vs strong base (HClvsNaOH). Estimation of Ferrous iron by Potentiometry.	6+6= 12
IV	<b>ENERGY SOURCES AND STORAGE DEVICES</b> Introduction- nuclear energy- nuclear fission- controlled nuclear fission- nuclear fusion differences between nuclear fission and fusion- nuclear chain reactions- nuclear reactor power generator- classification of nuclear reactor- light water reactor- breeder reactor. Batteries and fuel cells: Types of batteries- alkaline battery- lead storage battery- lithium ion battery- fuel cell H <sub>2</sub> -O <sub>2</sub> fuel cell applications.	6
V	<b>SPECTROSCOPY</b> Beer-Lambert's law – UV-visible spectroscopy and IR spectroscopy – principles – instrumentation (block diagram only) - applications – flame photometry – principle – instrumentation (block diagram only) – estimation of sodium by flame photometry – atomic absorption spectroscopy – principles – instrumentation (block diagram only) – Estimation of nickel by atomic absorption spectroscopy.	6
<b>Total Instructional Hours</b>		<b>45</b>

At the end of the course, the learner will be able to

Course Outcome

- CO1: List out the chemicals used in food, soaps and detergents, drugs, cosmetics and plastics  
CO2: Differentiate hard and soft water and solve the related problems on water purification in domestic as well as in industries.  
CO3: Develop knowledge on the basic principles of electro chemistry and understand the causes of corrosion, its consequences to minimize corrosion to improve industrial design  
CO4: Develop knowledge about the renewable energy resources and batteries along with the need of new materials to improve energy storage capabilities  
CO5: List out the applications of spectroscopic techniques in various engineering fields.

#### TEXT BOOKS

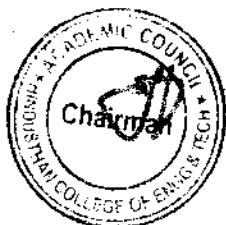
- T1 - P.C.Jain& Monica Jain, "Engineering Chemistry" Dhanpat Rai Pub, Co., New Delhi (2018).  
T2 -O.G.Palanna, "Engineering chemistry" McGraw Hill Education India (2017).

#### REFERENCE BOOKS:

- R1 - Shikha Agarwal "Engineering Chemistry -Fundamentals and Applications, Cambridge University Press, Delhi, 2019  
R2 - S.S.Dara "A Text book of Engineering Chemistry" S.Chand& Co. Ltd., New Delhi (2018).

Chairman, Board of Studies

Chairman - BoS  
IT - HICET



Dean Academics

Dean (Academics)  
HiCET



Programme / Semester	Course Code	Name of the Course	L	T	P	C
B.E. / B. TECH	22CS1151	PROBLEM SOLVING USING C PROGRAMMING	2	0	2	3

- Course Objective**
- The learner should be able to
1. To develop simple algorithms for arithmetic and logical problems.
  2. To understand and implement the fundamental concepts in a program.
  3. To enable how to implement conditional branching, iteration and recursion.
  4. To understand how to decompose a problem into functions and synthesize a complete program and to enable them to use arrays, pointers, strings and structures in solving problems.
  5. To understand the use files to perform read and write operations

Unit	Description	Instructional Hours
------	-------------	---------------------

### INTRODUCTION TO COMPUTERS

- |   |                                                                                                                                                                                         |   |
|---|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---|
| I | Computer Systems – Computing Environments – Computer Language – Creating and Running programs – Computer Numbering System – Storing Integers and Real Numbers – Algorithms - Flowchart. | 7 |
|---|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---|

### INTRODUCTION TO C LANGUAGE

Character set - C Tokens, Identifiers and Keywords - Constants, Variables - Data types – Text Input / Output – Operators - Expressions – Precedence and Associativity – Evaluating Expressions – Type Conversions.

*Illustrative program: 1) Josh went to the market to buy N apples. He found two shops, shop A and B, where apples were being sold in lots. He can buy any number of the complete lot(s) but not loose apples. He is confused with the price and wants you to figure out the minimum cost to buy exactly N apples. Write an algorithm for Josh to calculate the minimum cost to buy exactly N apples.*

**Input Format:**

- |    |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |     |
|----|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----|
| II | <ul style="list-style-type: none"> <li>• The first line of the input consists of an integer – N, representing the total number of apples that Josh wants to buy.</li> <li>• The second line consists of two space-separated positive integers – M1 and P1, representing the number of apples in a lot and the lot's price at shop A, respectively.</li> <li>• The third line consists of two space-separated positive integers-M2 and P2, representing the number of apples in a lot and lot's price at shop B, respectively.</li> </ul> | 6+4 |
|----|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----|

**Output Format:**

Print a positive integer representing the minimum price at which Josh can buy the apples.  
 2) Chaman planned to choose a four-digit lucky number for his car. His lucky numbers are 3, 5 and 7. Help him find the number, whose sum is divisible by 3 or 5 or 7. Provide a valid car number, fails to provide a valid input then display that number is not a valid car number.  
 Note: The input other than 4 digit positive number [includes negative and 0] is considered as invalid.

### DECISION MAKING, ARRAYS, STRINGS AND POINTERS

- |     |                                                                                                                                                                                                                                                                                    |     |
|-----|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----|
| III | Two-way selection – Multi-way selection – Concept of a Loop – Pre-test and Post-test Loops – Initialization and Updating – Controlled Loops – Other Statements Related to Looping – Looping Application - Arrays - Strings - Pointers – Pointer Applications – Processor Commands. | 6+4 |
|-----|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----|

*Illustrative program: 1) You are playing an online game. In the game, a list of N numbers is given. The player has to arrange the numbers so that all the odd numbers of the list come after the even numbers. Write an algorithm to arrange the given list such that all the odd numbers of the list come after the even numbers.*

**Input**

*M. Sabaraj*  
Chairman, Board of Studies

Chairman - BoS  
IT - HICET



*[Signature]*  
Dean Academics

Dean (Academics)  
HICET

- The first line of the input consists of an integer number, representing the size of the list(N).
- The second line of the input consists of N space-separated integers representing the values of the list

**Output**

Print N space-separated integers such that all the odd numbers of the list come after the even numbers

2) Given an integer matrix of size N x N. Traverse it in a spiral form.

**Input:**

The first line contains N, which represents the number of rows and columns of a matrix. The next N lines contain N values, each representing the values of the matrix.

**Output:**

A single line containing integers with space, representing the desired traversal. Constraints:  $0 < N < 500$

3) A digital machine generates binary data which consists of a string of 0s and 1s. A maximum signal M, in the data, consists of the maximum number of either 1s or 0s appearing consecutively in the data but M can't be at the beginning or end of the string. Design a way to find the length of the maximum signal.

**Input**

The first line of the input consists of an integer N, representing the length of the binary string. The second line consists of a string of length N consisting of 0s and 1s only.

**Output**

Print an integer representing the length of the maximum signal.

4) Given a string S(input consisting) of '\*' and '#'. The length of the string is variable. The task is to find the minimum number of '\*' or '#' to make it a valid string. The string is considered valid if the number of '\*' and '#' are equal. The '\*' and '#' can be at any position in the string.

Note : The output will be a positive or negative integer based on number of '\*' and '#' in the input string.

(\*>#): positive integer

(#>\*): negative integer

(#=\*): 0

**FUNCTIONS, STRUCTURES AND UNION**

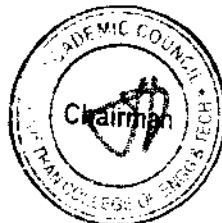
Designing Structured Programs – Functions in C – User defined functions – Inter-Function Communication – Standard Function – Passing Arrays to Functions – Passing Pointers to Function – Recursion – Passing an array to a function – typedef – Enumerated types - Structure – Union – Programming Application.

*Illustrative program:* 1) The Caesar cipher is a type of substitution cipher in which each alphabet in the plaintext or messages is shifted by a number of places down the alphabet. For example, with a shift of 1, P would be replaced by Q, Q would become R, and so on. To pass an encrypted message from one person to another, it is first necessary that both parties have the 'Key' for the cipher, so that the sender may encrypt and the receiver may decrypt it. Key is the number of OFFSET to shift the cipher alphabet. Key can have basic shifts from 1 to 25 positions as there are 26 total alphabets. As we are designing custom Caesar Cipher, in addition to alphabets, we are considering numeric digits from 0 to 9. Digits can also be shifted by key places. For Example, if a given plain text contains any digit with values 5 and key = 2, then 5 will be replaced by 7, "-" (minus sign) will remain as it is. Key value less than 0 should result into "INVALID INPUT". Write a function CustomCaesarCipher(int key, String message) which will accept plaintext and key as input parameters and returns its cipher text as output.

IV

5+4

Enter your PlainText: All the best  
Enter the Key: 1  
The encrypted Text is: BmmuifCftu



*[Signature]*  
Chairman, Board of Studies  
**Chairman - BoS**  
**IT - HICET**

*[Signature]*  
Dean - Academics  
**Dean (Academics)**  
**HICET**

## BINARY INPUT / OUTPUT

- V Defining and Opening a file, closing a file - input/output operations on files - error handling during I/O operations - random access to files - Text versus Binary Streams – Standard Library Functions for Files – Converting File type. 6+3

*Illustrative program: 1) Write a C Program to merge contents of two files into a third file. 2) Write a program in C to delete a specific line from a file.*

### Course Outcome

- At the end of the course, the learner will be able to
- CO1: Develop simple algorithms for arithmetic and logical problems.
  - CO2: Test and execute the programs and correct syntax and logical errors.
  - CO3: Implement conditional branching, iteration and recursion.
  - CO4: Decompose a problem into functions and synthesize a complete program and use arrays, pointers, strings and structures to formulate algorithms and programs.
  - CO5: Use files to perform read and write operations.

### TEXT BOOKS:

- T1: Behrouz A. Forouzan, Richard F. Gilberg, J. Jaya, S. Shankar, I. Jasmine Selvakumari Jeya, M. Ramya Devi, "Computer Programming in C", Cengage Learning, 2022.  
T2: Byron Gottfried, "Programming with C", Schaum's Outlines Series, McGraw Hill Education, 3<sup>rd</sup> edition, 2017.

### REFERENCE BOOKS:

- R1: Schildt Herbert, "C: The Complete Reference", Tata McGraw Hill Education, 4<sup>th</sup> edition, 2014.  
R2: R. S. Bichkar, "Programming with C", Universities Press, 2<sup>nd</sup> edition 2012.  
R3: YashvantKanetkar, "Exploring C", BPB Publishers, 2<sup>nd</sup> edition, 2003.  
R4: W. Kernighan Brian, Dennis M. Ritchie, "The C Programming Language", PHI Learning, 2<sup>nd</sup> edition, 1988

  
Chairman, Board of Studies

**Chairman - BoS  
IT - HiCET**



8

  
Dean - Academics

**Dean (Academics)  
HiCET**

Programme	Course Code	Name of the Course	L	T	P	C
B TECH IT	22IT1152	INTRODUCTION TO WEB APPLICATION DEVELOPMENT	2	0	2	3

- Course Objective**
- To discuss the essence of software development methods
  - To gain knowledge about basic HTML Tags.
  - To create static websites using HTML.
  - To impart knowledge about Cascading Style sheet.
  - To design a front end web application using HTML and CSS

Unit	Description	Instructional Hours
I	<b>Unit-1 Software Development Life Cycle</b> Software Development Model -Waterfall Model- Incremental Process Models- Evolutionary Process Models- Spiral Model-Agile Software Development –Agile process-Agility principles-Introduction Github.	5
II	<b>Unit-2 Hyper Text Markup Language-I</b> Web Essentials: Clients, Servers, Basic Terminologies-HTML Basic Tags – Elements - Attributes - Basic Formatting, Fonts and Colors-Hyperlink-Images- Tables - cell spanning, cell spacing- Table contents, Border. List –ordered List-Unordered List-Definition List. <b>Illustrative problems:</b> Designing a web page using HTML basic tags, Developing web site with suitable contents and links, Designing web pages using lists and tables, Designing a web page using images and embed an image map in a web page	(6+4)
III	<b>Unit-3 Hyper Text Markup Language-II</b> Frames-HTML Forms - Single line text field, Text area, Check box, Radio buttons, Password fields, Pull-down menus, File selector dialog box–HTML 5 features. <b>Illustrative problems:</b> Designing the Login form with username, password and submit field, Designing a course registration form.	(6+4)
IV	<b>Unit-4 Cascading Style Sheet-I</b> Introduction - CSS Syntax -Type of CSS Selector-Simple Selectors, Universal Selector, ID Selector, Class selector and Pseudo Classes – Style Specification Formats-Inline Style-Embedded Style sheet-External Style sheet. <b>Illustrative problems:</b> Developing a web application using internal, external and embedded style sheet, Applying style specification in HTML page using CSS.	(6+4)
V	<b>Unit-5 Cascading Style Sheet-II</b> Font properties-List properties- Background properties-Colors RGB and RGBA, HSL and HSLA, Borders, Rounded Corners, Applying Shadows in border- Padding, Margin-CSS Layout- Normal Flow Layout-Relative positioning-Float positioning-Absolute positioning. <b>Illustrative problems:</b> Developing an web application using CSS Positioning.	(6+4)
<b>Total Instructional Hours</b>		<b>45</b>

- Course Outcome**
- Basic understanding of development of software life cycle.
  - To understand basic HTML Tags.
  - Designing a simple web application using HTML.
  - Understanding about the usage of Cascading Style Sheet.
  - Creating a front end Web application using HTML and CSS

**TEXT BOOKS:**

T1 – Roger S.Pressman, Bruce R. Maxim, Software engineering- A practitioner's Approach, McGraw-Hill International Edition, 8th edition ( 2015). ISBN: 9789353165710

T2- Jeffrey C. Jackson, "Web Technologies--A Computer Science Perspective", Pearson Education, 2006.

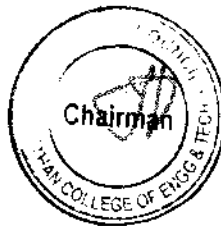
T3- Deitel, Deitel, Goldberg, "Internet & World Wide Web How To Program", Third Edition, Pearson Education, 2006.

**REFERENCE:**

R1 - Robert. W. Sebesta, "Programming the World Wide Web", Fourth Edition, Pearson Education, 2007.

R2 - <https://www.w3schools.com/>

R3 - <https://www.tutorialspoint.com/>



*[Signature]*  
Chairman, Board of Studies  
Chairman - Bos  
IT - HICET

*[Signature]*  
Dean–Academics  
Dean (Academics)  
HICET

Programme	Course Code	Name of the Course	L	T	P	C
B TECH IT	22HE1072	ENTREPRENEURSHIP & INNOVATION	1	0	0	1
Course Objective	1. To acquire the knowledge and skills needed to manage the development of innovation. 2. To recognize and evaluate potential opportunities to monetize these innovations. 3. To plan specific and detailed method to exploit these opportunities. 4. To acquire the resources necessary to implement these plans. 5: To make students understand organizational performance and its importance.					
Module	Description					
1	Entrepreneurial Thinking					
2	Innovation Management					
3	Design Thinking					
4	Opportunity Spotting/Opportunity Evaluation					
5	Industry and Market Research					
6	Innovation Strategy and Business Models					
7	Financial Forecasting					
8	Business Plans/Business Model Canvas					
9	Entrepreneurial Finance					
10	Pitching to Resources Providers/Pitch Deck					
11	Negotiating Deals					
12	New Venture Creation					
13	Lean Start-ups					
14	Entrepreneurial Ecosystem					
15	Velocity Venture					
Course Outcome	CO1: Understand the nature of business opportunities, resources, and industries in critical and creative aspects. CO2: Understand the processes by which innovation is fostered, managed, and commercialized. CO3: Remember effectively and efficiently the potential of new business opportunities. CO4: Assess the market potential for a new venture, including customer need, competitors, and industry attractiveness. CO5: Develop a business model for a new venture, including revenue. Margins, operations, Working capital, and investment					

#### TEXT BOOKS

- T1: Arya Kumar "Entrepreneurship—Creating and leading an Entrepreneurial Organization", Pearson, Second Edition(2012).  
 T2: Emrah Yayici "Design Thinking Methodology", Artbiz tech, First Edition(2016).

#### REFERENCE BOOKS

- R1: Christopher Golis "Enterprise & Venture Capital", Allen & Unwin Publication, Fourth Edition (2007).  
 R2: Thomas Lock Wood & Edger Papke "Innovation by Design", Career Press.com, Second Edition(2017).  
 R3: Jonathan Wilson "Essentials of Business Research", Sage Publication, First Edition(2010).

#### WEBRESOURCES

- W1: <https://blof.forgeforward.in/tagged/startup-lessons>  
 W2: <https://blof.forgeforward.in/tagged/entrepreneurship>  
 W3: <https://blof.forgeforward.in/tagged/minimum-viable-product>  
 W4: <https://blof.forgeforward.in/tagged/minimum-viable-product>  
 W5: <https://blof.forgeforward.in/tagged/innovation>



*[Signature]*  
 Chairman, Board of Studies

*[Signature]*  
 Dean - Academics

**Chairman - BOS  
 IT - HICET**

**Dean (Academics)  
 HICET**

Programme	Course Code	Course Title	L	T	P	C
-----------	-------------	--------------	---	---	---	---

- Course Objectives:**
1. To develop and nurture the soft skills of the students through instruction, knowledge acquisition, demonstration and practice.
  2. To enhance the students ability to deal with numerical and quantitative skills.
  3. To identify the core skills associated with critical thinking.
  4. To develop and integrate the use of English language skills.

Unit	Description	Instructional Hours
I	<b>Lessons on excellence</b> Skill introspection, Skill acquisition, consistent practice	2
II	<b>Logical Reasoning</b> Problem Solving - Critical Thinking- Lateral Thinking - Coding and Decoding – Series – Analogy - Odd Man Out - Visual Reasoning - Sudoku puzzles - Attention to detail	11
III	<b>Quantitative Aptitude</b> Addition and Subtraction of bigger numbers - Square and square roots - Cubes and cube roots - Vedic maths techniques - Multiplication Shortcuts - Multiplication of 3 and higher digit numbers – Simplifications - Comparing fractions - Shortcuts to find HCF and LCM - Divisibility tests shortcuts - Algebra and functions	11
IV	<b>Recruitment Essentials</b> Resume Building - Impression Management	2
V	<b>Verbal Ability</b> Nouns and Pronouns – Verbs - Subject-Verb Agreement - Pronoun-Antecedent – Agreement - Punctuations	4
<b>Total Instructional Hours</b>		<b>30</b>

- Course Outcome:**
- CO1: Students will analyze interpersonal communication skills. public speaking skills.
  - CO2: Students will exemplify tautology, contradiction and contingency by logical thinking.
  - CO3: Students will be able to develop an appropriate integral form to solve all sorts of quantitative problems.
  - CO4: Students can produce a resume that describes their education, skills, experiences and measurable achievements with proper grammar, format and brevity.
  - CO5: Students will be developed to acquire the ability to use English language with an error while making optimum use of grammar.



*[Signature]*  
**Chairman, Board of Studies**  
**Chairman - BoS**  
**IT - HICET**

*[Signature]*  
**Dean-Academics**  
**Dean (Academics)**  
**HICET**

# COURSE CODE – 22MC1093

GE3152

தமிழர் மரபு

LTPC  
1 0 0 1

**அலகு I மொழி மற்றும் இலக்கியம்:** 3  
இந்திய மொழிக் குடும்பங்கள் - திராவிட மொழிகள் - தமிழ் ஒரு செம்மொழி - தமிழ் செவ்விலக்கியங்கள் - சங்க இலக்கியத்தின் சமயச் சார்பற்ற தன்மை - சங்க இலக்கியத்தில் பகிர்தல் அறம் - திருக்குறளில் மேலாண்மைக் கருத்துக்கள் - தமிழ்க் காப்பியங்கள், தமிழகத்தில் சமண பௌத்த சமயங்களின் தாக்கம் - பக்தி

இலக்கியம், ஆழ்வார்கள் மற்றும் நாயன்மார்கள் - சிறுநிலக்கியங்கள் - தமிழில் நவீன இலக்கியத்தின் வளர்ச்சி - தமிழ் இலக்கிய வளர்ச்சியில் பாரதியார் மற்றும் பாரதிதாசன் ஆகியோரின் பங்களிப்பு.

**அலகு II மரபு - பாறை ஓவியங்கள் முதல் நவீன ஓவியங்கள் வரை - சிற்பக் கலை:** 3  
நடுகல் முதல் நவீன சிற்பங்கள் வரை - ஜம்பொன் சிலைகள் - பழங்குடியினர் மற்றும் அவர்கள் தயாரிக்கும் கைவினைப் பொருட்கள், பொம்மைகள் - தேர் செய்யும் கலை - சுடுமண் சிற்பங்கள் - நாட்டுப்புறத் தெய்வங்கள் - குமரிமனையில் திருவள்ளுவர் சிலை - இசைக் கருவிகள் - மிருதங்கம், பறை, வீணை, யாழ், தாளஸ்வரம் - தமிழர்களின் சமூக பொருளாதார வாழ்வில் கோவில்களின் பங்கு.

**அலகு III நாட்டுப்புறக் கலைகள் மற்றும் வீர விளையாட்டுகள்:** 3  
தெருக்கூத்து, கரகாட்டம், வில்லுப்பாட்டு, கணியான் கூத்து, ஓயிலாட்டம், தோல்பாவைக் கூத்து, சிலம்பாட்டம், வளரி, புனியாட்டம், தமிழர்களின்

விளையாட்டுகள்.

**அலகு IV தமிழர்களின் இணைக் கோட்பாடுகள்:** 3  
தமிழகத்தின் தாவரங்களும், விலங்குகளும் - தொல்காப்பியம் மற்றும் சங்க இலக்கியத்தில் அகம் மற்றும் புறக் கோட்பாடுகள் - தமிழர்கள் போற்றிய அறக்கோட்பாடு - சங்ககாலத்தில் தமிழகத்தில் எழுத்தறிவும், கல்வியும் - சங்ககால நகரங்களும் துறை முகங்களும் - சங்ககாலத்தில் ஏற்றுமதி மற்றும் இறக்குமதி - கடவுட்கடந்த நாடுகளில் சோழர்களின் வெற்றி.

**அலகு V இந்திய தேசிய இயக்கம் மற்றும் இந்திய பண்பாட்டிற்குத் தமிழர்களின் பங்களிப்பு:** 3  
இந்திய விடுதலைப்போரில் தமிழர்களின் பங்கு - இந்தியாவின் பிறப்பகுதிகளில் தமிழ்ப் பண்பாட்டின் தாக்கம் - சுயமரியாதை இயக்கம் - இந்திய மருத்துவத்தில், சித்த மருத்துவத்தில் பங்கு - கல்வெட்டுகள், கையெழுத்துப்படிக்கள் - தமிழ்ப் புத்தகங்களின் அச்ச வரலாறு.



Chairman, Board of Studies

Chairman - BoS  
IT - HiCET

12

Dean - Academics

Dean (Academics)  
HiCET

1. தமிழக வரலாறு - மக்களும் பண்பாடும் - கே.கே. பிள்ளை (வெளியீடு தமிழ்நாடு பாடநூல் மற்றும் கல்வியியல் பணிகள் கழகம்).
2. கணிவித் தமிழ் - முனைவர் இல. சுந்தரம். (விகடன் பிரசுரம்).
3. கீழடி - வைகை நதிக்கரையில் சங்ககால நகர நாகரிகம் (தொல்வியல் துறை வெளியீடு)
4. பொருதை - ஆற்றங்கரை நாகரிகம். (தொல்வியல் துறை வெளியீடு)
5. Social Life of Tamils (Dr.K.K.Pillay) A joint publication of TNTB & ESC and RMRL - (in print)
6. Social Life of the Tamils - The Classical Period (Dr.S.Singaravelu) (Published by: International Institute of Tamil Studies).
7. Historical Heritage of the Tamils (Dr.S.V.Subetamanian, Dr.K.D. Thirunavukkarasu) (Published by: International Institute of Tamil Studies).
8. The Contributions of the Tamils to Indian Culture (Dr.M.Vetamathi) (Published by: International Institute of Tamil Studies.)
9. Keeladi - 'Sangam City Civilization on the banks of river Vaigai' (Jointly Published by: Department of Archaeology & Tamil Nadu Text Book and Educational Services Corporation, Tamil Nadu)
10. Studies in the History of India with Special Reference to Tamil Nadu (Dr.K.K.Pillay) (Published by: The Author)
11. Ponnai Civilization (Jointly Published by: Department of Archaeology & Tamil Nadu Text Book and Educational Services Corporation, Tamil Nadu)
12. Journey of Civilization Indus to Vaigai (R.Balakrishnan) (Published by: RMRL) - Reference Book.



Chairman, Board of Studies

Chairman - BoS  
HICET

13

Dean-Academics

Dean (Academics)  
HICET



Programme Course code Name of the course L T P C



**The student should be able**

- Course Objective**
- 1 Introduce students to the great History of Tamil literature.
  - 2 Establish the heritage of various forms of Rock art and Sculpture art.
  - 3 To study and understand the various folk and Martial arts of Tamil culture
  - 4 Introduce students to Ancient Tamil concepts to understand the richness of Tamil literature.
  - 5 To learn about the various influences or impacts of Tamil language in Indian culture.

Unit	Description	Instructional Hours
	<b>Language and Literature</b>	
I	Language families in India – Dravidian Languages – Tamil as a classical language – Classical Literature in Tamil- Secular nature of Sangam Literature – Distributive justice in Sangam Literature – Management principles in Thirukural – Tamil epics and impacts of Buddhism & Jainism in Tamil and Bakthi literature of Azhwars and Nayanmars – Forms of minor poetry _ Development of Modern literature in Tamil – Contribution of Bharathiyar and Bharathidasan.	6
	<b>Heritage _ Rock Art Paintings to Modern Art – Sculpture</b>	
II	Hero Stone to Modern Sculpture – Bronze icons – Tribes and their handcrafts - Art of temple car making – Massive Terracotta sculptures, Village deities, Thiruvalluvar statue at Kanyakumari, Making of musical instruments – Mridangam, Parai, Yazh and Nadhaswaram - Role of Temples in social and economic life of Tamils.	6
	<b>Folk and Martial Arts</b>	
III	Therukoothu, Karagattam, Villupattu, Kaniyan koothu, Oyilattam, Leather puppetry, Silambattam., Valari Tiger dance – Sports and Games of Tamils.	6
	<b>Thinai Concept of Tamils</b>	
IV	Flora and Fauna of Tamils – Aham and Puram Concept from Tholkappiyam and Sangam Literature – Aram concept of Tamils – Education and Literacy during Sangam Age - Ancient cities and ports of Sangam age – Export and Import during Sangam age – Overseas conquest of Cholas.	6
	<b>Contribution of Tamils to Indian National Movement and Indian Culture</b>	
V	Contribution of Tamils to Indian freedom struggle – The cultural influence of Tamils over the other parts of India – Self respect movement – Role of Siddha Medicine in indigenous systems of Medicine – Inscriptions & Manuscripts – Print History of Tamil books.	6
	<b>Total Instructional Hours</b>	<b>30</b>

Course Outcome	CO1	CO2	CO3	CO4	CO5
	Learn about the works pertaining to Sangam age	Aware of our Heritage in art from Stone sculpture to Modern Sculpture.	Appreciate the role of Folk arts in preserving, sustaining and evolution of Tamil culture.	Appreciate the intricacies of Tamil literature that had existed in the past.	Understand the contribution of Tamil Literature to Indian Culture

**TEXTBOOKS:**

- T1 Social Life of Tamils (Dr.K.K.Pillay) A joint publication of TNTB & ESC and RMRL – (in print)
- T2 Social Life of the Tamils - The Classical Period (Dr.S.Singaravelu) (Published by: International Institute of Tamil Studies.
- T3 Historical Heritage of the Tamils (Dr.S.V.Subatamanian, Dr.K.D. Thirunavukkarasu)(Published by: International Institute of Tamil Studies).

**REFERENCES:**

- R1 The Contributions of the Tamils to Indian Culture (Dr.M.Valarmathi) (Published by: International Institute of Tamil Studies)
- R2 Civilization (Jointly Published by: Department of Archaeology & Tamil Nadu Text Book and Educational Services Corporation, Tamil Nadu)
- R3 Journey of Civilization Indus to Vaigai (R.Balakrishnan) (Published by: RMRL) – Reference Book.

Chairman, Board of Studies

Chairman - B03  
IT - HiCET



Dean-Academics  
Dean (Academics)  
HiCET

Programme	Course Code	Name of the Course	L	T	P	C
-----------	-------------	--------------------	---	---	---	---

**The student should be made**

**Course Objectives**

1. To help the students appreciate the essential complementarity between 'VALUES' and 'SKILLS' to ensure sustained happiness and prosperity which are the core aspirations of all human beings.
2. To facilitate the development of a Holistic perspective among students towards life and profession as well as towards happiness and prosperity based on a correct understanding of the Human reality and the rest of existence. Such a holistic perspective forms the basis of Universal Human Values and movement towards value-based living in a natural way.
3. To highlight plausible implications of such a Holistic understanding in terms of ethical human conduct, trustful and mutually fulfilling human behavior and mutually enriching interaction with Nature.

**Unit**

**Description**

**Instructional Hours**

I	<b>Introduction to Value Education</b> Right Understanding, Relationship and Physical Facility (Holistic Development and the Role of Education)-Understanding Value Education - Self-exploration as the Process for Value Education - Continuous Happiness and Prosperity – the Basic Human Aspirations - Happiness and Prosperity – Current Scenario - Method to Fulfill the Basic Human Aspirations	6
II	<b>Harmony in the Human Being and Harmony in the Family</b> Understanding Human being as the Co-existence of the Self and the Body - Distinguishing between the Needs of the Self and the Body - The Body as an Instrument of the Self - Understanding Harmony in the Self- Harmony of the Self with the Body - Programme to ensure self-regulation and Health	6
III	<b>Harmony in the Family and Society</b> Harmony in the Family – the Basic Unit of Human Interaction. Values in Human to Human Relationship 'Trust' – the Foundational Value in Relationship Values in Human to Human Relationship 'Respect' – as the Right Evaluation Understanding Harmony in the Society	6
IV	<b>Harmony in the Nature / Existence</b> Understanding Harmony in the Nature. Interconnectedness, self-regulation and Mutual Fulfillment among the Four Orders of Nature- Understanding Existence as Co-existence of mutually interacting units in all pervasive space Realizing Existence as Co-existence at All Levels The Holistic Perception of Harmony in Existence. Vision for the Universal Human Order	6
V	<b>Implications of the Holistic Understanding – a Look at Professional Ethics</b> Natural Acceptance of Human Values Definitiveness of (Ethical) Human Conduct A Basis for Humanistic Education, Humanistic Constitution and Universal Human Order-Competence in Professional Ethics Holistic Technologies, Production Systems and Management Models-Typical Case Studies Strategies for Transition towards Value-based Life and Profession	6
<b>Total Instructional Hours</b>		<b>30</b>

At the end of the course, the learner will be able

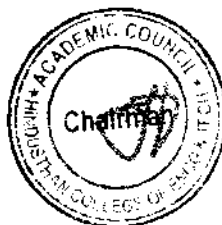
**Course Outcome**

CO1: To become more aware of holistic vision of life - themselves and their surroundings.  
 CO2: To become more responsible in life, in the Society and in handling problems with sustainable Solutions.  
 CO3: To sensitive towards their commitment towards what they understood towards environment and Socially responsible behavior.  
 CO4: To able to apply what have learnt to their own self in different day-to-day settings in real life and In handling problems with sustainable solutions.  
 CO5: To develop competence and capabilities for maintaining Health and Hygiene.

**Reference Books:**

- R1.A Foundation Course in Human Values and Professional Ethics, R R Gaur, R Asthana, G P Bagaria, 2<sup>nd</sup> Revised Edition, Excel Books, New Delhi, 2019. ISBN 978-93-87034-47-1
- R2.Teachers' Manual for A Foundation Course in Human Values and Professional Ethics, R R Gaur, R Asthana, G P Bagaria, 2<sup>nd</sup> Revised Edition, Excel Books, New Delhi, 2019. ISBN 978-93- 87034-53-2
- R3.Jeevan Vidya: Ek Parichaya, A Nagaraj, Jeevan Vidya Prakashan, Amarkantak, 1999.
- R4.Human Values, A.N. Tripathi, New Age Intl. Publishers, New Delhi, 2004.

Chairman, Board of Studies  
 Chairman - BOS  
 IT - HICET



Dean - Academics

Dean (Academics)  
 HICET

# **Service Course**



Programme	Course code	Name of the course	L	T	P	C
B.TECH.	22IT1151	<b>PYTHON PROGRAMMING AND PRACTICES</b> (AGRI, CHEM, FT, AERO, AUTO, CIVIL, MECH, ECT, ECE, BME)	2	0	2	3

**The student should be able**

- Course Objective**
- 1 To know the basics of algorithmic problem solving
  - 2 To read and write simple Python programs
  - 3 To develop Python programs with conditionals and loops and to define Python functions and call them
  - 4 To use Python data structures — lists, tuples, dictionaries
  - 5 To do input/output with files in Python

Unit	Description	Instructional Hours
I	<b>ALGORITHMIC PROBLEM SOLVING</b> Algorithms, building blocks of algorithms (statements, state, control flow, functions), notation (pseudo code, flow chart, programming language), algorithmic problem solving, simple strategies for developing algorithms (iteration, recursion).	(5+2)
II	<b>DATA, STATEMENTS, CONTROL FLOW</b> Data Types, Operators and precedence of operators, expressions, statements, comments; Conditionals: Boolean values and operators, conditional (if), alternative (if -else), chained conditional (if -elif-else); Iteration: state, while, for, break, continue, pass;	(6+4)
III	<b>FUNCTIONS, STRINGS</b> Functions, parameters and arguments; Fruitful functions: return values, local and global scope, function composition, recursive functions. Strings: string slices, immutability, string functions and methods, string module.	(6+4)
IV	<b>LISTS, TUPLES, DICTIONARIES</b> Lists: list operations, list slices, list methods, list loop, mutability, aliasing, cloning lists, list parameters; Tuples: tuple assignment, tuple as return value; Dictionaries: operations and methods; advanced list processing - list comprehension.	(6+4)
V	<b>FILES, MODULES, PACKAGES</b> Files and exception: text files, reading and writing files, errors and exceptions, handling exceptions, modules, packages	(6+2)
<b>Total Instructional Hours</b>		<b>45</b>

**S.No List of Experiments**

- 1 Read NAME, REG NO, PHYSICS, CHEMISTRY, MATHS MARKS and calculate cutoff marks out of 200 print the cutoff marks of the student
- 2 Take two numbers of int data type, two numbers of float data type as input. Print the sum and difference of two int variable on a new line Print the sum and difference of two-float variable rounded to one decimal place on a new line.
- 3 Get two integer inputs from user as dividend named as x and y. Find out Greatest Common Divisor Between both of the above two dividends  
Tony's Maths teacher ask him to solve an exponential problem but he don't know how to solve.
- 4 Teacher gives two values as named base and exponent value ask tony to find the factor. Help him to do his task.

*M. S. Srinivasan*  
Chairman, Board of Studies  
**Chairman - BoS**  
**IT - HICET**



*[Signature]*  
Dean - Academics  
**Dean (Academics)**  
**HICET**

- 5 Read four inputs from the user named X1, X2, Y1, Y2 and compute to find a distance between two points.
- 6 Read the five different subject marks of the student, calculate total marks and print the total marks, grade.
- 7 Given the age input as N from the user and check whether user is eligible for voting or not using if condition and print Eligible or Not Eligible. Hint: The minimum age to vote is 18 years
- 8 Write a program that reads a integer value as N from the user and then produces n lines of output The first line contains 1 star,the second line contains 2 stars and so on until the last line which should have N stars.can you Write this using single loop? Hint: remember what the expression '+' \*5 does.
- 9 A year is a leap year if it is divisible by 4, unless it is divisible by 100 and not by 400. Write a function that takes an integer value representing a year , and returns a Boolean result indicating whether or not the year is a leap year
- 10 sheela wants to convert time into minutes but she have no idea about it. Create a function named time() and get the input from the user as two integers hours, minutes and print the minutes as output. Help sheela to do this conversion
- 11 Get the two different matrix elements for (2x2) matrix. Perform addition operation and subtraction operation and print the result in matrix format using nested loop in python.
- 12 Read the input from the user for no of elements as N and then append it into the list. Write a python program to find the maximum element in the list.
- 13 Read the N no of elements from the user and append it into the list, perform linear search operations using python programming List operations
- 14 Read the List of Numbers from the user with N elements and perform Selection sorting operation using python programming.
- 15 Write a python program to take input as filename with extension, perform reading and writing operations in the file.

<b>Course Outcome</b>	CO1	Develop algorithmic solutions to simple computational problems
	CO2	Read, write, execute by hand simple Python programs
	CO3	Structure simple Python programs for solving problems and Decompose a Python program into functions
	CO4	Represent compound data using Python lists, tuples, dictionaries
	CO5	Read and write data from/to files in Python Programs.

**TEXT BOOK:**

- T1 Guido van Rossum and Fred L. Drake Jr, An Introduction to Python – Revised and updated for Python 3.6.2, Shroff Publishers, First edition (2017).
- T2 S. Annadurai, S.Shankar, I.Jasmine, M.Revathi, Fundamentals of Python Programming, Mc-Graw Hill Education (India) Private Ltd, 2019

**REFERENCES:**

- R1 Charles Dierbach, —Introduction to Computer Science using Python: A Computational Problem-Solving Focus, Wiley India Edition, 2013.
- R2 Timothy A. Budd, —Exploring PythonI, Mc-Graw Hill Education (India) Private Ltd., 2015
- R3 Robert Sedgewick, Kevin Wayne, Robert Dondero, —Introduction to Programming in Python: An Interdisciplinary Approach, Pearson India Education Services Pvt. Ltd., 2016



*[Signature]*  
 Chairman, Board of Studies  
**Chairman - BoS**  
**IT - HiCET**

*[Signature]*  
 Dean - Academics  
**Dean (Academics)**  
**HiCET**

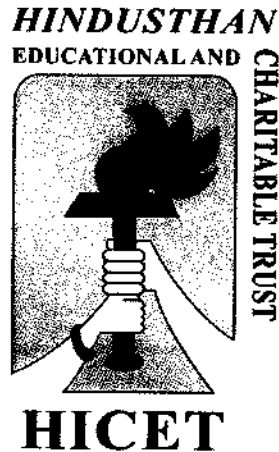
***HINDUSTHAN COLLEGE OF ENGINEERING AND TECHNOLOGY***

**(An Autonomous Institution Affiliated to Anna University, Chennai)**

**(Approved by AICTE, New Delhi, Accredited by NAAC with 'A' Grade)**

**Coimbatore - 641 032.**

**B.TECH. INFORMATION TECHNOLOGY**



**CHOICE BASED CREDIT SYSTEM**

**Revised Curriculum and Syllabus for the Odd semester**

**Academic year 2023-24**

**(Academic Council Meeting held on 19.06.2023)**





# **CURRICULUM R2022**



**DETAILS OF CHANGES CARRIED OUT IN CURRICULUM & SYLLABUS**

**CBCS PATTERN**

**UNDERGRADUATE PROGRAMMES**

**B.TECH. INFORMATION TECHNOLOGY (UG)**

**REGULATION-2022**

**For the students admitted during the academic year 2022-2023 and onwards**

**SEMESTER I**

S. No	Course Code	Course Title	Category	L	T	P	C	TCP	CIA	ESE	Total
<b>THEORY</b>											
1.	22MA1101	Matrices and Calculus	BSC	3	1	0	4	4	40	60	100
<b>THEORY WITH LAB COMPONENT</b>											
2.	22HE1151	English for Engineers	HSC	2	0	2	3	4	50	50	100
3.	22CY1151	Chemistry for Circuit Engineers	BSC	2	0	2	3	4	50	50	100
4.	22CS1151/ 22CS1152	Problem solving using C programming / Object Oriented Programming using Python	ESC/ICC	2	0	2	3	4	50	50	100
5.	22IT1152	Introduction to Web Application Development	ESC	2	0	2	3	4	50	50	100
<b>EEC COURSES (SE/AE)</b>											
6.	22HE1071	UHV	AEC	2	0	0	2	3	40	60	100
7.	22HE1072	Entrepreneurship & Innovation	AEC	1	0	0	1	1	100	0	100
<b>MANDATORY COURSE</b>											
8.	22MC1091/ 22MC1092	தமிழரும் தொழில் நுட்பமும் / Indian Constitution	MC	2	0	0	0	2	0	0	0
<b>TOTAL</b>				<b>16</b>	<b>1</b>	<b>8</b>	<b>19</b>	<b>26</b>	<b>480</b>	<b>320</b>	<b>800</b>

**SEMESTER II**

S. No	Course Code	Course Title	Category	L	T	P	C	TCP	CIA	ESE	Total
<b>THEORY</b>											
1.	22MA2103	Differential Equations And Linear Algebra	BSC	3	1	0	4	4	40	60	100
2.	22PH2101	Basics of Material Science	BSC	2	0	0	2	3	40	60	100
<b>THEORY WITH LAB COMPONENT</b>											
3.	22HE2151	Effective Technical Communication	HSC	2	0	2	3	4	50	50	100
4.	22PH2151	Physics for Circuit Engineering	BSC	2	0	2	3	4	50	50	100
5.	22IT2251/ 22IT2252	Python programming and Practices/ Relational Database	PCC/ICC	2	0	2	3	4	50	50	100

		Management System										
6.	22IT2253	Dynamic Web Design	PCC	2	0	2	2	4	50	50	100	
<b>PRACTICAL</b>												
7.	22ME2001	Engineering Practices	ESC	0	0	4	2	2	60	40	100	
<b>EEC COURSES (SE/AE)</b>												
8.	22HE2071	Design Thinking	AEC	2	0	0	2	2	100	0	100	
9.	22HE2072	Soft Skills and Aptitude 1	AEC	1	0	0	1	1	100	0	100	
<b>MANDATORY COURSE</b>												
10.	22MC2091/ 22MC2092	தமிழர் மரபு / Heritage of Tamils	MC	2	0	0	0	1	0	0	0	
11.	22MC2093	NCC */NSS / YRC / Sports / Clubs / Society Service - Enrollment (Common)	MC	All students shall enroll, on admission, in anyone of the personality and character development programmes and undergo training for about 80 hours								
<b>TOTAL</b>				<b>17</b>	<b>1</b>	<b>14</b>	<b>22</b>	<b>32</b>	<b>640</b>	<b>360</b>	<b>1000</b>	

### SEMESTER III

S. No	Course Code	Course Title	Category	L	T	P	C	TCP	CIA	ESE	Total
<b>THEORY</b>											
<b>THEORY WITH LAB COMPONENT</b>											
<b>PRACTICAL</b>											
<b>EEC COURSES (SE/AE)</b>											
8.	22HE3071	Soft Skills and Aptitude-II (Common)	SEC	0	0	0	1	1	100	0	100
<b>MANDATORY COURSE</b>											
10.	22MC3191	Essence of Indian Traditional Knowledge	MC	2	0	0	0	2	40	60	100
<b>TOTAL</b>				<b>17</b>	<b>2</b>	<b>14</b>	<b>25</b>	<b>34</b>	<b>530</b>	<b>470</b>	<b>1000</b>

### SEMESTER IV

**SEMESTER IV**

S. No	Course Code	Course Title	Category	L	T	P	C	TCP	CIA	ESE	Total
<b>THEORY</b>											
1.	22HE4101	IPR and Start-ups	HSC	2	0	0	2	2	40	60	100
2.	22IT4201	Design and Analysis of Algorithms	PCC	3	0	0	3	3	40	60	100
3.	22IT4202	Advanced JAVA Programming	PCC	3	0	0	3	3	40	60	100
4.	22IT4203	Software Engineering	PCC	3	0	0	4	4	40	60	100
<b>THEORY WITH LAB COMPONENT</b>											
5.	22IT4251	Web Framework	PCC	2	0	2	3	4	50	50	100
6.	22IT4252/ 22IT4253	Database Management System / Design Thinking	PCC	2	0	2	3	4	50	50	100
<b>PRACTICAL</b>											
7.	22IT4001	Case Tools Laboratory	PCC	0	0	4	2	4	60	40	100
8.	22IT4002	Advanced JAVA Laboratory	PCC	0	0	4	2	4	60	40	100
<b>EEC COURSES (SE/AE)</b>											
9.	22HE4071	Soft Skills -III	SEC	1	0	0	1	1	100	0	100
<b>TOTAL</b>				<b>16</b>	<b>0</b>	<b>12</b>	<b>23</b>	<b>29</b>	<b>480</b>	<b>420</b>	<b>900</b>
<p>* Two weeks internship carries 1 credit and it will be done during Semester III summer vacation and same will be evaluated in Semester IV. If students unable to undergo in semester III, then the Internship I offered in the semester IV can be clubbed with Internship II (Total: 4 weeks-2 credits)</p>											

**SEMESTER V**

S. No	Course Code	Course Title	Category	L	T	P	C	TCP	CIA	ESE	Total
<b>THEORY</b>											
1.	22IT5201	Artificial Intelligence & Machine Learning	PCC	3	1	0	4	4	40	60	100
2.	22IT5202	Computer Networks	PCC	3	0	0	3	3	40	60	100
3.	22IT53XX	Professional Elective-1	PEC	3	0	0	3	3	40	60	100
4.	22IT53XX	Professional Elective-2	PEC	3	0	0	3	3	40	60	100
5.	22IT53XX	Professional Elective-3	PEC	3	0	0	3	3	40	60	100
<b>THEORY WITH LAB COMPONENT</b>											
6.	22IT5251/ 22IT5252	Artificial Intelligence & Machine Learning / Business Intelligence	PCC/CC	2	0	2	3	4	50	50	100
<b>PRACTICAL</b>											
7.	22IT5001	Networks Laboratory	PCC	0	0	4	2	4	60	40	100
<b>EEC COURSES (SE/AE)</b>											
8.	22HE5071	Soft Skills -4/ Foreign languages	SEC	1	0	0	1	1	100	0	100
<b>TOTAL</b>				<b>18</b>	<b>1</b>	<b>6</b>	<b>22</b>	<b>25</b>	<b>410</b>	<b>390</b>	<b>800</b>

**SEMESTER VI**

S. No	Course Code	Course Title	Category	L	T	P	C	TCP	CIA	ESE	Total
<b>THEORY</b>											
1.	22IT6201/ 22IT6202	Foundation of Data Science / Data Science	PCC	3	0	0	3	3	40	60	100
2.	22HE6101	Professional Ethics	HSC	3	0	0	3	3	40	60	100
3.	22IT63XX/ 22IT6313	Professional Elective - 4/ Predictive Modeling	PEC/ ICC	3	0	0	3	3	40	60	100
4.	22IT63XX	Professional Elective-5	PEC/ ICC	3	0	0	3	3	40	60	100
5.	22XX64XX	Open Elective – 1*	OEC	3	0	0	3	3	40	60	100
6.	22XX64XX	Open Elective – 2*	OEC	3	0	0	3	3	40	60	100
7.	22CY6101	Environmental Science	ESC	2	0	0	2	3	40	60	100
<b>PRACTICAL</b>											
8.	22IT6001	Data Science Laboratory	PCC	0	0	4	2	4	60	40	100
<b>EEC COURSES (SE/AE)</b>											
9.	22HE6071	Soft Skills – 5	SEC	2	0	0	2	2	100	0	100
<b>TOTAL</b>				<b>22</b>	<b>0</b>	<b>4</b>	<b>24</b>	<b>27</b>	<b>440</b>	<b>460</b>	<b>900</b>

**SEMESTER VII**

S. No	Course Code	Course Title	Category	L	T	P	C	TCP	CIA	ESE	Total
<b>THEORY</b>											
1.	22IT7201	Cryptography and Network Security	PCC	3	0	0	3	3	40	60	100
2.	22IT7202	Data Warehousing and Data Mining	PCC	3	1	0	4	4	40	60	100
3.	22IT73XX/ 22IT7307	Professional Elective-6 / Big Data with Security	PEC	3	0	0	3	3	40	60	100
4.	22XX74XX	Open Elective – 3*	OEC	3	0	0	3	3	40	60	100
5.	22XX74XX	Open Elective – 4*	OEC	3	0	0	3	3	40	60	100
<b>PRACTICAL</b>											
6.	22IT7001	Cryptography and Network Security Laboratory	PCC	0	0	4	2	4	60	40	100
<b>EEC COURSES (SE/AE)</b>											
7.	22IT7701	Internship - II*	SEC	0	0	0	2	2	100	0	100
<b>TOTAL</b>				<b>15</b>	<b>1</b>	<b>4</b>	<b>20</b>	<b>22</b>	<b>360</b>	<b>340</b>	<b>700</b>

\* - Two weeks internship carries 1 credit and it will be done during Semester VI summer vacation/placement training and same will be evaluated in Semester VII.

**SEMESTER VIII**

S. No	Course Code	Course Title	Category	L	T	P	C	TCP	CIA	ESE	Total
<b>EEC COURSES (SE/AE)</b>											
1.	22IT8901	Project Work/Granted Patent	SEC	0	0	20	10	20	100	100	200
<b>TOTAL</b>				<b>0</b>	<b>0</b>	<b>20</b>	<b>10</b>	<b>20</b>	<b>100</b>	<b>100</b>	<b>200</b>

**Note:**

1. \*As per the AICTE guideline, in Semesters I, II, III & IV NCC one credit subject is added as Value Added Course with Extra Credit. Further, the students who enrolled his/her name in HICET NCC and Air Wing are eligible to undergo this subject. The earned extra credits printed in the Consolidated Mark sheet as per the regulation.
2. NCC course level 1 & Level 2 will be added in the list of open elective subjects in the appropriate semester. Further, the students' who have opted NCC subjects in Semester I, II, III & IV are eligible to undergo NCC Open Elective Subjects.
3. The above-mentioned NCC Courses will be offered to the students who are going to be admitted in the Academic Year 2021 – 22.

**OPEN ELECTIVE I AND II (EMERGING TECHNOLOGIES)**

To be offered for the students other than CSE, IT, AI&ML, ECE & BIOMEDICAL

S. NO.	COURSE CODE	COURSE TITLE	CATE GORY	PERIODS PER WEEK			TOTAL CONTACT PERIODS	CREDITS
				L	T	P		
1	22AI6451	Artificial Intelligence and Machine Learning Fundamentals	OEC	2	0	2	4	3
2	22CS6451	BlockChain Technology	OEC	2	0	2	4	3
3	22EC6451	Cyber security	OEC	2	0	2	4	3
4	22EC6452	IoT Concepts and Applications	OEC	2	0	2	4	3
5	22IT6451	Data Science and Analytics	OEC	2	0	2	4	3
6	22BM6451	Augmented and Virtual Reality	OEC	2	0	2	4	3

**OPEN ELECTIVE I AND II**

To be offered for the students other than AUTO, AERO, AGRI, MECH, MCTS, CIVIL, EEE, CHEMICAL, FOOD TECH, E&I

S. NO.	COURSE CODE	COURSE TITLE	CATE GORY	PERIODS PER WEEK			TOTAL CONTACT PERIODS	CREDITS
				L	T	P		
1	22AE6401	Space Science	OEC	3	0	0	3	3
2	22MT6401	Introduction to Industrial Engineering	OEC	3	0	0	3	3
3	22MT6402	Industrial Safety and Environment	OEC	3	0	0	3	3
4	22CE6401	Climate Change and its Impact	OEC	3	0	0	3	3
5	22CE6402	Environment and Social Impact Assessment	OEC	3	0	0	3	3
6	22ME6401	Renewable Energy System	OEC	3	0	0	3	3
7	22ME6402	Additive Manufacturing systems	OEC	3	0	0	3	3
8	22EI6401	Introduction to Industrial	OEC	3	0	0	3	3

		Instrumentation and Control						
9	22EI6402	Graphical Programming using Virtual Instrumentation	OEC	3	0	0	3	3
10	22AU6401	Fundamentals of Automobile Engineering	OEC	3	0	0	3	3
11	22AU6402	Automotive Vehicle Safety	OEC	3	0	0	3	3
12	22EE6401	Digital Marketing	OEC	3	0	0	3	3
13	22EE6402	Research Methodology	OEC	3	0	0	3	3
14	22FT6401	Traditional Foods	OEC	3	0	0	3	3
15	22AG6401	Urban Agriculture and Organic Farming	OEC	3	0	0	3	3
16	22CH6401	Biomass and Biorefinery	OEC	3	0	0	3	3

**Note:** Non-Circuit Departments can add one Open Elective course in the above list to offer for the circuit branches

### OPEN ELECTIVE III

Students shall choose any one of the open elective courses such that the course content or title not belong to their own programme.

(Note: Each programme in our institution is expected to provide one course only)

S. NO.	COURSE CODE	COURSE TITLE	CATE GORY	PERIODS PER WEEK			TOTAL CONTACT PERIODS	CREDITS
				L	T	P		
1	22IT7401	Disaster Management	OEC	3	0	0	3	3

### OPEN ELECTIVE IV

S. NO.	COURSE CODE	COURSE TITLE	CATE GORY	PERIODS PER WEEK			TOTAL CONTACT PERIODS	CREDITS
				L	T	P		
1	22LS7401	General studies for competitive examinations	OEC	3	0	0	3	3
2	22LS7402	Human Rights, Women Rights and Gender equity	OEC	3	0	0	3	3
3	22LS7403	Indian ethos and Human values	OEC	3	0	0	3	3
4	22LS7404	Financial independence and management	OEC	3	0	0	3	3
5	22LS7405	Yoga for Human Excellence	OEC	3	0	0	3	3
6	22LS7406	Democracy and Good Governance	OEC	3	0	0	3	3
7	22LS7407	NCC Level - II	OEC	3	0	0	3	3



**PROFESSIONAL ELECTIVE COURSES: VERTICALS**

Vertical I Data Science	Vertical II Full Stack Development for IT	Vertical III Cloud Computing and Data Centre Technologies	Vertical IV Internet of things	Vertical V Creative Media	Vertical VI Emerging Technologies
22IT5301 Exploratory Data Analysis	22IT5304 Cloud Computing	22IT5307 Security and Privacy in Cloud	22IT5310 Fundamentals of IoT & Cloud	22IT5313 Multimedia Data Compression and Storage	22IT5316 Augmented Reality
22IT5302 Recommender Systems	22 IT5305 App Development	22IT5308 Virtualization	22IT5311 IoT Architectures and Protocols	22IT5314 Multimedia and Animation	22IT5317 Robotic Process Automation
22IT5303 Computer Vision	22IT5306 Cloud Services Management	22IT5309 Stream Processing	22IT5312 Architecting Smart IoT Devices	22IT5315 Video Creation and Editing	22IT5318 Neural Networks and Deep Learning
22IT6301 Text and Speech Analysis	22IT6303 Dev-ops	22IT6305 Data Warehousing	22IT6307 Fog Computing & Energy Management In lot Devices	22IT6309 UI and UXDesign	22IT6311 Cyber security
22IT6302 Big Data Analytics	22IT6304 Software Testingand Automation	22IT6306 Storage Technologies	22IT6308 IoT cloud and data analytics	22IT6310 Digital marketing	22IT6312 Quantum Computing
22IT7301 Image and video analytics	22IT7302 Web Application Security	22IT7303 Software Defined Networks	22IT7304 IOT Security	22IT7305 Visual Effects	22IT7306 Cryptocurrency and Block chain Technologies

Students are permitted to choose all Professional Electives from a particular vertical or from different verticals.

**PROFESSIONAL ELECTIVE COURSES: VERTICALS**

**Details of Vertical I: Data Science**

S. NO.	COURSE CODE	COURSE TITLE	CATE GORV	PERIODS PER WEEK			TOTAL CONTACT PERIODS	CREDITS
				L	T	P		
1.	22IT5301	Exploratory Data Analysis	PEC	3	0	0	3	3
2.	22IT5302	Recommender Systems	PEC	3	0	0	3	3
3.	22IT5303	Computer Vision	PEC	3	0	0	3	3
4.	22IT6301	Text and Speech Analysis	PEC	3	0	0	3	3
5.	22IT6302	Big Data Analytics	PEC	3	0	0	3	3
6.	22IT7301	Image and video analytics	PEC	3	0	0	3	3

**Details of Vertical II: Full Stack Development for IT**

S. NO.	COURSE CODE	COURSE TITLE	CATEGORY	PERIODS PER WEEK			TOTAL CONTACT PERIODS	CREDITS
				L	T	P		
1.	22IT5304	Cloud Computing	PEC	3	0	0	3	3
2.	22IT5305	App Development	PEC	3	0	0	3	3
3.	22IT5306	Cloud Services Management	PEC	3	0	0	3	3
4.	22IT6303	Dev-ops	PEC	3	0	0	3	3
5.	22IT6304	Software Testing and Automation	PEC	3	0	0	3	3
6.	22IT7302	Web Application Security	PEC	3	0	0	3	3

**Details of Vertical III: Cloud Computing and Data Centre Technologies**

S. NO.	COURSE CODE	COURSE TITLE	CATEGORY	PERIODS PER WEEK			TOTAL CONTACT PERIODS	CREDITS
				L	T	P		
1.	22IT5307	Security and Privacy in Cloud	PEC	3	0	0	3	3
2.	22IT5308	Virtualization	PEC	3	0	0	3	3
3.	22IT5309	Stream Processing	PEC	3	0	0	3	3
4.	22IT6305	Data Warehousing	PEC	3	0	0	3	3
5.	22IT6306	Storage Technologies	PEC	3	0	0	3	3
6.	22IT7303	Software Defined Networks	PEC	3	0	0	3	3

**Details of Vertical IV: Internet of Things**

S. NO.	COURSE CODE	COURSE TITLE	CATEGORY	PERIODS PER WEEK			TOTAL CONTACT PERIODS	CREDITS
				L	T	P		
1.	22IT5310	Fundamentals of IoT & Cloud	PEC	3	0	0	3	3
2.	22IT5311	IoT Architectures and Protocols	PEC	3	0	0	3	3
3.	22IT5312	Architecting Smart IoT Devices	PEC	3	0	0	3	3
4.	22IT6307	Fog Computing & Energy Management In IoT Devices	PEC	3	0	0	3	3
5.	22IT6308	IoT cloud and data analytics	PEC	3	0	0	3	3
6.	22IT7304	IOT Security	PEC	3	0	0	3	3

### Details of Vertical V: Creative Media

S. NO.	COURSE CODE	COURSE TITLE	CATEGORY	PERIODS PER WEEK			TOTAL CONTACT PERIODS	CREDITS
				L	T	P		
1.	22IT5313	Multimedia Data Compression and Storage	PEC	3	0	0	3	3
2.	22IT5314	Multimedia and Animation	PEC	3	0	0	3	3
3.	22IT5315	Video Creation and Editing	PEC	3	0	0	3	3
4.	22IT6309	UI and UX Design	PEC	3	0	0	3	3
5.	22IT6310	Digital marketing	PEC	3	0	0	3	3
6.	22IT7305	Visual Effects	PEC	3	0	0	3	3

### Details of Vertical VI: Emerging Technologies

S. NO.	COURSE CODE	COURSE TITLE	CATEGORY	PERIODS PER WEEK			TOTAL CONTACT PERIODS	CREDITS
				L	T	P		
1.	22IT5316	Augmented Reality	PEC	3	0	0	3	3
2.	22IT5317	Robotic Process Automation	PEC	3	0	0	3	3
3.	22IT5318	Cognitive Science and Deep Learning	PEC	3	0	0	3	3
4.	22IT6311	Cyber security	PEC	3	0	0	3	3
5.	22IT6312	Quantum Computing	PEC	3	0	0	3	3
6.	22IT7306	Cryptocurrency and Blockchain Technologies	PEC	3	0	0	3	3

#### Enrollment for B.E. / B. TECH. (HONOURS) / Minor Degree (optional)

A student can also optionally register for additional courses (18 credits) and become eligible for the award of B.E. / B. Tech. (Honours) or Minor Degree. For B.E. / B. Tech. (Honours), a student shall register for the additional courses (18 credits) from semester V onwards. These courses shall be from the same vertical or a combination of different verticals of the same programme of study only. For minor degree, a student shall register for the additional courses (18 credits) from semester V onwards. All these courses have to be in a particular vertical from any one of the other programmes.

**Clause 4.10** of Regulation 2022 is applicable for the Enrolment of B.E. / B. TECH. (HONOURS) / Minor Degree (Optional).

#### VERTICALS FOR MINOR DEGREE

- Heads are requested to provide one vertical from their program to offer for other program students to register for additional courses (18 Credits) to become eligible for the B.E./B.Tech. Minor Degree.

Note: Each programme should provide verticals for minor degree

S. NO.	COURSE CODE	COURSE TITLE	CATE GORY	PERIODS PER WEEK			TOTAL CONTACT PERIODS	CREDITS
				L	T	P		
1.	22IT5601	Sem 5: Database System	MDC	3	0	0	3	3
2.	22IT6601	Sem 6: Fundamentals of Data Science	MDC	3	0	0	3	3
3.	22IT6602	Sem 6: Artificial Intelligence and Expert Systems	MDC	3	0	0	3	3
4.	22IT7601	Sem 7: Data Exploration and Visualization	MDC	3	0	0	3	3
5.	22IT7602	Sem 7: Business Intelligence	MDC	3	0	0	3	3
6.	22IT8601	Sem 8: Cyber Security	MDC	3	0	0	3	3

\*MDC – Minor Degree Course

In addition to the above the following additional courses for Minor Degree can also be given to the student's common to all the branches.

Vertical I Fintech and Block Chain	Vertical II Entrepreneurship	Vertical III Environment and Sustainability
Financial Management	Foundations of Entrepreneurship	Sustainable infrastructure Development
Fundamentals of Investment	Team Building & Leadership Management for Business	Sustainable Agriculture and Environmental Management
Banking, Financial Services and Insurance	Creativity & Innovation in Entrepreneurship	Sustainable Bio Materials
Introduction to Blockchain and its Applications	Principles of Marketing Management for Business	Materials for Energy Sustainability
Fintech Personal Finance and Payments	Human Resource Management for Entrepreneurs	Green Technology
Introduction to Fintech	Financing New Business Ventures	Environmental Quality Monitoring and Analysis

### B Tech (Hons) Information Technology with Specialization in Artificial Intelligence and Machine Learning

S.No.	Course Code	Course Title	Category	Periods per Week				TCP	CIA	ESE	Total
				L	T	P	C				
1.	22IT5203	Foundations of Machine Learning	PC	3	0	0	3	4	40	60	100
2.	22IT6203	Knowledge Engineering	PC	3	0	0	3	4	40	60	100
3.	22IT6204	Soft Computing	PC	3	0	0	3	4	40	60	100
4.	22IT7203	Optimization Techniques	PC	3	0	0	3	4	40	60	100
5.	22IT7204	Deep Learning	PC	3	0	0	3	4	40	60	100
6.	22IT8201	Game theory	PC	3	0	0	3	4	40	60	100

**B Tech (Hons) Information Technology with Specialization in Cyber Security**

S.No.	Course Code	Course Title	Category	Periods per Week				TCP	CIA	ESE	Total
				L	T	P	C				
1.	22IT5204	Ethical Hacking	PC	3	0	0	3	3	40	60	100
2.	22IT6205	Digital and Mobile Forensics	PC	3	0	0	3	3	40	60	100
3.	22IT6206	Social Network Security	PC	3	0	0	3	3	40	60	100
4.	22IT7206	Engineering Secure Software Systems	PC	3	0	0	3	3	40	60	100
5.	22IT7207	Cryptocurrency and Blockchain Technologies	PC	3	0	0	3	3	40	60	100
6.	22IT8202	Network Security	PC	3	0	0	3	3	40	60	100

**B Tech (Hons) Information Technology with Specialization in BlockChain Technology**

S.No.	Course Code	Course Title	Category	Periods per Week				TCP	CIA	ESE	Total
				L	T	P	C				
1.	22IT5205	Fundamentals of Blockchain Technology	PC	3	0	0	3	3	40	60	100
2.	22IT6207	Blockchain Architecture and Design	PC	3	0	0	3	3	40	60	100
3.	22IT6208	Building Private Blockchain	PC	3	0	0	3	3	40	60	100
4.	22IT7208	Blockchain Business Models	PC	3	0	0	3	3	40	60	100
5.	22IT7209	Blockchain and IoT	PC	3	0	0	3	3	40	60	100
6.	22IT8203	Blockchain and AI	PC	3	0	0	3	3	40	60	100

Note: Each programme should provide verticals for Honours degree

Sem. No	Course	Course Title	L	T	P	C	TCP	CIA	ESE	TOTAL
<b>SKILLED / INTEGRATED COURSES OFFERED THROUGH CHOICE BASED CREDIT SYSTEM</b>										
1	22CS1152	Object Oriented Programming using Python	2	0	2	3	4	50	50	100
2	22IT2252	Relational Database Management System	2	0	2	3	4	50	50	100
4	22IT4204	Design Thinking	3	0	0	3	3	40	60	100
4	22IT4003	Design Thinking Laboratory	0	0	4	2	4	60	40	100
5	22IT5252	Predictive Modeling	2	0	2	3	4	50	50	100
6	22IT6313	Business Intelligence	3	0	0	3	3	40	60	100
6	22IT6314	Big Data and Security	3	0	0	3	3	40	60	100
7	22IT7205	Data Science	3	1	0	4	4	40	60	100
7	22IT7002	Data Science Laboratory	0	0	4	2	4	60	40	100

**SEMESTER-WISE CREDIT DISTRIBUTION**

<b>B.E. / B.TECH. PROGRAMMES</b>										
S.No.	Course Area	Credits per Semester								Total Credits
		I	II	III	IV	V	VI	VII	VIII	
1	HSC	3	3	-	2	-	3	-	-	11
2	BSC	7	9	4	-	-	-	-	-	23
3	ESC	6	2	5	-	-	2	-	-	15
4	PCC	-	5	13	20	12	5	9	-	61
5	PEC	-	-	-	-	9	6	3	-	18
6	OEC	-	-	-	-	-	6	6	-	12
7	EEC	3	3	3	1	1	2	2	10	25
8	MCC	✓	✓	-	-	-	-	-	-	-
<b>Total</b>		<b>19</b>	<b>22</b>	<b>25</b>	<b>23</b>	<b>22</b>	<b>24</b>	<b>20</b>	<b>10</b>	<b>165</b>

**CREDIT DISTRIBUTION R2022**

Semester	I	II	III	IV	V	VI	VII	VIII	Total
Credits	19	22	25	23	22	24	20	10	165

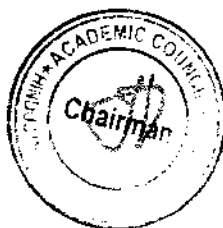
*[Signature]*  
Chairman BoS

Chairman - BoS  
IT - HICET

*[Signature]*  
Dean Academics

Dean (Academics)  
HICET

*[Signature]*  
Principal



# **SYLLABUS**





**SEMESTER III**

Programme	Course code	Name of the course	L	T	P	C
-----------	-------------	--------------------	---	---	---	---

Unit	Description	Instructional Hours
<b>The student should be able</b>		
<b>Course Objective</b>	1 Construct a well-defined knowledge of statistics.	
	2 Introduce Correlation and Regression concepts.	
	3 Describe some basic concepts of statistical methods for testing the hypothesis.	
	4 Analyze the design of experiment techniques to solve various engineering problems.	
	5 Apply the basic characteristic features of a queuing system and acquire skills in analyzing queuing models.	
<b>I</b>	<b>DISCRIPTIVE STATISTICS</b> Descriptive statistics - Measures of central tendency - mean - median - mode, Measures of dispersion - range - quartile deviation - standard deviation - coefficient of variation.	12
<b>II</b>	<b>CORRELATION AND REGRESSION</b> Correlation - Karl Pearson's correlation coefficient - Spearman's Rank Correlation - Regression lines (problems based on Raw data only).	12
<b>III</b>	<b>HYPOTHESIS TESTING</b> Large sample test based on Normal distribution - test of significance for single mean and difference of means - Tests based on t (for single mean and difference of means) - F distribution - for testing difference of variance, Chi - Square test for Contingency table (Test for Independency) - Goodness of fit.	12
<b>IV</b>	<b>ANALYSIS OF VARIANCE</b> Introduction, assumptions of analysis of variance, completely randomized design, randomized block design, Latin square design.	12
<b>V</b>	<b>QUEUEING THEORY</b> Markovian models: Single and Multiple server queuing models (Excluding proof) - (M/M/1);(∞/FCFS), (M/M/1):(N/FCFS), (M/M/C):(∞/FCFS) and (M/M/C):(N/FCFS).	12
<b>Total Instructional Hours</b>		<b>60</b>
<b>Course Outcome</b>	CO1 Understand the concepts of statistics.	
	CO2 Compute correlation and predict unknown values using regression.	
	CO3 Understand the concepts of statistical methods for testing the hypothesis.	
	CO4 Apply Design of Experiment techniques to solve various engineering problems	
	CO5 Identify the queuing models in the given system, find the performance measures and analyse the result	

**TEXT BOOK:**

- T1 Gupta S. P, "Statistical Methods", Sultan Chand & Sons Publishers, 2016
- T2 Walpole. R.E., Myers. R.H., Myers. S.L., and Ye. K., "Probability and Statistics for Engineers and Scientists", 10th Edition, Pearson Education, Asia, 2015.

**REFERENCES:**

- R1 Applied statistics and Probability for Engineers by C.Montgomery, 6<sup>th</sup> Edition, Wiley Publications.
- R2 A.O. Allen, "Probability, Statistics and Queuing Theory with Computer Applications", Elsevier, Second Edition, 2012.
- R3 Walpole R. E., Myers S.L. & Keying Ye, "Probability and Statistics for Engineers and Scientists", Pearson Education Inc, 9th edition, 2012.



*[Signature]*  
**Chairman, Board of Studies**  
**Chairman - BOS**  
**IT - HICET**

*[Signature]*  
**Dean - Academics**  
**Dean (Academics)**  
**HICET**



	<b>The student should be able</b>	
<b>Course Objective</b>	1 To understand the concept of ADT and list operations	
	2 To learn linear data structures – Stack and Queue	
	3 To gain expertise in various searching, sorting and hashing algorithms	
	4 To apply tree data structure	
	5 To understand the graph data structure and its applications	
<b>Unit</b>	<b>Description</b>	<b>Instructional Hours</b>
	<b>LIST</b>	
I	Abstract Data Types (ADTs) – List ADT – Array-based implementation – Linked list implementation – Singly linked lists- Doubly-linked lists - Circularly linked lists – Applications of lists.	9
	<b>STACK AND QUEUE</b>	
II	Stack: Array and Linked Stacks – Applications: Balancing Symbols, Infix to Postfix conversion, Evaluating Postfix expression, Recursion – Queue: Array and Linked Queue, Circular Queue – Double Ended Queue – Applications.	9
	<b>SEARCHING, SORTING AND HASHING TECHNIQUES</b>	
III	Introduction to searching - Types of search -Linear Search-Binary Search- Sorting: Bubble sort-Insertion sort- Selection sort-Shell sort- Merge sort – Hashing: Hash table – Hash functions –Resolving Collision Techniques: Separate chaining – Open addressing –Double hashing.	9
	<b>TREE STRUCTURES</b>	
IV	Tree Terminologies – Binary tree: Representation - Tree traversal: In-order, Pre-order, Post order, Level order – Binary Search Tree: Representation – Operations– AVL Tree – B-Tree– Applications: Expression tree.	9
	<b>GRAPH STRUCTURES</b>	
V	Graph: Terminologies – Representation of Graph - Graph traversal –Breadth-first traversal – Depth-first traversal-Topological sort – Shortest path algorithm- Dijkstra’s algorithm- Minimum spanning tree algorithm	9
	<b>Total Instructional Hours</b>	<b>45</b>
<b>Course Outcome</b>	CO1 Comprehend the working of linear data structures and identify their applications	
	CO2 Demonstrate the stack and queue with suitable applications	
	CO3 Apply suitable methods for efficient data access through searching, sorting and hashing	
	CO4 Understand the various tree data structures for efficient storage and retrieval of data	
	CO5 Employ graph data structure for solving real world problems	

**TEXT BOOK:**

- T1 Mark A.Weiss, “Data Structures and Algorithm Analysis in C”, Second Edition, Pearson Education, 2010  
T2 Seymour Lipschutz, ”Data Structures using C”, First Edition, McGraw Hill Education, 2017.

**REFERENCES:**

- R1 Salaria R S, “Data Structures and Algorithms using C”, Fifth Edition, Khanna Book Publishing, New Delhi, 2012  
R2 ReemaThareja, “Data Structures Using C”, Second Edition, Oxford University Press, 2019.  
R3 Venkatesan R and Lovelyn Rose S, “Data Structures”, Wiley India Pvt.Ltd., New Delhi, 2015.



*[Signature]*  
**Chairman, Board of Studies**  
**Chairman - BoS**  
**HICET**

*[Signature]*  
**Dean–Academics**  
**Dean (Academics)**  
**HICET**

Unit	Description	Instructional Hours
<b>The student should be able</b>		
<b>Course Objective</b>	1 Study the basic concepts and Understand the structure of Operating Systems	
	2 Learn about Processes, Scheduling algorithms	
	3 Learn about Deadlocks and various Memory Management schemes	
	4 Study about Storage Management systems	
	5 Learn Virtual Machine Concepts	
<b>OPERATING SYSTEMS OVERVIEW</b>		
I	Introduction: Operating System Structure–Operating System Operations–Process Management– Memory Management– Storage Management. System Structures: Operating System Services – System Calls –Types of System Calls –System Programs– System Boot.	9
<b>PROCESS MANAGEMENT</b>		
II	Process Concept– Inter-process Communication – Threads: Overview– Multithreading Models. Synchronization: The Critical-Section Problem – Mutex Locks - Semaphores– Process Scheduling: Basic Concepts– Scheduling Criteria– Scheduling Algorithms.	9
<b>DEADLOCK &amp; MEMORY MANAGEMENT</b>		
III	Deadlocks: System Model–Deadlock Characterization–Deadlock Prevention – Deadlock Avoidance – Deadlock Detection– Recovery from Deadlock. Memory Management Strategies: Swapping – Contiguous Memory Allocation– Segmentation –Paging. Virtual Memory Management: Demand Paging–Page Replacement.	12
<b>STORAGE MANAGEMENT</b>		
IV	Mass-Storage Structure: Disk Scheduling, RAID Structure, File System: File Concept– Access Methods–Directory and Disk Structure–Protection – File System Implementation: File System Structure– Allocation Methods– Free-space Management.	9
<b>VIRTUAL MACHINES</b>		
V	Overview– Building Blocks –Types of Virtual Machines and Their Implementations –Virtualization– Virtual Machine Examples.	6
<b>Total Instructional Hours</b>		<b>45</b>
<b>Course Outcome</b>	CO1 Compare the various System Calls and programs	
	CO2 Analyse the various Scheduling algorithms	
	CO3 Compare Deadlock Concepts and various memory management schemes	
	CO4 Analyse and implement a Storage Management Concepts	
	CO5 Study the Virtual Machine Concepts	

**TEXT BOOK:**

- T1 Abraham Silberschatz, Peter Baer Galvin and Greg Gagne, —Operating System Concepts, 9th Edition, John Wiley and Sons Inc., 2012. ISBN:9781118063330
- T2 RamazElmasri, A. Gil Carrick, David Levine, —Operating Systems – A Spiral Approach ,Tata McGraw Hill Edition, 2010

**REFERENCES:**

- R1 Andrew S.Tanenbaum, Modern Operating Systems,4/E,Pearson Publications,
- R2 Harvey M.Deitel–Operating systems, Third Edition, Pearson/Prentice Hall,2004. ISBN 0-13-124696
- R3 William Stallings, Operating Systems –Internals and Design Principles, 8/E, Pearson Publications



*[Signature]*  
Chairman, Board of Studies

*[Signature]*  
Dean–Academics

Dean (Academics)  
HICET

Programme Course code Name of the course L T P C

**The student should be able**

- Course Objective**
- 1 To study combinational circuits.
  - 2 To learn synchronous sequential circuits
  - 3 To understand the different development stages of digital computer.
  - 4 To expose the students about Parallelism using the concept of Pipelining
  - 5 To familiarize the Hierarchical Memory System and Accessing I/O devices

Unit	Description	Instructional Hours
I	<b>COMBINATIONAL LOGIC</b> Combinational Circuits – Karnaugh Map -Analysis and Design Procedures–Binary Adder – Subtractor – BCD Adder-Magnitude Comparator–Decoder–Encoder– Multiplexers-Demultiplexers	9
II	<b>SYNCHRONOUS SEQUENTIAL LOGIC</b> Introduction to Sequential Circuits–Flip-Flops–SR,JK,T,D-Operation and Excitation tables, Analysis and design of clocked sequential circuits–Design–Moore/Mealy models, State minimization, State assignment-Shift registers–Design of Counters-Ripple Counters.	9
III	<b>COMPUTER FUNDAMENTALS</b> Functional Units of a Digital Computer: Von-Neumann Architecture–Operation and Operands of Computer Hardware Instruction–Instruction Set Architecture (ISA): Memory Location, Address and Operation–Instruction and Instruction Sequencing– Addressing Modes, Encoding of Machine Instruction–Interaction between Assembly and High Level Language.	9
IV	<b>PROCESSOR</b> Instruction Execution–Building a Data Path–Designing a Control Unit–Hardwired Control, Microprogrammed Control–Pipelining–Data Hazard–Control Hazards.	9
V	<b>MEMORY AND I/O</b> Memory Concepts and Hierarchy–Memory Management–Cache Memories: Mapping and Replacement Techniques–Virtual Memory–DMA–I/O–Accessing I/O: Parallel and Serial Interface–Interrupt I/O–Interconnection Standards: USB, SATA	9
<b>Total Instructional Hours</b>		<b>45</b>

- Course Outcome**
- CO1 Design various combinational digital circuits using logic gates.
  - CO2 Analyze Sequential logic circuits.
  - CO3 Present an overview of the evolution of computer technology from early digital computers to the latest microprocessors.
  - CO4 Learn Pipelined concepts, Hazards and methods to overcome the Hazards
  - CO5 Exemplify in a better way the I/O and Memory Organization

**TEXT BOOK:**

- T1 M. Morris Mano, Michael D. Ciletti, "Digital Design : With an Introduction to the Verilog HDL, VHDL, and System Verilog", Sixth Edition, Pearson Education, 2018.
- T2 David A. Patterson, John L. Hennessy, "Computer Organization and Design, The Hardware/Software Interface", Sixth Edition, Morgan Kaufmann/Elsevier, 2020.

**REFERENCES:**

- R1 Carl Hamacher, Zvonko Vranesic, Safwat Zaky, Naraig Manjikian, "Computer Organization and Embedded Systems", Sixth Edition, Tata McGraw-Hill, 2012.
- R2 William Stallings, "Computer Organization and Architecture–Designing for Performance", Tenth Edition, Pearson Education, 2016.
- R3 M. Morris Mano, "Digital Logic and Computer Design", Pearson Education, 2016.

Chairman, Board of Studies

Chairman - BoS  
HICET



Dean–Academics

Dean (Academics)  
HICET

Programme	Course code	Name of the course	L	T	P	C
-----------	-------------	--------------------	---	---	---	---

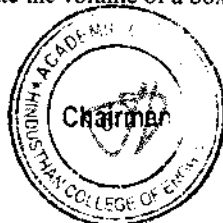


Unit	Description	Instructional Hours
	<b>The student should be able</b>	
<b>Course Objective</b>	1 Learn the basics of Java programming language 2 Discuss about classes and object in Java Programming. 3 Understanding Interface and package in Java Programming 4 Learn about Exception handling and IO Streams 5 Understanding about Multithreading And Applet	
<b>I</b>	<b>INTRODUCTION TO OBJECT ORIENTED PROGRAMMING</b> Basic Concepts of Object-oriented Programming- Object and classes –Abstraction and Encapsulation-Inheritance-Polymorphism-Dynamic binding-Message Communication. Introduction to Java programming-Features of Java Language -The Java Environment-Primitive Data types-variables - operators –control statements-Array-Strings	15
<b>II</b>	<b>CLASS AND OBJECT</b> Classes and objects –Methods-Access Specifier -constructor-Method overloading-static members -Inheritance – overriding methods – final keyword – abstract classes.	15
<b>III</b>	<b>INTERFACE AND PACKAGE</b> Interfaces-Defining Interface-Extending Interface -Implementing interface-Accessing Interface Variables. Packages-creating a package-accessing package –using package	15
<b>IV</b>	<b>EXCEPTION HANDLING AND IO STREAMS</b> Managing Error and exception-Exception-Syntax of Exception handling-Multiple catch statements-finally statements-Throwing our own exception -I/O basics- reading console input-writing console output-reading and writing files-Serialization	
<b>V</b>	<b>MULTITHREADING AND APPLLET</b> Creating Threads- Extending thread class-Stopping and Blocking Thread-Life cycle – Using Thread methods - Thread priority- Runnable Interface-Thread Class -Inter thread communication-Applet Introduction-Applet Life Cycle-Creating and Executing an Applet	15
<b>Total Instructional Hours</b>		<b>60</b>

**S.No List of Experiments**

- 1 If the appraisal rating is between 1 and 3, the increment is 10% of the salary.  
If the appraisal rating is between 3.1 and 4, the increment is 25% of the salary.  
If the appraisal rating is between 4.1 and 5, the increment is 30% of the salary.  
Help them to do this, by writing a Java program that displays the incremented salary.  
Note: If either the salary is 0 or negative (or) if the appraisal rating is not in the range 1 to 5 (inclusive), then the output should be "Invalid Input".
- 2 A year is a leap year if it is divisible by 4, unless it is divisible by 100 and not by 400. Write a Java Program that takes an integer value representing a year, and returns a Boolean result indicating whether or not the year is a leap year
- 3 Write a Java program to check whether a given substring is present in the given string
- 4 The Fibonacci sequence is defined by the following rule: The first two values in the sequence are 1 and 1. Every subsequent value is the sum of the two values preceding it. Write a Java program that uses both recursive and non-recursive methods to print the nth value in the Fibonacci sequence.
- 5 Write a Java program to calculate the volume of a box using class, objects and methods.

Chairman, Board of Studies  
 Chairman - BOS  
 IT - HICET



Dean-Academics  
 Dean (Academics)  
 HICET

- 6 Write a Java program to create an abstract class named Shape that contains an empty method named number Of Sides ( ). Provide three classes named Trapezoid, Triangle and Hexagon such that each one of the classes extends the class Shape. Each one of the classes contains only the method number Of Sides ( ) that shows the number of sides in the given geometrical figures.
- 7 Develop a calculator application should be able to perform arithmetic operations such as addition, subtraction, multiplication, and division. The calculator class will have multiple methods to handle different types of inputs and return the appropriate result. (Hint: Use Method loading)
- 8 In the online shopping system, there are various types of customers: regular customers and premium customers. Both types of customers have a unique identifier, name, and contact information. Premium customers, however, have additional benefits such as free shipping and discounts. Design a class hierarchy to model these customers using inheritance.
- 9 Create a Java package Compare with a class to calculate minimum and maximum value in tan array and import the package to perform the above operations.
- 10 Design an interface shape with a method to calculate area. Inherit these interfaces through class circle, square, rectangle, cylinder, and sphere and display the area.
- 11 Design a Java Program that implements following exception

- a. Divide By Zero
- b. Array Index Out Of Bounds
- c. Multiple Catch Blocks

- 12 Write a program to input name and balance of customer and create a user defined exception "Minimum Balance", which has to be thrown if the balance is less than 1500
- 13 Develop a Java application that reads the content of one file and copy to another file.
- 14 Build a Java application to implement multithreading by printing the time, date and year
- 15 Design an Applet that performs Arithmetic operation and displays the result.

**Course Outcome**

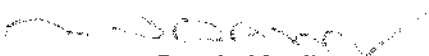
- CO1 Understand the basics of Java Programming
- CO2 Implementation of classes, object and methods in Java
- CO3 Developing a Java Program that uses Interface and package.
- CO4 Creating a Java Program that handles Exception and uses IO Streams
- CO5 To Develop a Java program using Multithreading And Applet

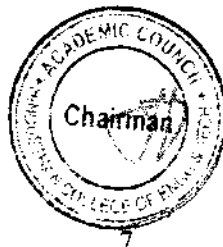
**TEXT BOOK:**


- T1 Herbert Schildt, Java: The Complete Reference, Tenth edition, McGraw – Hill 2018. ISBN: 9789387432291

**REFERENCES:**

- R1 E. Balagurusamy, Programming with java A Primer, fifth edition, McGraw – Hill 2014 ISBN: 9789351343202.
- R2 H.M. Deitel, P.J. Deitel, "Java: how to program", Fifth edition, Prentice Hall of India private limited, 2003. ISBN: 9780131016217

  
 Chairman, Board of Studies  
 Chairman - BoS  
 IT - MICET



  
 Dean - Academics  
 Dean (Academics)  
 HiCET



**The student should be able**

- |                         |   |                                                                                                               |
|-------------------------|---|---------------------------------------------------------------------------------------------------------------|
| <b>Course Objective</b> | 1 | Understand the history of data visualization and its connection with computer graphics.                       |
|                         | 2 | Examine the foundations and characteristics of data, which forms the beginning of the visualization pipeline. |
|                         | 3 | Understand the role of user interaction within visualizations and visualization design process                |
|                         | 4 | Evaluate the data using advanced python packages                                                              |
|                         | 5 | Analyze and apply some commercial data visualization packages with functionality.                             |

Unit	Description	Instructional Hours
<b>INTRODUCTION TO STATISTICS</b>		
I	Data collection methods, Descriptive Statistics Mean, Median, Mode, Inferential Statistics, Random Variables, Probability Distributions, Normal Distribution, Sampling and Sampling Distribution.	15
<b>VISUALIZATION USING R</b>		
II	Overview of R, Descriptive data analysis using R, Data manipulation with R Data visualization with R, R studio installation, Data manipulation with R (dplyr, data.table, reshape2 package, tidyr package, Lubricate package) ,Data Visualization with R (working with Graphics,ggplot2).	15
<b>WATSON STUDIO</b>		
III	Data visualization in Watson studio, Adding data to data refiner, Visualization of data in Watson studio.	15
<b>DATA ANALYSIS USING PYTHON</b>		
IV	Introduction to python, Python scripting basics, Data types - Introduction to Jupyter notebook, Numpy and Pandas, Python and Anaconda installation , Pandas (text data,date time columns, indexing and selecting data, group by Merge/join datasets).	15
<b>VISUALIZATION USING PYTHON</b>		
V	Data Visualization tools in python ,Basic plots using Matplotlib ,Specialized Visualization tools using Matplotlib ,Advanced Visualization tools using Matplotlib-Seaborn functionalities ,Spatial visualization and analysis in python in folium ,Usage of Seaborn functionalitie s ,Case studies	15
<b>Total Instructional Hours</b>		<b>60</b>

- |                       |     |                                                                                              |
|-----------------------|-----|----------------------------------------------------------------------------------------------|
| <b>Course Outcome</b> | CO1 | Understand the data collection methods and different distribution in statistics              |
|                       | CO2 | Understand the exploratory data analysis using visualization.                                |
|                       | CO3 | Design visual presentation of data for effective communication.                              |
|                       | CO4 | Apply various advanced python packages on data.                                              |
|                       | CO5 | Apply data transformation such as aggregation, filtration and application for visualization. |

**TEXT BOOK:**

- T1 IBM CE-Data visualization

**REFERENCES:**

- R1 Information Dashboard Design: Displaying Data for At-a-glance Monitoring  
 R2 The Big Book of dashboard by Steve Wexler.  
 R3 Mastering python data Visualization.



*[Signature]*  
 Chairman, Board of Studies  
 Chairman - SoS  
 IT - HICET

*[Signature]*  
 Dean - Academics  
 Dean (Academics)  
 HICET

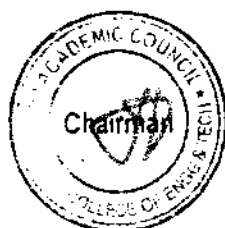


<b>Course Objective</b>	<b>The student should be able</b>
	1 Learn shell programming and the UNIX environment
	2 Be exposed to programming in C using system calls
	3 Learn to use the file system related system calls
	4 Be exposed to process creation and inter process communication.
5 Be familiar with implementation of CPU Scheduling Algorithms, page replacement algorithms and Deadlock avoidance	

Exp. No	Description of the Experiments
1	Study of Basic UNIX commands and its uses
2	Shell programming using operators and decision making statements
3	Implementation of CPU scheduling algorithms
4	Implementation of file allocation strategies
5	Implementation of Semaphores
6	Implementation of File Organization Techniques
7	Implementation of Bankers Algorithm for Dead Lock Avoidance
8	Implementing an Algorithm for Dead Lock Detection
9	Implementation of Page replacement algorithms
10	Implementation of IPC using Shared memory
11	Implementation Paging Technique for memory management

**Total Instructional Hours          60**

<b>Course Outcome</b>	CO1 Understand different UNIX commands and implement shell programming
	CO2 Compare the performance of various CPU Scheduling Algorithm
	CO3 Analyze the performance of the various page replacement algorithms
	CO4 Creation of processes and implement IPC
	CO5 Visualize paging with other techniques and synchronization



*[Signature]*  
**Chairman, Board of Studies**  
**Chairman - BOS**  
**IT - HICET**

*[Signature]*  
**Dean-Academics**  
**Dean (Academics)**  
**HICET**





**The student should be able**

- Course Objective**
- 1 To understand different methods used for the simplification of Boolean functions
  - 2 To study combinational circuits
  - 3 To learn synchronous sequential circuits
  - 4 To understand about Shift registers
  - 5 To understand the basic concepts of Computer Organizations

**Exp. No Description of the Experiments**

- 1 Verification of Boolean theorems using logic gates.
- 2 Design and Implementation of Half Adder and Half Subtractor using basic gates.
- 3 Implementation of 4-bit binary adder/subtractor circuits.
- 4 Implementation of Code converters
- 5 Implementation of Magnitude Comparator
- 6 Implementation of Multiplexer using logic gates.
- 7 Implementation of Encoder and Decoder circuits.
- 8 Implementation of the synchronous counters
- 9 Implementation of Shift Register
- 10 Simulator based study of Computer Architecture

**Total Instructional Hours 60**

- Course Outcome**
- CO1 Simplify Boolean functions using different methods
  - CO2 Analyse, design and implement combinational logic circuits.
  - CO3 Analyse, design and implement Synchronous sequential logic circuits
  - CO4 Analyse, design and implement Shift Registers
  - CO5 Simulate the study of Computer Architecture



*[Signature]*  
 Chairman, Board of Studies  
**Chairman - BoS**  
**IT - HICET**

*[Signature]*  
 Dean-Academics  
**Dean (Academics)**  
**HICET**

Programme	Course code	Name of the course	L	T	P	C
BE/BTECH	22HE3071	SOFT SKILLS AND APTITUDE - II	0	0	0	1

**The student should be able**

**Course Objective**

- 1 Solve Logical Reasoning questions of easy to intermediate level
- 2 Solve Quantitative Aptitude questions of easy to intermediate level
- 3 Solve Verbal Ability questions of easy to intermediate level
- 4 Display good writing skills while dealing with essays

Unit	Description	Instructional Hours
I	<b>Logical Reasoning</b> Clocks - Calendars - Direction Sense - Cubes - Data Interpretation: Tables, Pie Chart, Bar Graph - Data Sufficiency	9
II	<b>Quantitative Aptitude</b> Time and work: Work with different efficiencies, Pipes and cisterns, Work equivalence, Division of wages - Time, Speed and Distance: Basics of time, speed and distance, Relative speed, Problems based on trains, Problems based on boats and streams, - Profit and loss, Basic terminologies in profit and loss - Averages - Weighted average	12
III	<b>Verbal Ability</b> Sentence Correction: Subject-Verb Agreement, Modifiers, Parallelism, Pronoun-Antecedent Agreement, Verb Time Sequences, Comparisons, Prepositions, Determiners - Sentence Completion and Para-jumbles: Pro-active thinking, Reactive thinking (signpost words, root words, prefix suffix, sentence structure clues), Fixed jumbles, Anchored jumbles.	7
IV	<b>Writing skills for placements</b> Essay writing: Idea generation for topics, Best practices, Practice and feedback	2
<b>Total Instructional Hours</b>		<b>30</b>

**Course Outcome**

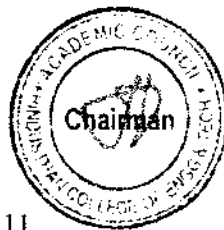
- CO1 Students will avoid the various fallacies that can arise through the misuse of logic.
- CO2 Students would opt for alternate methods to solve the problems rather than conventional methods.
- CO3 Students will heighten their awareness of correct usage of English grammar in writing and speaking
- CO4 Students will be concise and clear, using professional language for placements.

**REFERENCES:**

- R1 A New Approach To Reasoning Verbal & Non-Verbal By B.S. Sijwali
- R2 How to prepare for data interpretation for CAT by Arun Sharma.
- R3 How to Crack TEST OF REASONING in all competitive examinations by Jaikishan and Premkishan.
- R4 Quantitative Aptitude for Competitive Examinations - Dr. R.S. Aggarwal, S. Chand
- R5 Word Power Made Easy by Norman Lewis
- R6 Six weeks to words of power by Wilfred Funk

**Chairman, Board of Studies**

**Chairman - BoS  
IT - HICET**



11

**Dean-Academics**

**Dean (Academics)  
HICET**



<b>Course Objective</b>	<b>The student should be able</b>	
	1	To understand the linear data structures and its types
	2	To learn linear data structures – stack and queue
	3	Be exposed to sorting, searching, hashing algorithms
	4	To learn tree data structure and its applications
<b>Exp. No</b>		<b>Description of the Experiments</b>
	1	Program to implement list using arrays
	2	Implementation of Singly Linked List
	3	Implement Doubly linked list with all its basic operations
	4	Implementation of Stack
	5	Implementation of Queue
	6	Implementation of Evaluating Postfix Expressions, Infix to Postfix conversion
	7	Develop a program to perform a linear and binary search
	8	Program to sort the elements in ascending order using selection sort, insertion sort, bubble sort
	9	Program to sort the elements in ascending order using Merge sort
	10	Write a program to implement Hash Table with Quadratic Probing.
	11	Implementation of Binary Search Trees
	12	Program to construct expression tree for a given expression and perform various tree traversal methods
	13	Implementation of the following graph traversal algorithms: a) Depth first traversal b) Breadth first traversal
	14	Implementation of Dijkstra’s algorithm for a graph.
	15	Implementation of Prim’s algorithm for a graph.
<b>Course Outcome</b>		<b>Total Instructional Hours</b> <b>60</b>
	CO1	Demonstrate the various Linear data structures using simple applications.
	CO2	Apply the linear data structures – stack and queue for real world problems
	CO3	To implement various Sorting and Searching and Hashing Techniques.
	CO4	To implement non linear data structure - Tree
	CO5	Employ graph data structure for solving real world problems



*[Signature]*  
**Chairman, Board of Studies**  
**Chairman - BoS**  
**HICET**

*[Signature]*  
**Dean - Academics**  
**Dean (Academics)**  
**HICET**

Programme	Course code	Name of the course	L	T	P	C
B.E	22MC3191	ESSENCE OF INDIAN TRADITIONAL KNOWLEDGE	2	0	0	0

**The student should be able**

- Course Objective**
- 1 To facilitate the students with the concepts of Indian traditional knowledge and to make them understand the Importance of roots of knowledge system.
  - 2 To make the students understand the traditional knowledge and analyse it and apply it to their day-to-day life.
  - 3 To impart basic principles of thought process, It has and Dharma Shastra and connecting society and nature.
  - 4 To understand the concept of Intellectual and intellectual property rights with special Reference.
  - 5 The course focuses on introduction to Indian Knowledge System, Indian perspective of modern scientific world-view and basic principles of Yoga and Indian philosophy.

Unit	Description	Instructional Hours
	<b>Introduction to traditional knowledge:</b> Define traditional knowledge, nature and characteristics, scope and importance, kinds of traditional knowledge, Indigenous Knowledge (IK), characteristics, traditional knowledge vs indigenous knowledge, traditional knowledge vs western knowledge	9
I	<b>Protection of traditional knowledge:</b> The need for protecting traditional knowledge, Significance of TK Protection, value of TK in global economy, Role of Government to harness TK	9
II	<b>Itihas and Dharma-Shastra</b> Itihas: The Mahabharata - The Puranas - The Ramayana Dharma-Shastra: Manu Needhi - The Tirukkural – Thiru Arutpa	9
III	<b>Traditional knowledge and intellectual property:</b> Systems of traditional knowledge protection, Legal concepts for the protection of traditional knowledge, Patents and traditional knowledge, Strategies to increase protection of traditional knowledge	9
IV	<b>Indian philosophy</b> Jain – Buddhist – Charvaka – Samkhya - Yoga - Nyaya - Vaisheshika - Saiva Siddhanta	9
V	<b>Total Instructional Hours</b>	45

Course Outcome	Description
CO1	Identify the concept of Traditional knowledge and its importance.
CO2	Explain the need and importance of protecting traditional knowledge.
CO3	Explain the need and importance of Itihas and Dharma Shastra.
CO4	Interpret the concepts of Intellectual property to protect the traditional knowledge.
CO5	Interpret the concepts of indian philosophy to protect the traditional knowledge.

**REFERENCES:**

- R1 Traditional Knowledge System in India, by Amit Jha, 2009.
- R2 Traditional Knowledge System in India by Amit Jha Atlantic publishers, 2002.
- R3 "Knowledge Traditions and Practices of India" Kapil Kapoor1, Michel Danino2.
- R4 V. Sivaramakrishna (Ed.), Cultural Heritage of India-Course Material, Bharatiya Vidya Bhavan, Mumbai, 5th Edition, 2014.
- R5 V N Jha ( Eng. Trans.), Tarkasangraha of Annam Bhatta, International Chinmay Foundation, Velliarnad, Amaku,am.

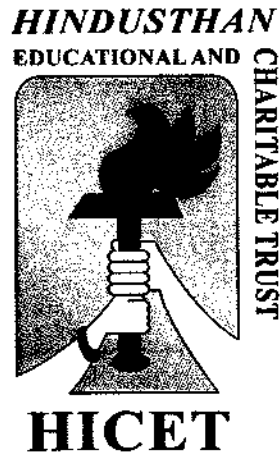


Chairman, Board of Studies  
Chairman - BOS  
IT - HICET

Dean-Academics  
Dean (Academics)  
HiCET

**HINDUSTHAN COLLEGE OF ENGINEERING AND TECHNOLOGY**  
(An Autonomous Institution Affiliated to Anna University, Chennai)  
(Approved by AICTE, New Delhi, Accredited by NAAC with 'A' Grade)  
Coimbatore - 641 032.

**B.TECH. INFORMATION TECHNOLOGY**



**CHOICE BASED CREDIT SYSTEM**

**Revised Curriculum and Syllabus for the Odd semester**  
**Academic year 2023-24**  
**(Academic Council Meeting held on 19.06.2023)**





**DETAILS OF CHANGES CARRIED OUT IN CURRICULUM & SYLLABUS**

**CBCS PATTERN**

**UNDERGRADUATE PROGRAMMES**

**B.TECH. INFORMATION TECHNOLOGY (UG)**

**REGULATION-2019**

**For the students admitted during the academic year 2021-2022 and onwards**

**The course code 21 indicates that the students joined in the academic year 2021**

**SEMESTER I**

S.No.	Course Code	Course Title	Type	L	T	P	C	CIA	ESE	TOTAL
<b>THEORY</b>										
1.	21HE1101	Technical English	HS	2	1	0	3	40	60	100
2.	21MA1101	Calculus	BS	3	1	0	4	40	60	100
<b>THEORY &amp; LAB COMPONENT</b>										
3.	21PH1151	Applied Physics	BS	2	0	2	3	50	50	100
4.	21CY1151	Chemistry for Engineers	BS	2	0	2	3	50	50	100
5.	21CS1151	Python Programming and Practices	ES	2	0	2	3	50	50	100
6.	21EC1154	Basics of Electron Devices and Electric Circuits	ES	2	0	2	3	50	50	100
<b>PRACTICAL</b>										
7.	21HE1071	Language Competency Enhancement Course-I	HS	0	0	2	1	100	0	100
<b>MANDATORY COURSES</b>										
8.	21HE1072	Career Guidance Level – I Personality, Aptitude and Career Development	EEC	2	0	0	0	100	0	100
9.	21HE1073	Entrepreneurship & Innovation	EEC	1	0	0	0	100	0	100
<b>Total:</b>				<b>16</b>	<b>2</b>	<b>10</b>	<b>20</b>	<b>580</b>	<b>320</b>	<b>900</b>

**SEMESTER II**

S.No.	Course Code	Course Title	Type	L	T	P	C	CIA	ESE	TOTAL
<b>THEORY</b>										
1.	21HE2101	Business English for Engineers	HS	2	1	0	3	40	60	100
2.	21MA2104	Differential Equations and Linear Algebra	BS	3	1	0	4	40	60	100
<b>THEORY &amp; LAB COMPONENT</b>										
3.	21IT2151*	Programming in C	ES	2	0	2	3	50	50	100
4.	21ME2154	Engineering Graphics	ES	1	0	4	3	50	50	100
5.	21PH2151	Material Science	BS	2	0	2	3	50	50	100
6.	21CY2151	Environmental Studies	BS	2	0	2	3	50	50	100
<b>PRACTICALS</b>										
7.	21ME2001	Engineering Practices	ES	0	0	4	2	50	50	100
8.	21HE2001	Language Competency	HS	0	0	2	1	100	0	100

		Enhancement Course-II								
<b>MANDATORY COURSES</b>										
9.	21HE2072	Career Guidance Level – II Personality, Aptitude and Career Development	EEC	2	0	0	0	100	0	100
<b>Total:</b>				<b>14</b>	<b>2</b>	<b>16</b>	<b>22</b>	<b>530</b>	<b>370</b>	<b>900</b>

### SEMESTER III

S.No.	Course Code	Course Title	Type	L	T	P	C	CIA	ESE	TOTAL
<b>THEORY</b>										
1.	21MA3151	Statistics and Queuing Theory	BS	3	0	2	4	50	50	100
2.	21IT3201	Data Structures and Algorithm Design	PC	3	0	0	3	40	60	100
3.	21IT3202	Object Oriented Programming Using C++	PC	3	0	0	3	40	60	100
4.	21IT3203	Computer Organization and Architecture	PC	3	0	0	3	40	60	100
<b>THEORY &amp; LAB COMPONENT</b>										
5.	21IT3251*	Digital Principles and System Design	PC	3	0	2	4	50	50	100
<b>PRACTICALS</b>										
6.	21IT3001	Data Structures and Algorithm Laboratory	PC	0	0	3	1.5	50	50	100
7.	21IT3002	Object Oriented Programming using C++ Laboratory	PC	0	0	3	1.5	50	50	100
<b>MANDATORY COURSES</b>										
8.	21MC3191	Indian Constitution	AC	2	0	0	0	100	0	100
9.	21HE3071	Career Guidance Level – III Personality, Aptitude and Career Development	EEC	2	0	0	0	100	0	100
10.	21HE3073	Leadership Management Skills	EEC	1	0	0	0	100	0	100
<b>Total:</b>				<b>20</b>	<b>0</b>	<b>10</b>	<b>20</b>	<b>575</b>	<b>425</b>	<b>1000</b>

### SEMESTER IV

S.No.	Course Code	Course Title	Type	L	T	P	C	CIA	ESE	TOTAL
<b>THEORY</b>										
1.	21MA4102	Discrete Mathematics	BS	3	1	0	4	40	60	100
2.	21IT4201	Java Programming	PC	3	0	0	3	40	60	100
3.	21IT4202	Advanced Database Management Systems	PC	3	0	0	3	40	60	100
<b>THEORY &amp; LAB COMPONENT</b>										
4.	21IT4251*	Object Oriented Software Engineering	PC	3	0	2	4	50	50	100
5.	21IT4253	Principles of Operating Systems	PC	3	0	2	4	50	50	100
<b>PRACTICALS</b>										
6.	21IT4001	Java Programming Laboratory	PC	0	0	3	1.5	50	50	100
7.	21IT4002	Database Management Systems Laboratory	PC	0	0	3	1.5	50	50	100
<b>MANDATORY COURSES</b>										
8.	21AC4191	Essence of Indian tradition knowledge/Value Education	AC	2	0	0	0	100	0	100



9.	21HE4072	Career Guidance Level – IV Personality, Aptitude and Career Development	EEC	2	0	0	0	100	0	100
10.	21HE4073	Ideation Skills	EEC	1	0	0	0	100	0	100
<b>Total:</b>				<b>20</b>	<b>2</b>	<b>8</b>	<b>21</b>	<b>620</b>	<b>380</b>	<b>1000</b>

### SEMESTER V

S. No	Course Code	Course Title	Category	L	T	P	C	CIA	ESE	Total
1.	21IT5201	Mobile Computing	PC	3	0	0	3	40	60	100
4.	21IT5204	Artificial Intelligence and Machine Learning	PC	3	0	0	3	40	60	100
5.	21IT5205	Data Warehousing and Data Mining	PC	3	0	0	3	40	60	100
6.	21IT53XX* /21IT5357	Professional Elective-I/ Business Intelligence Analyst	PE/ICC	2	0	2	3	50	50	100
<b>PRACTICALS</b>										
7.	21IT5001	Machine Learning Laboratory	PC	0	0	3	1.5	50	50	100
8.	21IT5002	Mobile Application Development Laboratory	PC	0	0	3	1.5	50	50	100
<b>MANDATORY COURSES</b>										
9.	21HE5071	Soft Skills - I	EEC	1	0	0	1	100	0	100
10.	21HE5072	Design Thinking	EEC	1	0	0	1	100	0	100
<b>TOTAL</b>				<b>19</b>	<b>0</b>	<b>8</b>	<b>23</b>	<b>550</b>	<b>450</b>	<b>1000</b>

S.No.	Course Code	Course Title	Type	L	T	P	C	CIA	ESE	TOTAL
<b>PROFESSIONAL ELECTIVE I</b>										
1	21IT5351R	Internet and Web Technology	PE	2	0	2	3	50	50	100
2	21IT5352	Advanced Java Programming	PE	2	0	2	3	50	50	100
3	21IT5353	C# and .Net Programming	PE	2	0	2	3	50	50	100
4	21IT5354	Advanced Data Structure	PE	2	0	2	3	50	50	100
5	21IT5355	Advanced Database Technology	PE	2	0	2	3	50	50	100
6	21IT5356	Ethics and AI	PE	2	0	2	3	50	50	100

**SEMESTER VI**

S. No	Course Code	Course Title	Category	L	T	P	C	CIA	ESE	Total
<b>THEORY</b>										
1.	21IT6181	Software Project Management	HS	3	0	0	3	40	60	100
2.	21IT6201	Internet of Things	PC	3	0	0	3	40	60	100
3.	21IT6202	Principles of Compiler Design	PC	3	0	0	3	40	60	100
4.	21IT63XX*	Professional Elective II	PE	3	0	0	3	40	60	100
5.	21XX64XX	Open Elective I	OE	3	0	0	3	40	60	100
<b>THEORY &amp; LAB COMPONENT</b>										
6.	21IT6251*	Cryptography and Network Security	PC	3	0	2	4	50	50	100
<b>PRACTICALS</b>										
7.	21IT6001	Internet of Things Laboratory	PC	0	0	3	1.5	50	50	100
8.	21IT6002	Hardware and Software Clinic	PC	0	0	3	1.5	50	50	100
<b>MANDATORY COURSES</b>										
9.	21IT6701	Internship/Industrial Training	EEC	0	0	0	1	100	0	100
10.	21HE6071	Soft Skill-II	EEC	1	0	0	1	100	0	100
11.	21HE6072	Intellectual Property Rights (IPR)	EEC	1	0	0	1	100	0	100
<b>TOTAL</b>				<b>20</b>	<b>0</b>	<b>8</b>	<b>25</b>	<b>575</b>	<b>525</b>	<b>1100</b>

S.No.	Course Code	Course Title	Type	L	T	P	C	CIA	ESE	TOTAL
<b>PROFESSIONAL ELECTIVE II</b>										
1	21IT6301	Business Intelligence And Analysis	PE	3	0	0	3	40	60	100
2	21IT6302	Information Security	PE	3	0	0	3	40	60	100
3	21IT6303	Software Design	PE	3	0	0	3	40	60	100
4	21IT6304	Natural Language Processing	PE	3	0	0	3	40	60	100
5	21IT6305	Soft Computing	PE	3	0	0	3	40	60	100
6	21IT6307	Virtual Reality and Augmented Reality	PE	3	0	0	3	40	60	100
7.	21IT6308	Web Development - I	PE	0	0	3	3	50	50	100

**OPEN ELECTIVE**

S.No.	Course Code	Course Title	Type	L	T	P	C	CIA	ESE	TOTAL
1.	21IT6402	Machine Learning for Engineers	OE	3	0	0	3	40	60	100

**SEMESTER VII**

S. No	Course Code	Course Title	Category	L	T	P	C	CIA	ESE	Total
<b>THEORY</b>										
1.	21IT7201	Distributed and Cloud Computing	PC	3	0	0	3	40	60	100
2.	21IT7202*	Data Science and Analytics	PC	3	0	0	3	40	60	100
3.	21IT7203	Software Testing and Quality Assurance	PC	3	0	0	3	40	60	100
4.	21IT73XX	Professional Elective III	PE	3	0	0	3	40	60	100
5.	21XX74XX	Open Elective – II	OE	3	0	0	3	25	75	100
<b>PRACTICALS</b>										
6.	21IT7001R	Distributed and Cloud Computing Laboratory	PC	0	0	3	1.5	50	50	100
7.	21IT7002R*	Data Analytics Laboratory	PC	0	0	3	1.5	50	50	100
<b>PROJECT WORK -</b>										
8.	21IT7901	Project Work - Phase I	EEC	0	0	4	2	50	50	100
<b>TOTAL</b>				<b>15</b>	<b>0</b>	<b>10</b>	<b>20</b>	<b>335</b>	<b>465</b>	<b>800</b>

<b>PROFESSIONAL ELECTIVE III</b>										
S.No.	Course Code	Course Title	Type	L	T	P	C	CIA	ESE	TOTAL
1.	21IT7301	Social Network analysis	PE	3	0	0	3	40	60	100
2.	21IT7302	Cyber Forensics	PE	3	0	0	3	40	60	100
3.	21IT7303	Software Documentation	PE	3	0	0	3	40	60	100
4.	21IT7304	Principles of Management	PE	3	0	0	3	40	60	100
5.	21IT7305	Software Architecture	PE	3	0	0	3	40	60	100
6.	21IT7306	Green Computing	PE	3	0	0	3	40	60	100
7.	21IT7307	Web Development - II	PE	0	0	3	3	50	50	100

<b>OPEN ELECTIVE - II</b>										
S.No.	Course Code	Course Title	Type	L	T	P	C	CIA	ESE	TOTAL
1.	21IT7401	Cyber Security	OE	3	0	0	3	40	60	100

**SEMESTER VIII**

S.No	Course Code	Course Title	Type	L	T	P	C	CIA	ESE	TOTAL
<b>THEORY</b>										
1.	21IT83XX	Professional Elective –IV	PE	3	0	0	3	25	75	100
2.	21IT83XX	Professional Elective- V	PE	3	0	0	3	25	75	100

PRACTICAL										
3.	21IT8901	Project Work – Phase II	EEC	0	0	24	8	50	50	100
TOTAL				6	0	24	14	100	200	300

PROFESSIONAL ELECTIVE IV										
1.	21IT8301	Graphics and Multimedia	PE	3	0	0	3	40	60	100
2.	21IT8302	Software Process	PE	3	0	0	3	40	60	100
3.	21IT8303	Service Oriented Architecture	PE	3	0	0	3	40	60	100
4.	21IT8304	Human Computer Interaction	PE	3	0	0	3	40	60	100
5.	21IT8305	Mobile Edge Systems	PE	3	0	0	3	40	60	100
6.	21IT8311	Robotics and its Applications	PE	3	0	0	3	40	60	100
PROFESSIONAL ELECTIVE V										
S.No.	Course Code	Course Title	Type	L	T	P	C	CIA	ESE	TOTAL
1.	21IT8306	Information Retrieval Technologies	PE	3	0	0	3	40	60	100
2.	21IT8307	Block Chain Technology	PE	3	0	0	3	40	60	100
3.	21IT8308	Professional Ethics	PE	3	0	0	3	40	60	100
4.	21IT8309	Deep Learning Techniques	PE	3	0	0	3	40	60	100
5.	21IT8310	Management Information System	PE	3	0	0	3	40	60	100
6.	21IT8312	Quantum Computing	PE	3	0	0	3	40	60	100
7.	21IT8314	Web Development - III	PE	0	0	3	3	50	50	100

LIFE SKILL COURSES										
1.	21LSZ401	General Studies for Competitive Examinations	OE	3	0	0	3	40	60	100
2.	21LSZ402	Human Rights, Women's Rights and Gender Equality	OE	3	0	0	3	40	60	100
3.	21LSZ403	Indian Ethos and Human Values	OE	3	0	0	3	40	60	100
4.	21LSZ404	Indian Constitution and Political System	OE	3	0	0	3	40	60	100
5.	21LSZ405	Yoga for Human Excellence	OE	3	0	0	3	40	60	100

#### Enrollment for B.E. / B. TECH. (HONOURS) / Minor Degree (optional)

A student can also optionally register for additional courses (18 credits) and become eligible for the award of B.E. / B. Tech. (Honours) or Minor Degree. For B.E. / B. Tech. (Honours), a student shall register for the additional courses (18 credits) from semester V onwards. These courses shall be from the same vertical or a combination of different verticals of the same programme of study only. For minor degree, a student shall register for the additional courses (18 credits) from semester V onwards. All these courses have to be in a particular vertical from any one of the other programmes.

Clause 4.10 of Regulation 2022 is applicable for the Enrolment of B.E. / B. TECH. (HONOURS) / Minor Degree (Optional).

## VERTICALS FOR MINOR DEGREE

- Heads are requested to provide one vertical from their program to offer for other program students to register for additional courses (18 Credits) to become eligible for the B.E./B.Tech. Minor Degree.

Note: Each programme should provide verticals for minor degree

S. NO.	COURSE CODE	COURSE TITLE	CATEGORY	PERIODS PER WEEK			TOTAL CONTACT PERIODS	CREDITS
				L	T	P		
2.	21IT6601	Sem 6: Fundamentals of Data Science	MDC	3	0	0	3	3
3.	21IT6602	Sem 6: Artificial Intelligence and Expert Systems	MDC	3	0	0	3	3
4.	21IT7601	Sem 7: Data Exploration and Visualization	MDC	3	0	0	3	3
5.	21IT7602	Sem 7: Business Intelligence	MDC	3	0	0	3	3
6.	21IT8601	Sem 8: Cyber Security	MDC	3	0	0	3	3

\*MDC – Minor Degree Course

In addition to the above the following additional courses for Minor Degree can also be given to the student's common to all the branches.

Vertical I - Fintech and Block Chain								
S. NO.	COURSE CODE	COURSE TITLE	CATEGORY	PERIODS PER WEEK			TOTAL CONTACT PERIODS	CREDITS
				L	T	P		
2.	21XXXXXX	Fundamentals of Investment	MDC	3	0	0	3	3
3.	21XXXXXX	Banking, Financial Services and Insurance	MDC	3	0	0	3	3
4.	21XXXXXX	Introduction to Blockchain and its Applications	MDC	3	0	0	3	3
5.	21XXXXXX	Fintech Personal Finance and Payments	MDC	3	0	0	3	3
6.	21XXXXXX	Introduction to Fintech	MDC	3	0	0	3	3

Vertical II - Entrepreneurship								
S. NO.	COURSE CODE	COURSE TITLE	CATEGORY	PERIODS PER WEEK			TOTAL CONTACT PERIODS	CREDITS
				L	T	P		
2.	21BA6601	Introduction to Business Venture	MDC	3	0	0	3	3
3.	21BA6602	Team Building & Leadership Management for Business	MDC	3	0	0	3	3

4.	21BA7601	Creativity & Innovation in Entrepreneurship	MDC	3	0	0	3	3
5.	21BA7602	Principles of Marketing Management for Business	MDC	3	0	0	3	3
6.	21BA8601	Human Resource Management for Entrepreneurs	MDC	3	0	0	3	3
7.	21BA8602	Financing New Business Ventures	MDC	3	0	0	3	3

Vertical III - Environment and Sustainability								
S. NO.	COURSE CODE	COURSE TITLE	CATEGORY	PERIODS PER WEEK			TOTAL CONTACT PERIODS	CREDITS
				L	T	P		
2.	22CEXXXX	Sustainable Agriculture and Environmental Management	MDC	3	0	0	3	3
3.	22CEXXXX	Sustainable Bio Materials	MDC	3	0	0	3	3
4.	22CEXXXX	Materials for Energy Sustainability	MDC	3	0	0	3	3
5.	22CEXXXX	Green Technology	MDC	3	0	0	3	3
6.	22CEXXXX	Environmental Quality Monitoring and Analysis	MDC	3	0	0	3	3

#### VERTICALS FOR HONOURS DEGREE

#### B.Tech. (Hons) Information Technology with Specialization in Artificial Intelligence and Machine Learning

S.No.	Course Code	Course Title	Category	Periods per Week				TCP	CIA	ESE	Total
				L	T	P	C				
2.	21IT6203	Knowledge Engineering	PC	3	0	0	3	4	40	60	100
3.	21IT6204	Soft Computing	PC	3	0	0	3	4	40	60	100
4.	21IT7205	Optimization Techniques	PC	3	0	0	3	4	40	60	100
5.	21IT7206	Deep Learning	PC	3	0	0	3	4	40	60	100
6.	21IT8201	Game theory	PC	3	0	0	3	4	40	60	100

#### B.Tech. (Hons) Information Technology with Specialization in Cyber Security and Data Privacy

S.No.	Course Code	Course Title	Category	Periods per Week				TCP	CIA	ESE	Total
				L	T	P	C				

2.	21IT6205	Digital and Mobile Forensics	PC	3	0	0	3	3	40	60	100
3.	21IT6207	Social Network Security	PC	3	0	0	3	3	40	60	100
4.	21IT7207	Engineering Secure Software Systems	PC	3	0	0	3	3	40	60	100
5.	21IT7208	Cryptocurrency and Blockchain Technologies	PC	3	0	0	3	3	40	60	100
6.	21IT8202	Network Security	PC	3	0	0	3	3	40	60	100

### B.Tech. (Hons) Information Technology with Specialization in BlockChain Technology

S.No.	Course Code	Course Title	Category	Periods per Week				TCP	CIA	ESE	Total
				L	T	P	C				
2.	21IT6208	Blockchain Architecture and Design	PC	3	0	0	3	3	40	60	100
3.	21IT6209	Building Private Blockchain	PC	3	0	0	3	3	40	60	100
4.	21IT7209	Blockchain Business Models	PC	3	0	0	3	3	40	60	100
5.	21IT7210	Blockchain and IoT	PC	3	0	0	3	3	40	60	100
6.	21IT8203	Blockchain and AI	PC	3	0	0	3	3	40	60	100

Note: Each programme should provide verticals for Honors degree


Sem. No.	Course Code	Course Title	L	T	P	C	CIA	ESE	TOTAL
<b>SKILLED / INTEGRATED COURSES OFFERED THROUGH CHOICE BASED CREDIT SYSTEM</b>									
1	21CS1152	Object Oriented Programming Using Python	2	0	2	3	50	50	100
2	21IT2153	Relational Database Management System	2	0	2	3	50	50	100
3	21IT3252	Data Visualization	3	0	2	4	50	50	100
4	21IT4252	Design Thinking	3	0	0	4	50	50	100
6	21IT6306	Predictive Modeling	3	0	0	3	40	60	100
6	21IT6252	Data Science	3	0	2	4	50	50	100
7	21IT7204	Big Data with Security	3	0	0	3	40	60	100
7	21IT7003	Big Data with Security Laboratory	0	0	3	1.5	50	50	100


**SEMESTER-WISE CREDIT DISTRIBUTION**

<b>B.E. / B.TECH. PROGRAMMES</b>										
<b>S.No.</b>	<b>Course Area</b>	<b>Credits per Semester</b>								<b>Total Credits</b>
		<b>I</b>	<b>II</b>	<b>III</b>	<b>IV</b>	<b>V</b>	<b>VI</b>	<b>VII</b>	<b>VIII</b>	
1	HS	04	04	-	-	-	03	-	-	11
2	BS	10	10	04	04	-	-	-	-	28
3	ES	06	08	-	-	-	-	-	-	11
4	PC	-	-	16	17	18	13	12		79
5	PE	-	-	-	-	03	03	03	06	15
6	OE	-	-	-	-	-	03	03	-	06
7	EEC	-	-	-	-	02	03	02	08	15
<b>Total</b>		<b>20</b>	<b>22</b>	<b>20</b>	<b>21</b>	<b>23</b>	<b>25</b>	<b>20</b>	<b>14</b>	<b>165</b>

**CREDIT DISTRIBUTION R2019**

<b>Semester</b>	<b>I</b>	<b>II</b>	<b>III</b>	<b>IV</b>	<b>V</b>	<b>VI</b>	<b>VII</b>	<b>VIII</b>	<b>Total</b>
<b>Credits</b>	20	22	20	21	23	25	20	14	165

  
**Chairman BoS**  
**Chairman - BoS**  
**IT - HICET**

  
**Dean Academics**  
**Dean (Academics)**  
**HICET**

  
**Principal**





# Hindusthan College of Engineering and Technology

An Autonomous Institution Affiliated to Anna University | Approved by AICTE, New Delhi

Accredited with 'A' Grade by NAAC | Accredited by NBA (ECE, MECH, EEE, IT & CSE)

Valley Campus, Pollachi Highway, Coimbatore 641 032. | [www.hicet.ac.in](http://www.hicet.ac.in)



S. No	Year	Semester	Course Code & Title	Existing Syllabus	Revised Syllabus	% of change
1.	III	V	2HITS202 COMPUTER NETWORKS	<p><b>COURSE CODE: 19ITS202</b></p> <p><b>Unit 1: OVERVIEW &amp; PHYSICAL LAYER</b>            Networks – Network Types – Protocol Layering – TCP/IP Protocol suite – OSI Model – Physical Layer :Performance – Transmission Media – Switching – Circuit-switched Networks – Packet Switching</p> <p><b>Unit 2: DATA LINK LAYER</b>            Introduction – Link-Layer Addressing – DLC Services – Data-Link Layer Protocols – HDLC– PPP – Media Access Control - Wired LANs: Ethernet - Wireless LANs: IEEE 802.11, Bluetooth – Connecting Devices.</p> <p><b>Unit 4: TRANSPORT LAYER</b>            Process to process delivery, User datagram protocol (UDP), Transmission control protocol (TCP), Data traffic, Congestion, Congestion control, Quality of service, Techniques to improve QoS, Integrated services, Differentiated services, QoS in switched networks.</p> <p><b>Unit 5: APPLICATION LAYER</b>            Client server model, Socket interface, Name space, Domain name space, Distribution of name space, DNS in the internet, Resolution, DNS messages, DDNS, Encapsulation, Electronic mail, File transfer, HTTP, World wide web (WWW), Digitizing audio and video, Audio and video compression, streamingstored audio/video, Streaming live audio/video, Real time interactive audio/video, Voice over IP.</p>	<p><b>COURSE CODE: 2HITS202</b></p> <p><b>Unit 1: OVERVIEW &amp; PHYSICAL LAYER</b>            Introduction - Network Types - TCP/IP Protocol suits - OSI Reference Model - Network Topologies – Physical Layer: Transmission Media: Guided Media, Unguided Media – Switching – Circuit Switched Networks - Packet Switching</p> <p><b>Unit 2 : DATA LINK LAYER</b>            Introduction – Link-Layer Addressing – DLC Services: Error detection and correction – Data-Link Layer Protocols – HDLC– PPP - Media Access Control - Wired LANs: Ethernet - Wireless LANs – Introduction –IEEE 802.11, Bluetooth – Connecting Devices.</p> <p><b>Unit 4: TRANSPORT LAYER</b>            Introduction – Transport Layer Protocols – Services – Port Numbers – User Datagram Protocol – Transmission Control Protocol – SCTP</p> <p><b>Unit 5: APPLICATION LAYER</b>            WWW and HTTP – FTP – Email – Telnet – SSH – DNS – SNMP.</p>	40

2.	III	V	21IT5203 Embedded System Design	<p><b>COURSE NAME &amp; CODE: 19IT5203 MICROCONTROLLER AND EMBEDDED SYSTEM</b></p> <p><b>Unit 1: THE MICROCONTROLLER ARCHITECTURE</b> Introduction to 8051 Microcontroller- Pin Configuration - Architecture- Input /Output Ports-Addressing Modes</p> <p><b>Unit 4: EMBEDDED COMPUTING AND MEMORY MANAGEMENT</b> Characteristics of Embedded Computing- Challenges of Embedded Systems- Embedded system design process-Memory System Mechanisms: Caches, Memory System Performance, MMU and Address Translation.</p> <p><b>Unit 5: EMBEDDED SYSTEM DEVELOPMENT</b> Embedded Software Development Tools-Emulators and Debuggers-Design Methodologies-Case Studies- Digital Camera, Smart Card, Mobile Phone Software.</p>	<p><b>COURSE NAME &amp; CODE: 21IT5203 EMBEDDED SYSTEM DESIGN</b></p> <p><b>Unit 1: INTRODUCTION TO EMBEDDED SYSTEM DESIGN</b> Complex systems and micro processors- Embedded system design process -Design example: Model train controller- Design methodologies- Design flows - Requirement Analysis - Specifications-System analysis and architecture design - Quality Assurance techniques.</p> <p><b>Unit 4: PROCESSES AND OPERATING SYSTEMS</b> Introduction - Multiple Tasks and Multiple Processes - Multirate Systems - Pre-emptive real-time Operating systems - Priority based scheduling - Inter process Communication Mechanisms - Distributed Embedded Systems - MPSoCs and Shared Memory Multiprocessors - Overview of Real time operating systems POSIX-Windows CE</p> <p><b>Unit 5: CASE STUDY</b> Audio Player - Digital Still Cameras - Engine Control Unit - Video Accelerator - Telephone Answering Machine - Data Compressor</p>	60
----	-----	---	------------------------------------------	-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------	------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------	----

Chairman BoS

Chairman - BoS  
IT - HiCET

Dean Academics

Dean (Academics)  
HiCET

Principal



# **SYLLABUS**



**SEMESTER V**

<b>Programme</b>	<b>Course code</b>	<b>Name of the course</b>	<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
B.TECH.	21IT5201	MOBILE COMPUTING	3	0	0	3

**The student should be able**

- Course Objective**
- 1 Learn the basic concepts of Mobile Computing.
  - 2 Understand the Architecture and Components of Mobile Operating Systems.
  - 3 Identify the various schemes in MAC protocols.
  - 4 Study the functionalities of Mobile IP protocols.
  - 5 Gain knowledge on Routing and Security issues in Ad hoc and Sensor networks

<b>Unit</b>	<b>Description</b>	<b>Instructional Hours</b>
	<b>CELLULAR TECHNOLOGY</b>	
<b>I</b>	Mobile Computing – Mobile Computing Vs Wireless Networking- Mobile Computing Applications – Characteristics of Mobile Computing – Structure of Cellular Mobile Communication –GSM – Services – Architecture – GPRS – Services – Architecture Services – UMTS, Satellite Systems-GEO, LEO, MEO.	9
<b>II</b>	<b>MOBILE APPLICATION DEVELOPMENT AND OPERATING SYSTEMS</b> Responsibilities of OS in Mobile device – Mobile O/S-Windows Mobile-Palm OS-Symbian OS Android and Blackberry OS, Protocols and Platforms for Mobile Computing -Mobile Devices as Web clients-WAP- Bluetooth, XML, J2ME, Java Card, Linux for Mobile Devices, Android Software Development Kit-M-Commerce-B2C and B2B applications-Security Issues	9
<b>III</b>	<b>MAC PROTOCOLS</b> Properties – Wireless MAC – Taxonomy – Fixed Assignment Schemes – Random Assignment Schemes – Reservation Based Schemes – Wireless LAN Standards – IEEE 802 Protocol Architecture, IEEE 802.11 System Architecture, Protocol Architecture & Services, MAC protocols for Ad Hoc networks, Cognitive Radio ad-Hoc networks	9
<b>IV</b>	<b>MOBILE INTERNET PROTOCOL AND MOBILE DATABASE</b> Mobile IP – Terminologies of Mobile IP – Packet Delivery – Features of Mobile IP – Key Mechanism– Route optimization -DHCP – Significance of DHCP , Transaction Processing in mobile Environment, Mobile Transaction models.	9
<b>V</b>	<b>MOBILE ADHOC NETWORKS &amp; WIRELESS SENSOR NETWORKS</b> MANET : Characteristics – Routing Protocols- VANET –Security issues in MANET – Attacks on Adhoc Networks – Sensor Networks: Characteristics - Routing Protocols.	9
	<b>Total Instructional Hours</b>	<b>45</b>

<b>Course Outcome</b>	CO1 Learn the basic concepts of mobile computing and its applications.
	CO2 Execute and Analyse the components of Mobile Operating Systems
	CO3 Understand the various schemes in MAC protocols.
	CO4 Understand and demonstrate the functionalities of Mobile IP protocols
	CO5 Understand the routing and security issues in Ad hoc and Sensor networks

**TEXT BOOK:**

- T1 Prasant Kumar Pattnaik, Rajib Mall, Fundamentals of Mobile Computing, PHI Learning Pvt. Ltd, Second Edition, New Delhi ,2015.
- T2 Jochen H. Schller, —Mobile Communications, Pearson Education, Second Edition, New Delhi, 2008

**REFERENCES:**

- R1 Asoke K Talukder, Hasan Ahmed and Roopa R Yavagal, —Mobile Computing–Technology, Applications and Service Creation, Tata McGraw Hill, New Delhi, 2010.
- R2 Jonathan Rodriguez, Fundamentals of 5G Mobile Networks, Wiley Publishers, 2015
- R3 Raj Kamal, —Mobile Computing, Oxford University Press, New Delhi, 2012

*[Signature]*  
Chairman, Board of Studies  
**Chairman - BoS**  
**IT - HICET**



*[Signature]*  
Dean–Academics  
**Dean (Academics)**  
**HICET**

**The student should be able**

- |                         |   |                                                                                       |
|-------------------------|---|---------------------------------------------------------------------------------------|
| <b>Course Objective</b> | 1 | To study the Protocol Layering and Physical Level Communication.                      |
|                         | 2 | To understand the Data Communication System and the purpose of Layered Architecture.  |
|                         | 3 | To analyze the concepts of Routing Methods and Sub-netting.                           |
|                         | 4 | To learn the functions of Network Layer and the various Routing Protocols.            |
|                         | 5 | To familiarize the functions and Protocols of the Transport Layer & Application Layer |

Unit	Description	Instructional Hours
<b>OVERVIEW &amp; PHYSICAL LAYER</b>		
I	Introduction - Network Types - TCP/IP Protocol suits - OSI Reference Model - Network Topologies - Physical Layer: Transmission Media: Guided Media, Unguided Media - Switching-Circuit Switched Networks-Packet Switching	9
<b>DATA LINK LAYER</b>		
II	Introduction - Link-Layer Addressing - DLC Services: Error detection and correction - Data-Link Layer Protocols - HDLC- PPP - Media Access Control - Wired LANs: Ethernet - Wireless LANs - Introduction -IEEE 802.11, Bluetooth - Connecting Devices.	9
<b>NETWORK AND ROUTING</b>		
III	Network Layer Services - Packet switching - Performance - IPV4 Addresses - Forwarding of IP Packets - Network Layer Protocols: IP, ICMP v4 - Unicast Routing Algorithms- IPV6 Addressing - IPV6 Protocol.	9
<b>TRANSPORT LAYER</b>		
IV	Introduction - Transport Layer Protocols - Services - Port Numbers - User Datagram Protocol - Transmission Control Protocol - SCTP.	9
<b>APPLICATION LAYER</b>		
V	WWW and HTTP - FTP - Email -Telnet -SSH - DNS - SNMP.	9
<b>Total Instructional Hours</b>		<b>45</b>

- |                       |     |                                                                                   |
|-----------------------|-----|-----------------------------------------------------------------------------------|
| <b>Course Outcome</b> | CO1 | Learn about the Protocol Layering and Physical Level Communication                |
|                       | CO2 | Understand the Data Communication System and the purpose of Layered Architecture. |
|                       | CO3 | Analyze the concepts of Routing Methods and Subnetting.                           |
|                       | CO4 | Describe the protocols for various functions in the Network.                      |
|                       | CO5 | Analyze the working of various Transport and application layer protocols          |

**TEXT BOOK:**

- T1 Larry Peterson, Bruce Davie, Computer Networks: A Systems Approach, Elsevier, Online Edition, 2019
- T2 Behrouz A. Forouzan, Data Communications and Networking with TCP/IP Protocol Suite, Sixth Edition TMH, 2022

**REFERENCES:**

- R1 Larry L. Peterson, Bruce S. Davie, Computer Networks: A Systems Approach, Fifth Edition, Morgan Kaufmann Publishers Inc., 2012.
- R2 William Stallings, Data and Computer Communications, Tenth Edition, Pearson Education, 2013.
- R3 Nader F. Mir, Computer and Communication Networks, Second Edition, Prentice Hall, 2014.
- R4 Ying-Dar Lin, Ren-Hung Hwang, Fred Baker, "Computer Networks: An Open Source Approach", McGraw Hill, 2012..



Chairman, Board of Studies

Dean - Academics

Dean (Academics)  
HiCET

Chairman - BOS  
IT - HiCET



**The student should be able to**

- Course Objective**
- 1 Understand the concepts of embedded system design and analysis
  - 2 Learn the architecture and programming of ARM processor
  - 3 Be exposed to the basic concepts of Embedded programming
  - 4 Understand the concepts of Processes and Operating systems
  - 5 Design an Embedded System for a Real time application.

Unit	Description	Instructional Hours
<b>INTRODUCTION TO EMBEDDED SYSTEM DESIGN</b>		
I	Complex systems and micro processors– Embedded system design process –Design example: Model train controller- Design methodologies- Design flows - Requirement Analysis – Specifications-System analysis and architecture design – Quality Assurance techniques.	9
<b>ARM PROCESSOR</b>		
II	ARM Architecture Versions – ARM Architecture – Instruction Set – Stacks and Subroutines – simple programs - Block Diagram description of ARM 9 and ARM Cortex M3 MCU – Block Diagram description of a Digital Signal Processor	9
<b>EMBEDDED PROGRAMMING</b>		
III	Components for embedded programs- Models of programs- Assembly, linking and loading – compilation techniques- Program level performance analysis – Software performance optimization – Program level energy and power analysis and optimization – Analysis and optimization of program size- Program validation and testing.	9
<b>PROCESSES AND OPERATING SYSTEMS</b>		
IV	Introduction – Multiple Tasks and Multiple Processes – Multirate Systems – Pre-emptive real-time Operating systems – Priority based scheduling – Inter process Communication Mechanisms – Distributed Embedded Systems – MPSoCs and Shared Memory Multiprocessors – Overview of Real time operating systems POSIX-Windows CE	9
<b>CASE STUDY</b>		
V	Audio Player – Digital Still Cameras - Engine Control Unit – Video Accelerator - Telephone Answering Machine – Data Compressor	9
<b>Total Instructional Hours</b>		<b>45</b>

- Course Outcome**
- CO1 Recall the various Design Methodologies for embedded system.
  - CO2 Describe the architecture and programming of ARM processor
  - CO3 Outline the concepts of embedded programming
  - CO4 Explain the basic concepts of Task and Scheduling.
  - CO5 Design Conceptual Embedded System

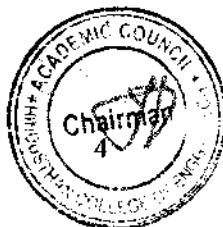
**TEXT BOOK:**


- T1 Wayne Wolf, "Computers as Components - Principles of Embedded Computing System Design", Morgan Kaufmann Publisher, 2nd Edition, 2011.
- T2 Shibu K V, "Introduction to Embedded Systems", Tata McGraw Hill Education, 2017

**REFERENCES:**

- R1 K.V.K.Prasad, "Embedded Real-Time Systems: Concepts, Design & Programming", Dreamtech Press, 2003.
- R2 RajKamal, "Embedded Systems Architecture, Programming And Design", Tata McGraw Hill, 2009.
- R3 Tammy Noergaard, "Embedded Systems Architecture", Elsevier, 2010.

  
 Chairman, Board of Studies  
 Chairperson - BGS  
 IT - HICET



  
 Dean Academics  
 Dean (Academics)  
 HICET

PROGRAMME	COURSE CODE	NAME OF THE COURSE	L	T	P	C
B.Tech	21IT5204	ARTIFICIAL INTELLIGENCE AND MACHINE LEARNING	3	0	0	3

The student should be made to:

- Course Objective**
1. Study the concepts of Artificial Intelligence.
  2. Learn the methods of solving problems using Artificial Intelligence.
  3. Understand the need for machine learning for various problem solving.
  4. Understand the latest trends in machine learning.
  5. Introduce the concepts of Expert Systems

Unit	Description	Instructional Hours
I	<b>INTRODUCTION AND PROBLEM SOLVING</b> Definitions of AI - Intelligent Agents. Problem solving by searching: Problem- solving agents- Example problems – Search for solutions- Uninformed Search Strategies – Informed search strategies – Heuristic functions. Local Search Algorithms and Optimization Problems	9
II	<b>PROBLEM SOLVING METHODS</b> Adversarial search: Games-Optimal decisions in games – Mini-Max Algorithm- Alpha-beta pruning-Constraint Satisfaction Problems(CSP):Defining CSP Problems- Constraint Propagation: Inference in CSPs - Backtracking search forCSPs	9
III	<b>INTRODUCTION TO MACHINE LEARNING</b> Machine Learning- Applications of Machine Learning-Types of Learning- Supervised, Unsupervised, reinforcement, Classification Learning-Important elements in Machine Learning: Data formats – Learnability- Statistical Learning Approaches- Elements of Information theory.	9
IV	<b>SUPERVISED AND UNSUPERVISED LEARNING</b> Classification: Introduction – Fundamentals of Classification-k-nearest neighbor Classifier-Classification with Support Vector Machines- Clustering: Introduction- K means Algorithm – Mean Shift Algorithm	9
V	<b>EXPERT SYSTEMS</b> Characteristics of Expert System- Components of an Expert System-ExpertSystem Development- Knowledge Engineering-Applications of Expert System- Case Studies: A Simple Medical Expert System-Successful Expert Systems.	9
<b>TOTAL INSTRUCTIONAL HOURS</b>		<b>45</b>

Upon completion of this course, the students will be able to

- Course Outcome**
- CO1: Identify problems that are amenable to solution by AI methods.  
CO2: Identify appropriate AI methods to solve a given problem.  
CO3: Differentiate between supervised, unsupervised, semi-supervised machine learning approaches.  
CO4: Analyse and suggest appropriate machine learning approaches for various types of problems  
CO5: Design and carry out case studies of Expert Systems.

**TEXT BOOKS:**

T1- Elaine Rich, Kevin Knight, Shivashankar B Nair—Artificial Intelligence-, Tata Mc Graw-Hill,(Third edition)-2013.

T2- Tom M. Mitchell, —Machine Learning, McGraw-Hill Education, 2013.

**REFERENCE BOOKS:**

R1- Vinod Chandra S.S and Anand Hareendran S, Artificial Intelligence and Machine Learning-PHILearning Private Limited-2014.

R2- Zsolt Nagy, Artificial Intelligence and Machine Learning Fundamentals-Packt Publishing-(1<sup>st</sup> Edition) 2018.

R3- Giuseppe Bonaccorso, Machine Learning Algorithms, Packt Publishing,2017.

R4- Stuart Russell, Peter Norvig, -Artificial Intelligence: A Modern Approach,Pearson, 2016

*[Signature]*  
Chairman, Board of Studies  
Chairman - BOS  
IT - HICET



*[Signature]*  
Dean—Academics  
Dean (Academics)  
HICET



PROGRAMME	COURSE CODE	NAME OF THE COURSE	L	T	P	C
B.TECH	21IT5205	DATA WAREHOUSING AND DATA MINING	3	0	0	3

**This course will enable students to**

- Course Objective**
1. To learn the concept of Data Warehousing and OLAP
  2. To understand Data and Preprocessing Techniques
  3. To acquaint with the techniques used for Knowledge Discovery in Databases.
  4. To study Association rule mining and Classification for handling large data
  5. To expose the concept of Clustering in data mining

Unit	Description	Instructional Hours
I	<b>DATA WAREHOUSING AND OLAP:</b> Basic Concepts - Operational database systems Vs Data warehouses- A Multi-tiered Architecture – Data Warehouse Models- Transformation and Loading- Metadata Repository <b>Data Cube and OLAP:</b> A Multidimensional Data Model- Stars, Snowflakes and Fact Constellations, Dimensions and Measures, Typical OLAP Operations and Server Architecture	9
II	<b>KNOWING DATA AND DATA PREPROCESSING:</b> <b>Knowing Data:</b> Data objects and attributes - Statistical description of data -Data visualization. <b>Data preprocessing:</b> Data cleaning - Data integration and transformation -Data reduction	8
III	<b>DATA MINING</b> Introduction to Knowledge Discovery from Databases (KDD) process, Kinds of data, Data Mining Functionalities, Technologies used - Issues – Applications: Mining Sequence data, Statistical data mining, Visual and Audio Data mining, Mining other kinds of data	9
IV	<b>ASSOCIATION RULE MINING AND CLASSIFICATION</b> Introduction - Association rule mining – Frequent Item Set Mining Methods: Apriori and FP Growth Algorithm, Pattern Evaluation Methods. Classification: Basic Concepts – Decision Tree Induction – Bayesian Classification – Rule Based Classification	10
V	<b>CLUSTERING</b> Cluster Analysis – Partitioning Methods: K-Means, K-Medoids- Hierarchical Methods: Agglomerative versus Divisive Hierarchical Clustering , BIRCH, Chameleon and Other clustering Methods	9
<b>TOTAL INSTRUCTIONAL HOURS</b>		<b>45</b>


- Course Outcome**
- Upon completion of this course, the students will be able to
- CO1: Identify the Concept of Data Warehousing And OLAP.
  - CO2: Implement Data Pre-processing For Mining Applications.
  - CO3: Use Data Mining in Business Applications.
  - CO4: Apply the Association Rules and Classification for Mining the Data.
  - CO5: Deploy Appropriate Clustering Techniques.

**TEXT BOOKS:**

- T1: Jiawei Han and MichelineKamber, Data Mining Concepts and Techniques, Third Edition, Elsevier,2012.  
T2: Alex Berson and Stephen J.Smith, Data Warehousing, Data Mining and OLAP, Tata McGraw – HillEdition,21st Reprint 2011.

**REFERENCE BOOKS:**

- R1: Pang-Ning Tan, Michael Steinbach and Vipin Kumar, Introduction to Data Mining,PersonEducation, 2007.  
R2. K.P. Soman, ShyamDiwakar and V. Aja, Insight into Data Mining Theory and Practice, EasternEconomy Edition, Prentice Hall of India, 2006.  
R3: G. K. Gupta, Introduction to Data Mining with Case StudiesI, Eastern Economy Edition, PrenticeHall of India, 2014.  
R4: Ian Witten, EibeFrank,Data mining: Practical Machine Learning Tools and Techniques,MorganKaufmann,Third edition,2011.

  
Chairman, Board of Studies  
**Chairman - BoS**  
**IT - HiCET**



  
Dean, Academics  
**Dean (Academics)**  
**HiCET**

PROGRAMME	COURSE CODE	NAME OF THE COURSE	L	T	P	C
B.TECH	21IT5001	MACHINE LEARNING LABORATORY	0	0	3	1.5

**This course will enable students to**

**Course Objective**

1. Provide a broad survey of approaches and techniques in Machine Learning.
2. Make use of Data sets in implementing the Machine Learning Algorithms.
3. Implement ML concepts and Algorithms in any suitable Language of choice.
4. Develop the basic skills necessary to pursue Research in Machine Learning.
5. Develop a deeper understanding of several major topics in Machine Learning

**Exp. No**

**Description of the Experiments**

- 1 Write a program to plot data points in a two-dimensional plane and execute the k-means algorithm on them to perform Clustering.
- 2 Write a program to illustrate Mean shift in 2D to perform Clustering.
- 3 Write a program to demonstrate the working of the Decision tree based ID3 Algorithm. Use an appropriate data set for building the decision tree and apply this knowledge to classify a new sample.
- 4 Build an Artificial Neural Network by implementing the Back-propagation algorithm and test the same using appropriate data sets.
- 5 Write a program to implement the Naïve Bayesian Classifier for a sample training data set stored as a .CSV file. Compute the accuracy of the classifier, considering few test data sets.
- 6 Assuming a set of documents that need to be classified, use the Naïve Bayesian Classifier model to perform this task. Built-in Java classes/API can be used to write the program. Calculate the accuracy, precision, and recall for your data set.
- 7 Write a program to construct a Bayesian Network considering medical data. Use this model to demonstrate the diagnosis of heart patients using standard Heart Disease Data Set. You can use Java/Python ML library classes/API.
- 8 Apply EM Algorithm to cluster a set of data stored in a .CSV file. Use the same data set for clustering using k-Means Algorithm. Compare the results of these two algorithms and comment on the quality of clustering. You can add Java/Python ML library classes/API in the program.
- 9 Write a program to implement k-Nearest Neighbor Algorithm to classify the iris data set. Print both correct and wrong predictions. Java/Python ML library classes can be used for this problem.
- 10 Implement the non-parametric Locally Weighted Regression Algorithm in order to fit data points. Select appropriate data set for your experiment and draw graphs.

**Total Practical Hours 45**

**Course Outcome**

Upon completion of this course, the students will be able to  
 CO1: Understand the implementation procedures for the Machine Learning Algorithms.  
 CO2: Design Java/Python programs for various Learning Algorithms.  
 CO3: Apply appropriate data sets to the Machine Learning Algorithms.  
 CO4: Identify and apply Machine Learning Algorithms to solve real world problems.  
 CO5: Understand how to perform evaluation of Learning Algorithms and model selection



Chairman, Board of Studies  
 Chairman - BoS  
 IT - HICET

Dean-Academics  
 Dean (Academics)  
 HICET

PROGRAMME	COURSE CODE	NAME OF THE COURSE	L	T	P	C
B.TECH	21IT5002	MOBILE APPLICATION DEVELOPMENT LABORATORY	0	0	3	1.5

**This course will enable students to**

1.To learn the Components and Structure of Mobile Application Development Frameworks for Android and Windows OS based Mobiles.

**Course Objective** 2.Understand how to work with various Mobile Application Development Frameworks.

3.Learn the basic and important Design concepts and issues of Development of Mobile Applications.

4.Study the Capabilities and Limitations of Mobile Devices.

**Exp. No**


**Description of the Experiments**

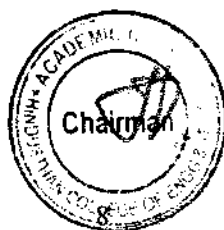
- 1 Develop an application that uses GUI component, Font and Colors.
- 2 Develop an application that uses Layout Managers and Event Listeners.
- 3 Develop a Native Calculator Application.
- 4 Write an application that draws basic Graphical Primitives on the Screen.
- 5 Develop an application that makes use of Database.
- 6 Develop an application that makes use of RSS Feed.
- 7 Implement an application that implements Multi-threading.
- 8 Develop a Native Application that uses GPS Location Information.
- 9 Implement an Application that writes Data to the SD card.
- 10 Implement an Application that creates an Alert upon receiving a Message.
- 11 Write a Mobile Application that creates Alarm Clock


**Total Practical Hours 45**

**Course Outcome**

Upon completion of this course, the students will be able to  
 CO1: Understand the working of various Mobile Application Development  
 CO2: Design concepts and issues of Development of Mobile Applications framework.  
 CO3: Design and Implement various Mobile Applications using Emulators.  
 CO4: Deploy Applications to Hand-Held Devices.

  
 Chairman, Board of Studies  
 Chairman - BOS  
 IT - HICET



  
 Dean-Academics  
 Dean (Academics)  
 HICET



# **PROFESSIONAL ELECTIVE 1**



Programme	Course code	Name of the course	L	T	P	C
B.TECH.	21IT5351R	INTERNET AND WEB TECHNOLOGY	2	0	2	3

Course Objective	The student should be able	

- 1 To understand Basic HTML tags
- 2 To design web page using HTML and CSS
- 3 To learn about Client Side Scripting: Java Script
- 4 To have a knowledge in server side scripting-Servlet
- 5 To understand Server-Side Scripting -Node.js

Unit	Description	Instructional Hours
I	<p><b>HTML</b></p> <p>Web Essentials: Clients, Servers, Basic Terminologies – HTML: Introduction - HTML Basic Tags – Elements - Attributes - Basic Formatting, Fonts and Colors, Images, Hyperlink – Entity- Grouping Using Div and Span, Lists, Tables, Frames, Form – HTML5 features-Audio-Video.</p> <p><b>Illustrative programs: Design a static web page using HTML – Mark Sheet, Curriculum Vitae, College Website; Design a Registration Form using HTML</b></p>	9
II	<p><b>CASCADING STYLE SHEET</b></p> <p>CSS: Introduction to Cascading Style Sheets-Features- Syntax - Types of Style Sheets – Selectors - CSS Background, Font, Text, Images-List, Tables, CSS Layout: Box Model-Normal Flow-Flexbox-Grids- Positioning.</p> <p><b>Illustrative programs: Apply CSS for a Chess Board design using DIV, Apply CSS for the Curriculum vitae, College Web site and Drop Down Menu design</b></p>	9
III	<p><b>CLIENT SIDE SCRIPTING: JAVA SCRIPT</b></p> <p>Introduction to JavaScript -Data Types, Variables, Operators, Conditional Statement, Iteration, Switch Case, Arrays, Dialog boxes- Functions: reduce, spread, rest – Event handling-Objects: Built-in -Global object - DOM-Object Properties – Asynchronous Programming.</p> <p><b>Illustrative programs: Mobile Number Validation, Rupee to Dollar &amp; Dollar to Rupee Conversion using DOM, RGB Range Selector.</b></p>	9
IV	<p><b>SERVER SIDE SCRIPTING: SERVLET AND JSP</b></p> <p>Servlets: Java Servlet Architecture- Servlet Life Cycle- Form GET and POST actions- Session Handling- Understanding Cookies-DATABASE CONNECTIVITY: JDBC perspectives, JDBC program example. JSP: Understanding Java Server Pages-JSP Standard Tag Library (JSTL)-Creating HTML forms by embedding JSP code</p> <p><b>Illustrative programs: Create a web application with Login Operation, Session Tracking</b></p>	9
V	<p><b>SERVER SIDE SCRIPTING: NODE JS</b></p> <p>Introduction to Node.js -Node.js Module- HTTP module- Express Framework- Request &amp; Response-Basic Routing-Serving Static Files- Sessions &amp; Cookies- DB</p>	9

*S. S. S.*  
 Chairman, Board of Studies  
**Chairman - BoS**  
**IT - HICET**



*[Signature]*  
 Dean-Academics  
**Dean (Academics)**  
**HICET**

Connection Setup with mongo DB.

**Illustrative programs: Create a web application with sessions and CRUD operations**

		<b>Total Instructional Hours</b>	<b>45</b>
<b>Course Outcome</b>	CO1	Design simple web pages using mark-up languages like HTML.	
	CO2	Develop a web page HTML and CSS.	
	CO3	Creation of dynamic web page using Client Side Scripting	
	CO4	Design a Server Side web application using servlet and JSP.	
	CO5	Creation of simple web application using node.js Framework	

**TEXT BOOK:**

- T1 DJeffrey C. Jackson, "Web Technologies--A Computer Science Perspective", Pearson Education, 2006.
- T2 Deitel, Deitel, Goldberg, "Internet & World Wide Web How To Program", Third Edition, Pearson Education, 2006.
- T3 <https://nodejs.dev/>.

**REFERENCES:**

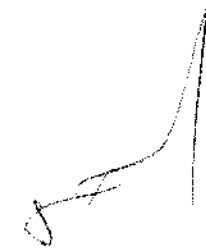
- R1 Robert. W. Sebesta, "Programming the World Wide Web", Fourth Edition, Pearson Education, 2007.
- R2 Mike Cantelon, Marc Hartert, T.J. Holowaychuk, Nathan Rajlich" Node.js in Action",
- R3 David Gutman, Fullstack Node.js The Complete Guide to Building Production Apps with Node.js
- R4 <https://javascript.info/>
- R5 <https://www.tutorialspoint.com/>

  
Chairman, Board of Studies

Chairman - BOS  
IT - HICET



11

  
Dean-Academics  
Dean (Academics)  
HiCET



PROGRAMME	COURSE CODE	NAME OF THE COURSE	L	T	P	C
B.E/B.Tech	21ITS352	ADVANCED JAVA PROGRAMMING	2	0	2	3

The student should be made to:

**Course Objective**

1. Understand the basic concepts of Inheritances, packages and interfaces in JAVA Programming.
2. Identify the need for advanced Java concepts like Enumerations and Collections.
3. Adapt Servlets to build Server-Side Programs.
4. Gain knowledge on Spring Core Framework.
5. Construct Database Queries and Understand the Mechanism of JDBC.

Unit	Description	Instructional Hours
------	-------------	---------------------

I	<b>OVERVIEW OF JAVA PROGRAMMING:</b> Introduction to Java Programming-Features of Java Language, JVM, Inheritance, Interfaces and Packages, Exception Handling, Multithreaded Programming. <b>Programs to demonstrate use of implementing Interfaces and Packages</b>	9
---	-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------	---

II	<b>ENUMERATIONS, AUTOBOXING AND ANNOTATIONS(METADATA):</b> Enumerations, Enumeration fundamentals, the values () and valueOf() Methods, Java enumerations are class types, enumerations Inherits Enum, example, type wrappers, Autoboxing, Autoboxing and Methods, Autoboxing/Unboxing occurs in Expressions, Autoboxing/Unboxing, Boolean and character values, Autoboxing/Unboxing helps prevent errors, A word of Warning. Annotations, Annotation basics, specifying retention policy, Obtaining Annotations at run time by use of reflection, Annotated element Interface, Using Default values, Marker Annotations, Single Member annotations, Built-In annotations. <b>Program to implement Wrapper Classes and their Methods.</b>	9
----	-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------	---

III	<b>SERVLETS:</b> Introduction to Servlets: The Life Cycle of a Servlet; Using Tomcat for Servlet Development; A simple Servlet; The Servlet API; The Javax. servlet Package; Reading Servlet Parameter; The Javax. servlet. http package; Handling HTTP Requests and Responses; Using Cookies; Session Tracking. Java Server Pages (JSP); JSP, JSP Tags, Tomcat, Request String, User Sessions, Cookies, Session Objects. <b>Programs to Demonstrate the use of Servlet Program.</b>	9
-----	--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------	---

IV	<b>JAVA SPRING FRAMEWORK:</b> Spring Introduction: What is Spring and Its Features, How Spring Fits in to Enterprise Edition? Spring Beans: What is Spring Bean-Bean Scope- Bean Lifecycle, IOC Containers: Core Container- J2EE Container-Web Container, Dependency Injection -Setter DI and Constructor DI, Auto wiring: ByType- ByName. <b>Create a Program using Bean Development Kit and JAR files.</b>	9
----	--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------	---

V	<b>JAVA DATABASE CONNECTIVITY:</b> The Concept of JDBC; JDBC Driver Types; JDBC Packages; A Brief Overview of the JDBC process; Database Connection; Associating the JDBC/ODBC Bridge with the Database, Statement Objects; Result Set; Transaction Processing; Metadata, Data types; Exceptions. <b>Programs to Illustrate the use of JDBC Connection.</b>	9
---	-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------	---

**TOTAL INSTRUCTIONAL HOURS** 45

**Course Outcome**

- CO1: Design program using user defined Packages and Interfaces.  
CO2: Interpret the need for advanced Java concepts like Enumerations and Collections in developing.  
CO3: Execute programs on basic concepts of JSP and Build Applications using JSP and deploy the Project using Tomcat Server.  
CO4: Work on concepts of Spring.  
CO5: Illustrate Database access and details for managing information using the JDBC API.

Chairman, Board of Studies

Chairman - BoS  
IT - HICET



Dean - Academics


Dean (Academics)  
HICET

**TEXT BOOKS :**


- T1 Herbert Schildt: JAVA the Complete Reference, Eleventh Edition, Tata McGraw Hill, 2018
- T2 Jim Keogh: J2EE-TheCompleteReference, McGraw Hill, 2015.

**REFERENCE :**

- R1 Cay S. Horstmann: Core Java, Volume II—Advanced Features, 11th Edition, Prentice Hall,2019.
- R2 Y. Daniel Liang: Introduction to JAVA Programming, Eleventh Edition, Pearson Education, 2017.
- R3 Markus Eisele: Modern Java EE Design Patterns: Building Scalable Architecture for Sustainable Enterprise Development, O'Reilly Media, Online Edition, 2016.
- R4 Uttam K Roy, Advanced JAVA programming, Oxford University press, 2015.

  
**Chairman, Board of Studies**  
**Chairman - BOS**  
**IT - HICET**



  
**Dean—Academics**  
**Dean (Academics)**  
**HICET**

PROGRAMME	COURSE CODE	NAME OF THE COURSE	L	T	P	C
B.E/B.Tech	21IT5353	C# AND .NET PROGRAMMING	2	0	2	3

The student should be made:

- Course Objective**
1. To learn Basics of C# Language.
  2. To interpret the Advanced Features of C#.
  3. To utilize the .Net Framework to develop Distributed Applications.
  4. To gain Basic Knowledge on Database Programming.
  5. To know the terminologies of ASP.Net in Web Applications Development.

Unit	Description	Instructional Hours
I	<b>C# LANGUAGE BASICS</b> Introducing C#, Understanding .NET, Overview of C#, Literals, Variables, Data Types, Operators, Expressions, Branching, Looping, Methods, Arrays, Strings, Structures, Enumerations. <b>Programs using Arrays and strings</b>	9
	<b>C# ADVANCED FEATURES</b> Classes, Objects, Inheritance, Polymorphism, Interfaces, Operator Overloading, Delegates, Events, Console I/O Operations, Errors and Exceptions, Multithread. <b>Programs using Interfaces and Exception Handling</b>	9
III	<b>.NET FRAMEWORK</b> Common language Runtime (CLR), Common Type System (CTS), Common language Specification (CLS), Compilation Process, Assemblies, Versioning, Reflection, Namespaces, Command line compiler, Marshaling, Remoting. <b>Client Server Programming</b>	9
IV	<b>DATABASE PROGRAMMING</b> Data Access with ADO.NET, Architecture, Data Reader, Data Adapter, Command, Connection, Data set, Data Table, Data Row, Data Column, Data binding, Data Grid Control, XML based Data sets. <b>Database Applications using ADO.Net</b>	9
V	<b>WEB APPLICATIONS</b> Web Development and ASP.NET, Architecture Web Forms, Web Form Controls, Life time Management, Application, Session, ASP with ADO.NET Validation Controls, Website Security. <b>Web Applications using ASP.Net</b>	9
<b>TOTAL INSTRUCTIONAL HOURS</b>		<b>45</b>

- Course Outcome**
- Upon completion of this course, the students will be able to
- CO1: Understand the Basic Terminologies of C# Languages.
  - CO2: Express the advanced features of C#.
  - CO3: Enhance the skills on Developing Client Server Applications.
  - CO4: Discover the ideas on Database Applications Development.
  - CO5: Exhibit Web Applications using ASP.Net.

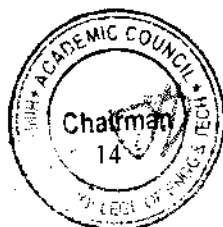
**TEXT BOOKS:**

- T1 E. Balagurusamy, Programming in C#: A Primer, Tata McGraw-Hill (4th Edition), 2015.
- T2 Andrew Troelsen, Philip Japikse, C# 6.0 and the .NET 4.6 Framework, A Press publication (7<sup>th</sup> Edition), 2015

**REFERENCE BOOKS:**

- R1-Andrew Troelsen and Philip Japikse, —Pro C# 7: With .NET and .NET Core, A Presspublication, (8th Edition) 2017.
- R2- Adrew Stellman and Jennifer Greene, —Head First C#, O'Reilly (3rd Edition), 2013.
- R3-Ian Griffiths, Matthew Adams, and Jesse Liberty, —Programming C# 4.0, O'Reilly (6thEdition), 2010.
- R4- Herbert Schildt, —C# 4.0: The Complete Reference, Tata McGraw-Hill, 2010.

*[Signature]*  
**Chairman, Board of Studies**  
**Chalman - BoS**  
**IT - HICET**



*[Signature]*  
**Dean-Academics**  
**Dean (Academics)**  
**HICET**

<b>PROGRAMME</b>	<b>COURSE CODE</b>	<b>NAME OF THE COURSE</b>	<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
B.E/B.TECH	21IT5354	ADVANCED DATA STRUCTURE	2	0	2	3

The student should be made:

**Course Objective**

1. To understand basic Data Structures such as Stacks and Queues.
2. To introduce a variety of Data Structures such as Hash Tables, Search Trees, Tries, Heaps, Graphs.
3. Exploring the Advanced Data Structure Algorithms such as Red Black, Splay Trees etc.,
4. To apply sorting such as Heap Sort, Merge Sort etc.
5. To learn the various Pattern Matching Algorithm.

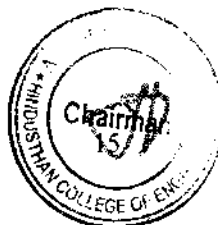
<b>Unit</b>	<b>Description</b>	<b>Instructional Hours</b>
I	<b>Introduction to Data Structures</b> , Abstract data types, Linear list – Singly linked list implementation, Insertion, Deletion and searching operations on linear list, Stacks-Operations, Array and linked Representations of Stacks, Stack Applications, Queues-Operations. <b>Programs using Singly Linked List, Stacks and Queues.</b>	9
II	<b>Dictionaries:</b> Linear list representation, Skip list representation, Operations - Insertion, Deletion and Searching. <b>Hash Table Representation:</b> Hash functions, Collision resolution- Separate Chaining, Open Addressing-Linear probing, Quadratic probing, Double hashing, Rehashing, Extendible Hashing. <b>Programs using Hash.</b>	9
III	<b>Search Trees:</b> Binary Search Trees, Definition, Implementation, Operations- Searching, Insertion and Deletion, AVL Trees, Definition, Height of an AVL Tree, Operations – Insertion, Deletion and Searching, Red –Black, Splay Trees. <b>Program using Search Trees.</b>	9
IV	<b>Graphs:</b> Graph Implementation Methods. Graph Traversal Methods. Sorting: Heap Sort, External Sorting- Model for external sorting, Merge Sort. <b>Program using Graph Traversal Methods and Sorting.</b>	9
V	<b>Pattern Matching and Tries:</b> Pattern Matching Algorithms-Brute Force, The Boyer –Moore Algorithm, The Knuth-Morris-Pratt algorithm, Standard Tries, Compressed Tries, Suffix Tries. <b>Program using Pattern Matching.</b>	9
<b>TOTAL INSTRUCTIONAL HOURS</b>		<b>45</b>

**Course Outcome**

- Upon completion of this course, the students will be able to
- CO1: Ability to select the Data Structures that efficiently model the Information in a problem.
- CO2: Ability to assess efficiency trade-offs among different Data Structure implementations or combinations.
- CO3: Implement and know the various Graph Traversal Methods.
- CO4: Implement and know the application of algorithms for Sorting and Pattern Matching.
- CO5: Design programs using a variety of data structures, including Hash tables, Binary and general Tree Structures, Search Trees, Tries, Heaps, Graphs, and AVL- trees.

Chairman, Board of Studies

Chairman - BoS  
IT - HICET



Dean-Academics  
Dean (Academics)  
HiCET

**TEXT BOOKS:**

T1: E. Horowitz, S. Sahni and Susan Anderson Freed "Fundamentals of Data Structures in C, Universities Press (2nd Edition), 2008.

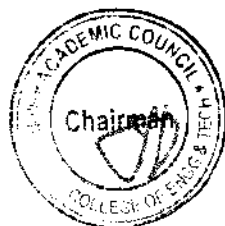
T2: A. M. Tanenbaum, Y. Langsam, and M.J. Augenstein, "Data Structures using C, PHI/Pearson Education, 2008.

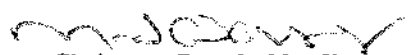
**REFERENCE BOOKS:**


R1- R. F. Gilberg and B.A.Forouzan, Cengage, A Pseudocode Approach with C, (2nd Edition), 2014. R2- Seymour Lipschutz, —Data Structures Schaum's Outlines, McGraw Hill (Revised 1st Edition), 2014.

R3- Jean-Paul Tremblay & Paul G. Sorenson, An Introduction to Data Structures with Applications, McGraw Hill, (2nd Edition), 2013.

R4- Reema Thareja, —Data Structures using C, Oxford press (3rd Edition), 2012.



  
Chairman, Board of Studies  
Chairman - BoS  
IT - HICET

  
Dean - Academics  
Dean (Academics)  
HiCET

PROGRAMME	COURSE CODE	NAME OF THE COURSE	L	T	P	C
B.E/B.TECH	21IT5355	ADVANCED DATABASE TECHNOLOGY	2	0	2	3

The student should be made:

**Course Objective**

1. To understand the basics of Distributed and Parallel Databases Architectures.
2. To familiar with Object Oriented Relational Databases.
3. To learn how to create XML documents with DTD and XML schema.
4. To understand the concepts of Data Mining and Data warehousing.
5. To study the applications of Intelligent Database Technologies

Unit	Description	Instructional Hours
	<b>PARALLEL AND DISTRIBUTED DATABASES</b>	
I	Database System Architectures: Centralized and Client-Server Architectures-Parallel Systems-Distributed Systems – Parallel Databases: I/O Parallelism – Inter and Intra Query Parallelism – Inter and Intra operation Parallelism – Distributed Database: Homogeneous and Heterogeneous Databases Distributed Data Storage – Distributed Transactions – Commit Protocols – Concurrency Control. <b>Implementation of client server application and 2 phase locking algorithms</b>	9
	<b>OBJECT AND OBJECT RELATIONAL DATABASES</b>	
II	Concepts for Object Databases: Object Identity – Objects versus Literals– Complex Type Structures for Objects and Literals– Encapsulation of Operations –Persistence of Objects -Type Hierarchies and Inheritance -ODMG Model – ODL – Object Database Conceptual Design- OQL–Object Relational features in SQL / Oracle <b>Creating Object Oriented Database using PL/SQL oracle</b>	9
	<b>XML DATABASES AND MOBILE DATABASES</b>	
III	XML Databases: XML Hierarchical Data Model– XML Documents,DTD– XML Schema – XML Querying–Mobile Databases: System Architecture - Location and Handoff Management <b>Design XML document with DTD and XML Schema using Eclipse.</b>	9
	<b>QUERY PROCESSING AND OPTIMIZATION</b>	
IV	Query Processing - SQL Query Translation - Pipelining - Query Optimization - Query Trees and Heuristics-Overview of Query Optimization in Oracle - Semantic Query Optimization	9
	<b>INTELLIGENT DATABASE TECHNOLOGIES</b>	
V	Intelligent Databases: Active databases and Triggers – Temporal Database- Spatial Database- Multimedia Database- Deductive Databases- Information Retrieval concepts. <b>Implementation of Triggers using PL/SQL.</b>	9
<b>TOTAL INSTRUCTIONAL HOURS</b>		<b>45</b>

Chairman, Board of Studies

Chairman - BoS  
IT - HiCET



Dean-Academics

Dean (Academics)  
HiCET

**Course  
Outcome**

Upon completion of this course, the students will be able to  
CO1: To understand the Design Fundamentals and Methodologies of the Software.  
CO2: To provide basic concepts of Software Design Principles.  
CO3: To understand the Architecture Design and Quality Attributes of the Software.  
CO4: To learn the tools of Architectural Design for the current trends.  
CO5: To Gain practical experience in the Architectural Design Process for learning-oriented software

**TEXT BOOKS:**

T1 -Henry F Korth, Abraham Silberschatz and S. Sudharshan, Database System Concepts, Seventh Edition, McGraw Hill, 2019.

T2 - R. Elmasri, S.B. Navathe, Fundamentals of Database Systems, Seventh edition, Pearson; 2016.

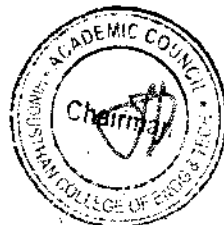
**REFERENCE BOOKS:**

R1 - Subramaniam, Multimedia Databases, Morgan Kauffman Publishers, 2019.

R2 - Thomas Cannolly and Carolyn Begg, Database Systems, A Practical Approach to Design, Implementation and Management Pearson; 7th edition (2015)

R3- Alex Berson and Stephen J.Smith, Data Warehousing, Data Mining and OLAP, Tata McGrawHill,2008.

R4- Vijay Kumar, Mobile Database systems A John Wiley & Sons, Inc., Publication 2006.



  
Chairman, Board of Studies

Chairman - BoS  
IT - HICET

  
Dean - Academics

Dean (Academics)  
HiCET

Programme	Course code	Name of the course	L	T	P	C
B.TECH.	21IT5356	ETHICS AND AI	2	0	2	3

Course Objective	The student should be able	
		1
	2	Learn ae Ethical initiatives in the field of artificial intelligence
	3	Study about AI standards and Regulations
	4	Study about social and ethical issues of Robot Ethics
	5	Study about AI and Ethics- challenges and opportunities

Unit	Description	Instructional Hours
	<b>INTRODUCTION</b>	
I	Definition of morality and ethics in AI-Impact on society-Impact on human psychology-Impact on the legal system-Impact on the environment and the planet-Impact on trust	9
	<b>ETHICAL INITIATIVES IN AI</b>	
II	International ethical initiatives-Ethical harms and concerns-Case study: healthcare robots, Autonomous Vehicles, Warfare and weaponization.	9
	<b>AI STANDARDS AND REGULATION</b>	
III	Model Process for Addressing Ethical Concerns During System Design - Transparency of Autonomous Systems-Data Privacy Process- Algorithmic Bias Considerations - Ontological Standard for Ethically Driven Robotics and Automation Systems	9
	<b>ROBOETHICS: SOCIAL AND ETHICAL IMPLICATION OF ROBOTICS</b>	
IV	Robot-Roboethics- Ethics and Morality- Moral Theories-Ethics in Science and Technology – Ethical Issues in an ICT Society- Harmonization of Principles- Ethics and Professional Responsibility Roboethics Taxonomy.	9
	<b>AI AND ETHICS- CHALLENGES AND OPPORTUNITIES</b>	
V	Challenges - Opportunities- ethical issues in artificial intelligence- Societal Issues Concerning the Application of Artificial Intelligence in Medicine- decision-making role in industries-National and International Strategies on AI.	9
	<b>Total Instructional Hours</b>	<b>45</b>

Course Outcome	CO1	CO2	CO3	CO4	CO5
	Learn about morality and ethics in AI	Acquire the knowledge of real time application ethics, issues and its challenges.	Understand the ethical harms and ethical initiatives in AI	Learn about AI standards and Regulations like AI Agent, Safe Design of Autonomous and Semi-Autonomous Systems	Understand the concepts of Roboethics and Morality with professional responsibilities

**TEXT BOOK:**

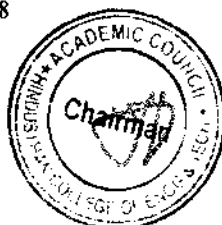
- T1 Y. Eleanor Bird, Jasmin Fox-Skelly, Nicola Jenner, Ruth Larbey, Emma Weitkamp and Alan Winfield, "The ethics of artificial intelligence: Issues and initiatives", EPRS | European Parliamentary Research Service Scientific Foresight Unit (STOA) PE 634.452 – March 2020
- T2 Patrick Lin, Keith Abney, George A Bekey, " Robot Ethics: The Ethical and Social Implications of Robotics", The MIT Press- January 2014.

**REFERENCES:**

- R1 Towards a Code of Ethics for Artificial Intelligence (Artificial Intelligence: Foundations, Theory, and Algorithms) by Paula Boddington, November 2017
- R3 Mark Coeckelbergh, " AI Ethics", The MIT Press Essential Knowledge series, April 2020

**WEB LINKS REFERENCES:**

- W1 [https://sci-hub.mkssa.top/10.1007/978-3-540-30301-5\\_65](https://sci-hub.mkssa.top/10.1007/978-3-540-30301-5_65)
- W2 <https://www.scu.edu/ethics/all-about-ethics/artificial-intelligence-and-ethics-sixteenchallenges-and-opportunities/>
- W3 <https://www.weforum.org/agenda/2016/10/top-10-ethical-issues-in-artificial-intelligence/>
- W4 <https://sci-hub.mkssa.top/10.1159/000492428>



Chairman, Board of Studies  
 Chairman - BoS  
 IT - HICET

Dean - Academics  
 Dean (Academics)  
 HICET



**B. Tech IT  
MINOR  
DEGREE**



Programme	Course code	Name of the course	L	T	P	C
-----------	-------------	--------------------	---	---	---	---

Course Objective	The student should be able	
	1	To learn the fundamentals of data models, relational algebra and SQL
	2	To represent a database system using ER diagrams and to learn normalization techniques
	3	To understand the fundamental concepts of transaction, concurrency and recovery processing
	4	To understand the internal storage structures using different file and indexing techniques which will help in physical DB design
	5	To have an introductory knowledge about the Distributed databases, NOSQL and database security

Unit	Description	Instructional Hours
	<b>INTRODUCTION TO DATABASES</b>	
I	Purpose of Database - Database System Architecture - Views of Data- Schema architecture - Data Independence - Schema and instance- Data Models- Benefits of Data Model - Phases of Data Model.ER Diagram - Extended ER Diagram - Examples.	9
	<b>RELATIONAL DATABASE AND DESIGN</b>	
II	Relational Data Model - Keys - Relational Algebra - SQL Fundamentals - Advanced SQL Features - Embedded SQL- Dynamic SQL. Normalization - Functional Dependency - First, Second, Third Normal Form - BCNF, Non Loss Decomposition - 4NF - Multi valued Dependency - 5NF - Join Dependency.	9
	<b>TRANSACTIONS AND CONCURRENCY CONTROL</b>	
III	Transaction processing - ACID Properties - failure and recovery - Schedules - Serializability - Concurrency Control - Lock based protocol - Two Phase Commit - Isolation levels - SQL Facilities for concurrency and recovery - Database integrity and security.	9
	<b>STORAGE &amp; INDEXING</b>	
IV	Overview of Storage Techniques - file organization - RAID -Indexing - Types of ordered indices - B & B+ tree - Hashing - Static & Dynamic Hashing. Query Processing & Optimization. Algorithms for SELECT and JOIN operations - Query optimization using Heuristics and Cost Estimation.	9
	<b>NOSQL</b>	
V	Need for NO SQL - Characteristics of NOSQL - Comparison of relational databases to new NoSQL stores - Key-value database - Apache Cassandra - Columnar Databases - MongoDB - CRUD operations with MongoDB - Document Databases - Graph Databases.	9
	<b>Total Instructional Hours</b>	<b>45</b>

Course Outcome	Description
CO1	Use fundamentals of data models and depict a database system
CO2	Implement relational databases for various business requirements.
CO3	Analyse and implement the properties of database.
CO4	Use the application technology for various evaluation techniques and recovery process in database storage.
CO5	Use non-structured database systems in application development.

**TEXT BOOK:**

- T1 Abraham Silberschatz, Henry F. Korth, S. Sudharshan, —|Database System Concepts|, Sixth Edition, Tata McGraw Hill, 2013.
- T2 RamezElmasri, Shamkant B. Navathe, —|Fundamentals of Database Systems|, Sixth Edition, Pearson Education, 2014.

**REFERENCES:**

- R1 C.J.Date, A.Kannan, S.Swamynathan, —|An Introduction to Database Systems|, Eighth Edition, Pearson Education, 2013.
- R2 Eben Hewitt, "Cassandra - The Definitive Guide", O' Reilly, 2010.
- R3 Krisitna Chodorow, "MongoDB - The Definitive Guide", O' Reilly, 2013.

*[Signature]*  
 Chairman, Board of Studies  
 Chairman - BoS  
 IT - HICET



*[Signature]*  
 Dean-Academics  
 Dean (Academics)  
 HICET



**The student should be able**

- |                         |   |                                                                               |
|-------------------------|---|-------------------------------------------------------------------------------|
| <b>Course Objective</b> | 1 | To acquire the knowledge of the decision areas in finance.                    |
|                         | 2 | To learn the various sources of Finance                                       |
|                         | 3 | To describe about capital budgeting and cost of capital                       |
|                         | 4 | To discuss on how to construct a robust capital structure and dividend policy |
|                         | 5 | To develop an understanding of tools on Working Capital Management.           |

Unit	Description	Instructional Hours
	<b>INTRODUCTION TO FINANCIAL MANGEMENT</b>	
I	Definition and Scope of Finance Functions - Objectives of Financial Management - Profit Maximization and Wealth Maximization- Time Value of money- Risk and return concepts	9
	<b>SOURCES OF FINANCE</b>	
II	Long term sources of Finance -Equity Shares – Debentures - Preferred Stock – Features – Merits and Demerits. Short term sources - Bank Sources, Trade Credit, Overdrafts, Commercial Papers, Certificate of Deposits, Money market mutual funds etc	9
	<b>INVESTMENT DECISIONS:</b>	
III	Investment Decisions: capital budgeting – Need and Importance – Techniques of Capital Budgeting – Payback -ARR – NPV – IRR –Profitability Index. Cost of Capital - Cost of Specific Sources of Capital - Equity -Preferred Stock- Debt - Reserves - Concept and measurement of cost of capital - Weighted Average Cost of Capital.	9
	<b>FINANCING AND DIVIDEND DECISION</b>	
IV	Operating Leverage and Financial Leverage- EBIT-EPS analysis. Capital Structure – determinants of Capital structure- Designing an Optimum capital structure . Dividend policy - Aspects of dividend policy - practical consideration - forms of dividend policy - - Determinants of Dividend Policy	9
	<b>WORKING CAPITAL DECISION</b>	
V	Working Capital Management: Working Capital Management - concepts - importance - Determinants of Working capital. Cash Management: Motives for holding cash – Objectives and Strategies of Cash Management. Receivables Management: Objectives - Credit policies	9
	<b>Total Instructional Hours</b>	<b>45</b>

- |                       |     |                                                                  |
|-----------------------|-----|------------------------------------------------------------------|
| <b>Course Outcome</b> | CO1 | Acquire the knowledge of the decision areas in finance.          |
|                       | CO2 | Learn the various sources of Finance                             |
|                       | CO3 | describe about capital budgeting and cost of capital             |
|                       | CO4 | Construct a robust capital structure and dividend policy         |
|                       | CO5 | Develop an understanding of tools on Working Capital Management. |

**TEXT BOOK:**

- T1 M.Y. Khan and P.K.Jain Financial management, Text, Tata McGraw Hill  
T2 M. Pandey Financial Management, Vikas Publishing House Pvt. Ltd

**REFERENCES:**

- R1 James C. Vanhorne –Fundamentals of Financial Management– PHI Learning.,  
R2 2. Prasanna Chandra, Financial Management,  
R3 3. Srivatsava, Mishra, Financial Management, Oxford University Press, 2011



**Chairman, Board of Studies**

**Chairman - BoS  
IT - HICET**

**Dean - Academics  
Dean (Academics)  
HiCET**

Unit	Description	Instructional Hours
	<b>The student should be able</b>	
<b>Course Objective</b>	1 To enable students gain insights on entrepreneurship.	
	2 To make students understand the sources of product & business ideas.	
	3 To provide knowledge on business opportunity identification.	
	4 To enable students to develop business plan	
	5 To enable students to prepare feasibility reports and understand trends in entrepreneurship.	
<b>I</b>	<b>Introduction to Entrepreneurship:</b> Entrepreneurial growth in India; sources of entrepreneurship in India. Entrepreneurship process; entrepreneurial mindset: concept and impact; Entrepreneurial growth strategies. Characteristics of an Entrepreneur – Qualities of an Entrepreneur. Entrepreneurial success and failure - reasons and remedies.	9
<b>II</b>	<b>Product Development:</b> Introduction and Meaning of a Product – Sources of Business or Product Ideas – Criteria for Selecting a Product – Barriers to the successful development of New Products – Why do new products fail. Technology - Considerations in selecting technology.	9
<b>III</b>	<b>Business Opportunity Identification:</b> Need and Importance - Steps in identification of Business Opportunity. Techniques of market Survey – Market Research Procedure.	9
<b>IV</b>	<b>Business Plan Development:</b> Business modelling: concept, types and functions; Innovation and Entrepreneurship: concept and challenges. The business plan as an entrepreneurial tool, Elements of business planning, Objectives, Market analysis, development of Product/idea, Marketing, Finance, Organization and management, Ownership, Critical risk contingencies of the proposal, Scheduling and milestones.	9
<b>V</b>	<b>Feasibility Report &amp; trends:</b> Contents of a feasibility report – Considerations while preparing a feasibility report – Proforma of a feasibility report. Technical, Financial, Marketing, Personnel, and management feasibility reports. Trends in entrepreneurship: Rural, Social and women entrepreneurship.	9
	<b>Total Instructional Hours</b>	<b>45</b>
<b>Course Outcome</b>	CO1 Understand the basics of entrepreneurship and its process.	
	CO2 Understand the concept of product development and the role of technology.	
	CO3 Able to understand and identify business opportunity	
	CO4 Able to develop business plan / business model	
	CO5 Able to prepare feasibility reports and understand the trends in entrepreneurship.	

**TEXT BOOK:**

- T1 S.Anil Kumar, S.C.Poornima, Mini KAbraham, K.Jayashree "Entrepreneurship Development",New Age International Publishers.
- T2 Jasmer singh Sain, Entrepreneurship and small Business" Deep and Deep publication
- T3 Shankar Raj, "Entrepreneurship Theory and Practice" Vijay Nicole Imprints Pvt ltd.
- T4 Khanka, S.S, "Entrepreneurship Development", S. Chand & company
- T5 Vasant Desai, "Fundamentals of Entrepreneurship "Himalaya Publishing House.

**REFERENCES:**

- R1 Khanna, S. S., Entrepreneurial Development, S. Chand, New Delhi.
- R2 Hisrich D. Robert, Michael P. Peters, Dean A. Sheperd, Entrepreneurship, McGraw-Hill,6 ed.
- R3 Zimmerer W. Thomas,Norman M.Scarborough, Essentials of Entrepreneurship and Small Business Management, PHI,4 ed.
- R4 Holt H. David, Entrepreneurship: New Venture Creation, Prentice- Hall of India, New Delhi, Latest edition.
- R5 Kuratko, F. Donald, Richard M. Hodgetts, Entrepreneurship: Theory, Process, Practice, Thomson, 7ed.
- R6 Desai, Vasant, Dynamics of Entrepreneurship: New Venture Creation, Prentice-Hall of India, New Delhi, Latest edition.
- R7 Patel, V. G., The Seven Business Crises and How to Beat Them, Tata McGraw-Hill, New Delhi, 1995.
- R8 Roberts, Edward B.(ed.), Innovation: Driving Product, Process, and Market Change, San Francisco: Jossey Bass, 2002.



Chairman, Board of Studies  
 Chairman - BoS  
 HICET

Dean-Academics  
 Dean (Academics)  
 HICET

- The student should be able**
- Course Objective**
- 1 To gain knowledge on concepts and socio-economic policies of sustainable development.
  - 2 To examine the strategies for implementing sustainable development programmes.
  - 3 To learn the various sustainability and performance indicators, their assessment techniques and constraints
  - 4 To explore the different approaches for resource management for a sustainable urban planning.
  - 5 To understand the principles of urban planning and built-in environment.

Unit	Description	Instructional Hours
	<b>INTRODUCTION TO SUSTAINABLE DEVELOPMENT</b>	
I	Definitions and principles of Sustainable Development - History and emergence of the concept of Sustainable Development - Environment and Development linkages- Globalization and environment – Millennium Development Goals: Status (global and Indian) Impacts on approach to development policy and practice in India, future directions.	9
	<b>ENVIRONMENTAL SUSTAINABILITY</b>	
II	Land, Water and Food production - Moving towards sustainability: Energy powering Sustainable Development - Financing the environment and Sustainable Development.	9
	<b>SUSTAINABILITY INDICATORS</b>	
III	Sustainability indicators – Hurdles to Sustainability-Operational Guidelines- Interconnected prerequisites for sustainable development - Science and Technology for sustainable development – Performance indicators of sustainability and Assessment mechanism – Constraints and barriers for sustainable development.	9
	<b>URBAN PLANNING AND ENVIRONMENT</b>	
IV	Environment and Resources, Sustainability Assessment, Future Scenarios, Form of Urban Region, Managing the change, Integrated Planning, Sustainable Development.	9
	<b>THE BUILT-IN ENVIRONMENT</b>	
V	Urban Form, Land Use, Compact Development, Principles of street design- complete streets, Transport Integrated Urban land use Planning, Guidelines for Environmentally Sound Transportation.	9
	<b>Total Instructional Hours</b>	<b>45</b>

- Course Outcome**
- CO1 Describe the concepts and socio-economic policies of sustainable development.
  - CO2 Recognize and identify the strategies for implementing sustainable development programmes.
  - CO3 Comprehend the various sustainability and performance indicators, their assessment techniques and constraints
  - CO4 Identify the different approaches for resource management for a sustainable urban planning
  - CO5 Illustrate the principles of urban planning and built-in environment.

**REFERENCES:**

- R1 Gilg A W and Yarwood R, "Rural Change and Sustainability-Agriculture, the Environment and Communities", CABI Edited by S J Essex, September 2005.
- R2 Ganesha Somayaji and Sakarama Somayaji, "Environmental Concerns and Sustainable development: Some perspectives from India", Editors: publisher TERI Press, ISBN 8179932249.
- R3 James H. Weaver, Michael T. Rock, Kenneth Kustere, "Achieving Broad-Based Sustainable Development: Governance, Environment, and Growth with Equity", Kumarian Press, West Hartford, CT. Publication Year, 1997.
- R4 Kirkby, J, O'Keefe P. and Timberlake, "Sustainable development" Earth Scan Publication, London, 1996.
- R5 Kerry Turner. R, "Sustainable Environmental Management", Principles and Practice Publisher: Belhaven Press, ISBN:1852930039.



Chairman, Board of Studies  
**Chairman - BoS**  
 IP - HICET

Dean-Academics  
 Dean (Academics)  
 HICET

**B. Tech IT  
HONOURS  
DEGREE**







**The student should be able**

- |                         |   |                                                                                                                                                               |
|-------------------------|---|---------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Course Objective</b> | 1 | To understand a range of machine learning algorithms along with their strengths and weaknesses.                                                               |
|                         | 2 | To understand the basic theory underlying machine learning.                                                                                                   |
|                         | 3 | To be able to formulate machine learning problems corresponding to different applications.                                                                    |
|                         | 4 | To be able to apply machine learning algorithms to solve problems of moderate complexity.                                                                     |
|                         | 5 | To apply the algorithms to a real-world problem, optimize the models learned and report on the expected accuracy that can be achieved by applying the models. |

Unit	Description	Instructional Hours
------	-------------	---------------------

	<b>INTRODUCTION</b>	
I	Machine Learning – Types of Machine Learning – Supervised Learning – Unsupervised Learning–Basic Concepts in Machine Learning – Machine Learning Process – Weight Space –Testing Machine Learning Algorithms – A Brief Review of Probability Theory –Turning Data into Probabilities–The Bias-Variance Trade off.	9
	<b>SUPERVISED LEARNING</b>	
II	Linear Models for Regression – Linear Basis Function Models – The Bias-Variance Decomposition – Bayesian Linear Regression – Common Regression Algorithms – Simple Linear Regression–Multiple Linear Regression – Linear Models for Classification – Discriminant Functions – Probabilistic Generative Models – Probabilistic Discriminative Models – Laplace Approximation –Bayesian Logistic Regression – Common Classification Algorithms – k-Nearest Neighbours – Decision Trees–Random Forest model –Support Vector Machines.	9
	<b>UNSUPERVISED LEARNING</b>	
III	Mixture Models and EM – K-Means Clustering – Dirichlet Process Mixture Models –Spectral Clustering – Hierarchical Clustering – The Curse of Dimensionality – Dimensionality Reduction–Principal Component Analysis – Latent Variable Models(LVM) – Latent Dirichlet Allocation (LDA).	9
IV	<b>GRAPHICAL MODELS</b> Naive Bayes Classifiers - Bayesian Networks – Markov Model - Markov Random Fields – Learning – Hidden Markov Model- Conditional Independence.	9
V	<b>ADVANCED LEARNING</b> Reinforcement Learning – Representation Learning – Neural Networks – Active Learning – Ensemble Learning – Bootstrap Aggregation – Boosting – Gradient Boosting Machines	9
	<b>Total Instructional Hours</b>	<b>45</b>

- |                       |     |                                                                                                     |
|-----------------------|-----|-----------------------------------------------------------------------------------------------------|
| <b>Course Outcome</b> | CO1 | Understand the basic concepts of Machine Learning                                                   |
|                       | CO2 | Understand the concepts behind supervised learning and their appropriateness                        |
|                       | CO3 | Understand the concepts behind unsupervised learning and their appropriateness                      |
|                       | CO4 | Choose and apply appropriate graphical model for a given real world problem                         |
|                       | CO5 | Identify applications suitable for different types of machine learning with suitable justification. |

**TEXT BOOK:**

- T1 Ethem Alpaydin, —Introduction to Machine LearningI, Third Edition, Prentice Hall of India, 2015  
T2 Tom Mitchell, —Machine LearningI, McGraw-Hill, 2017.

**REFERENCES:**

- R1 Christopher Bishop, —Pattern Recognition and Machine LearningI, Springer, 2006.  
R2 Kevin P. Murphy, —Machine Learning: A Probabilistic PerspectiveI, MIT Press, 2012  
R3 Fabio Nelli, —Python Data Analytics with Pandas, Numpy, and MatplotlibI, Second Edition, Apress, 2018

*[Signature]*  
**Chairman, Board of Studies**  
**Chairman - BoS**  
**IT - HICET**



*[Signature]*  
**Dean - Academics**  
**Dean (Academics)**  
**HICET**



Unit	Description	Instructional Hours
	<b>The student should be able</b>	
<b>Course Objective</b>	1 To learn about the importance of information security. 2 To learn different scanning and enumeration methodologies and tools. 3 To understand various hacking techniques and attacks. 4 To be exposed to programming languages for security professionals 5 To understand the different phases in penetration testing.	
<b>I</b>	<b>INTRODUCTION TO HACKING</b> Introduction to Hacking – Importance of Security – Elements of Security – Phases of an Attack – Types of Hacker Attacks – Hactivism – Vulnerability Research – Introduction to Foot printing – Information Gathering Methodology – Foot printing Tools – WHOIS Tools – DNS Information Tools.	9
<b>II</b>	<b>SCANNING AND ENUMERATION</b> Introduction to Scanning – Objectives – Scanning Methodology – Tools – Introduction to Enumeration – Enumeration Techniques – Enumeration Procedure – Tools.	9
<b>III</b>	<b>SYSTEM HACKING</b> Introduction – Cracking Passwords – Password Cracking Websites – Password Guessing – Password Cracking Tools – Password Cracking Counter measures – Escalating Privileges –Executing Applications – Key loggers and Spyware.	9
<b>IV</b>	<b>HACKING WEB SERVICES &amp; SESSION HIJACKING</b> Web application vulnerabilities- Application coding errors- SQL injection into Back-end Databases- Cross-site scripting- cross-Site request forging-Authentication bypass-Protective http headers Understanding Session Hijacking- Phases involved in Session Hijacking-Types of Session Hijacking- Session Hijacking Tools.	9
<b>V</b>	<b>HACKING WIRELESS NETWORKS</b> Introduction to 802.11-Role of WEP- Cracking WEP Keys- SniffingTrafficWirelessDOSattacks-WLANScanners-WLANSniffers- HackingTools-Securing Wireless Networks.	9
	<b>Total Instructional Hours</b>	<b>45</b>
<b>Course Outcome</b>	CO1 Understand and identify the vulnerabilities/threats/attacks. CO2 Understand and Defend hacking attacks. CO3 Use safe penetration techniques on the World Wide Web. CO4 Design a computer against a variety of security attacks using various tools. CO5 Understand penetration & security testing.	

**TEXT BOOK:**

- T1 Kimberly Graves, "Certified Ethical Hacker", Wiley India Pvt Ltd, 2010.
- T2 Michael T. Simpson, Kent Backman, James E. Corley, "Hands-On Ethical Hacking and Network Defense", Cengage Learning, 2013.

**REFERENCES:**

- R1 Patrick Engebretson, "The Basics of Hacking and Penetration Testing" Ethical Hacking and Penetration Testing Made Easy, Syngress Media, Second Revised Edition, 2013.
- R2 EC-Council, "Ethical Hacking and Countermeasures: Attack Phases", Cengage Learning, 2010.
- R3 Ramachandran V, "Wireless Penetration Testing Beginner's Guide " 3rd ed.. Packt Publishing, 2011. 2016.



*[Signature]*  
**Chairman, Board of Studies**  
**Chairman - BoS**  
**IT - HiCET**

*[Signature]*  
**Dean, Academics**  
**Dean (Academics)**  
**HiCET**

Programme	Course code	Name of the course	L	T	P	C
-----------	-------------	--------------------	---	---	---	---

- The student should be able**
- Course Objective**
- 1 To Understand how Blockchain systems (mainly Bitcoin and Ethereum) work.
  - 2 To impart knowledge in block chain techniques and able to present the concepts clearly and structured.
  - 3 To get familiarity with future currencies and to create own crypto token.
  - 4 To Design, build, and deploy smart contracts and distributed applications.
  - 5 To assess blockchain applications in a structured manner.

Unit	Description	Instructional Hours
	<b>INTRODUCTION TO BLOCKCHAIN</b>	
I	Introduction to Blockchain –Centralized vs. Decentralized Systems, The Byzantine Generals Problem- Satoshi Nakamoto’s Blockchain Breakthrough -Types of Blockchain -Blockchain Implementations - Blockchain Collaborative Implementations -Blockchain in practical use today - Financial Services Use Cases - Smart Contracts on the Blockchain.	9
	<b>BITCOIN</b>	
II	Bitcoin Working Procedure-Transactions, Blocks, Mining, and the Blockchain-Bitcoin Transactions Constructing a Transaction - Bitcoin Mining - Mining Transactions in Blocks -Spending the Transaction-Bitcoin Core: The Reference Implementation-Compiling Bitcoin Core from the Source Code-Creating, Signing, and Submitting Transactions Based on Unspent Outputs.	9
	<b>ETHEREUM</b>	
III	Ethereum Accounts - Ethereum Work - Decentralized Applications - Decentralized Autonomous Organizations- Ethereum Blockchain Development - Best Practices – Smart Contract Design – Lifecycle – Migration -Interaction with Users and Enterprise Applications – Debugging – Validation.	9
	<b>HYPERLEDGER</b>	
IV	Open computing - Hyperledger frameworks, tools, and building blocks - Hyperledger Fabric component design – Sample transaction - Understanding governance - Business Scenario - Trading and letter of credit -Business scenario and use case - Setting up the development environment - Network components configuration files - Launching trade network.	9
	<b>BLOCKCHAIN APPLICATIONS</b>	
V	Case studies in Financial Sector, Energy sector, Identity management, Supply chains, Pharma sector, Trade & Logistics, Media, and Government sector.	9
	<b>Total Instructional Hours</b>	<b>45</b>

- Course Outcome**
- CO1 Understand the fundamentals of Blockchain.
  - CO2 Perform simple operations using Bitcoins.
  - CO3 Perform simple operations on Ethereum.
  - CO4 Practice basic operations in permissioned hyper ledgers and Blockchain networks.
  - CO5 Understand the latest advances and its applications in Block Chain Technology.

**TEXT BOOK:**

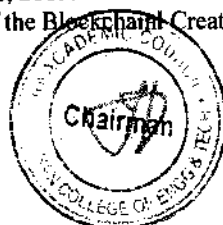
- T1 Joseph J. Bambara ,Paul R. Allen —Blockchain A Practical Guide to Developing Business, Law, and Technology Solutions! McGraw-Hill Education; 1 edition, 2018.
- T2 Andreas M. Antonopoulos” Mastering Bitcoin: Unlocking Digital Cryptocurrencies — O’Reilly Media; 2nd edition (March 2018).

**REFERENCES:**

- R1 Arshdeep Bahga and Vijay Madiseti, —Blockchain Applications: A Hands-On Approach”, 2017.
- R2 S. Shukla, M. Dhawan, S. Sharma and S. Venkatesan, —”Blockchain Technology: Cryptocurrency and Applications”,Oxford University Press, 2019.
- R3 Roger Wattenhofer, —The Science of the Blockchain Create Space Independent Publishing Platform, 2016.

*[Signature]*  
Chairman, Board of Studies

**Chairman - BoS  
IT - HICET**



*[Signature]*  
Dean - Academics

**Dean (Academics)  
HICET**



**SKILLED /  
INTEGRATED  
COURSES**



Program	Course code	Name of the course	L	T	P	C
---------	-------------	--------------------	---	---	---	---

**The student should be able**

- Course Objective**
- 1 To learn about BI architecture and its concept
  - 2 To understand how data is getting gathered, filtered / refined
  - 3 To analyze the various reports, patterns, and filters used in the business.
  - 4 To generate graphs based on the data inside Cognos tool
  - 5 To apply datasets and analyse how IBM Cognos tool handles large chunks of data

Unit	Description	Instructional Hours
<b>I</b>	<b>INTRODUCTION</b> IBM Cognos 10 Family -BI Enterprise Components, BI Architecture (high level) BI Security, BI Groups and Roles -Framework Manager UI, View the top-level objects and reports Package as a report author.	9
<b>II</b>	<b>DATA STRUCTURE</b> Data Sources and Model Types-Differentiate Data Entities- Relational Models-Operational vs Reporting-Operational Databases-Example of an Operational and Reporting Database Query-Create a Star Schema from an Operational Model-Operational Data -Reporting Data Fact Table-Dimension Tables-Define Relationships-Identify Issues with a Star Schema Cardinality- Relationships.	9
<b>III</b>	<b>REPORTS</b> Introduction to the Reporting Application - Report Studio- Explore the Environment Explorer Bar and Report Templates- Generate the Report-Create List Reports-Group Data-Format List Column- Include List Headers and Footers-Focus Reports using Filters- Create Filters Filter Your Data with Advanced Detail Filters-Create Crosstab Reports-Create a Crosstab Report- Add Measure to Crosstab Reports-Format Crosstab Reports	9
<b>IV</b>	<b>GRAPHICAL REPORT</b> Data Graphically - Chart Report- Charts Containing Peer and Nested Items-Reuse Custom Chart Palettes-Data driven Baselines and Markers to Charts-Focus Reports using Prompts - Parameters and Prompts-Create a Parameter Item on the Report-Build a Prompt Page- Prompt Item to a Report- Extend the Model to add Staff Location Metadata-Rearrange the diagram.	9
<b>V</b>	<b>DATA SOURCE</b> Extend Reports using Calculations - Derive Additional Information from the Data Source Run-time Date/Time Functions to Report - String Functions -Customize Reports with Conditional Formatting- Change Displays Based on Conditions-Steps for Conditional Formatting-Drill Through from One Report to Another. Navigate to Related Data in IBM Cognos BI-Set Up Drill-Report- Values Passed to Target Parameters-Create a Report using Relational Data- Relational Data Tree-List Object-Introduction to BI Administration BI Administration Workflow, Portal and Configuration Create a Report from a Dimensionally modeled Relational Data Source.	9
<b>Total Instructional Hours</b>		<b>45</b>

- Course Outcome**
- CO1 Understand the Business Intelligence (BI) Concepts
  - CO2 Understand patterns of Data Gathering and Preparation
  - CO3 Analyse the various Reports and filters
  - CO4 Design the different graphical reports using Data Analysis Tools and Techniques
  - CO5 Apply different data sets and practice Data Visualization

**TEXTBOOK:**

T1 IBM Course Ware

**REFERENCES:**

- R1 IBM Cognos Business Intelligence 10: The Official Guide by Dan Volitch and Gerard Ruppert:
- R2 IBM Cognos 10 Report Studio: Practical Examples by Filip Draskovic and Roger Johnson
- R3 IBM Cognos Business Intelligence 10.1 Dashboarding Cookbook by Ahmed Lashin

*[Signature]*  
Chairman, Board of Studies  
**Chairman - BoS**  
**IT - HICET**



*[Signature]*  
Dean - Academics  
**Dean (Academics)**  
**HICET**





***HINDUSTHAN COLLEGE OF ENGINEERING AND TECHNOLOGY***  
**(An Autonomous Institution Affiliated to Anna University, Chennai)**  
**(Approved by AICTE, New Delhi, Accredited by NAAC with 'A' Grade)**  
**Coimbatore - 641 032.**

**B.TECH. INFORMATION TECHNOLOGY**



**CHOICE BASED CREDIT SYSTEM**

**Revised Curriculum and Syllabus for the Odd semester**  
**Academic year 2023-24**  
**(Academic Council Meeting held on 19.06.2023)**



# **CURRICULUM**

## **R2019**





**DETAILS OF CHANGES CARRIED OUT IN CURRICULUM & SYLLABUS**

**CBCS PATTERN**

**UNDERGRADUATE PROGRAMMES**

**B.TECH. INFORMATION TECHNOLOGY (UG)**

**REGULATION-2019**

**For the students admitted during the academic year 2020-2021 and onwards**

**SEMESTER I**

S.No.	Course Code	Course Title	Type	L	T	P	C	CIA	ESE	TOTAL	
<b>THEORY</b>											
1.	19HE1101	Technical English	HS	2	1	0	3	25	75	100	
2.	19MA1101R	Calculus	BS	3	1	0	4	25	75	100	
<b>THEORY &amp; LAB COMPONENT</b>											
3.	19PH1151	Applied Physics	BS	2	0	2	3	50	50	100	
4.	19CY1151	Chemistry for Engineers	BS	2	0	2	3	50	50	100	
5.	19CS1151	Python Programming and Practices	ES	2	0	2	3	50	50	100	
6.	19EC1154	Basics of Electron Devices and Electric Circuits	ES	2	0	2	3	50	50	100	
<b>PRACTICAL</b>											
7.	19HE1071	Language Competency Enhancement Course-I	HS	0	0	2	1	0	100	100	
<b>MANDATORY COURSES</b>											
8.	19HE1072	Career Guidance Level – I Personality, Aptitude and Career Development	EEC	2	0	0	0	100	0	100	
	19HE1073	Entrepreneurship & Innovation	EEC	1	0	0	0	100	0	100	
				<b>Total:</b>	<b>16</b>	<b>2</b>	<b>10</b>	<b>20</b>	<b>450</b>	<b>450</b>	<b>900</b>
As Per AICTE Norms 3 Weeks Induction Programme is Added in The First Semester as an Audit Course											

**SEMESTER II**

S.No.	Course Code	Course Title	Type	L	T	P	C	CIA	ESE	TOTAL
<b>THEORY</b>										
1.	19HE2101	Business English for Engineers	HS	2	1	0	3	25	75	100
2.	19MA2104	Differential Equations and Linear Algebra	BS	3	1	0	4	25	75	100
<b>THEORY &amp; LAB COMPONENT</b>										
3.	19IT2151	Programming in C	ES	2	0	2	3	50	50	100
4.	19ME2154	Engineering Graphics	ES	1	0	4	3	50	50	100
5.	19PH2151	Material Science	BS	2	0	2	3	50	50	100
6.	19CY2151	Environmental Studies	BS	2	0	2	3	50	50	100
<b>PRACTICALS</b>										
7.	19ME2001	Engineering Practices	ES	0	0	4	2	50	50	100
8.	19HE2071	Language Competency	HS	0	0	2	1	0	100	100

		Enhancement Course-II								
<b>MANDATORY COURSES</b>										
9.	19HE2072	<b>Career Guidance Level – II</b> Personality, Aptitude and Career Development	EEC	2	0	0	0	100	0	100
<b>Total:</b>				<b>14</b>	<b>2</b>	<b>16</b>	<b>22</b>	<b>400</b>	<b>500</b>	<b>900</b>

### SEMESTER III

S.No	Course Code	Course Title	Type	L	T	P	C	CIA	ESE	TOTAL
<b>THEORY</b>										
1.	19MA3151	Statistics and Queuing Theory	BS	3	0	2	4	50	50	100
2.	19IT3201	Data Structures and Algorithm Design	PC	3	0	0	3	25	75	100
3.	19IT3202	Object Oriented Programming Using C++	PC	3	0	0	3	25	75	100
4.	19IT3203	Computer Organization and Architecture	PC	3	0	0	3	25	75	100
<b>THEORY AND LAB COMPONENT</b>										
5.	19IT3251	Digital Principles and System Design	PC	3	0	2	4	50	50	100
<b>PRACTICALS</b>										
6.	19IT3001R	Data Structures and Algorithm Laboratory	PC	0	0	3	1.5	50	50	100
7.	19IT3002R	Object Oriented Programming using C++ Laboratory	PC	0	0	3	1.5	50	50	100
<b>MANDATORY COURSES</b>										
8.	19MC3191	Indian Constitution	MC	2	0	0	0	100	0	100
9.	19HE3071	<b>Career Guidance Level – III</b> Personality, Aptitude and Career Development	EEC	2	0	0	0	100	0	100
10.	19HE3073	Leadership Management Skills	EEC	1	0	0	0	100	0	100
<b>Total</b>				<b>20</b>	<b>0</b>	<b>10</b>	<b>20</b>	<b>575</b>	<b>425</b>	<b>1000</b>

### SEMESTER IV

S.No	Course Code	Course Title	Type	L	T	P	C	CIA	ESE	TOTAL
<b>THEORY</b>										
1.	19MA4102	Discrete Mathematics	BS	3	1	0	4	25	75	100
2.	19IT4201	Java Programming	PC	3	0	0	3	25	75	100
3.	19IT4202	Database Management Systems	PC	3	0	0	3	25	75	100
4.	19IT4203	Principles of Operating Systems	PC	3	1	0	4	25	75	100
<b>THEORY AND LAB COMPONENT</b>										
5.	19IT4251	Object Oriented Software Engineering	PC	3	0	2	4	50	50	100
<b>PRACTICALS</b>										
6.	19IT4001R	Java Programming Laboratory	PC	0	0	3	1.5	50	50	100
7.	19IT4002R	Database Management	PC	0	0	3	1.5	50	50	100

		Systems Laboratory								
<b>MANDATORY COURSES</b>										
8.	19AC4191	Essence of Indian tradition knowledge/Value Education	AC	2	0	0	0	100	0	100
9.	19HE4072	<b>Career Guidance Level – IV</b> Personality, Aptitude and Career Development	EEC	2	0	0	0	100	0	100
10.	19HE4073	Ideation Skills	EEC	1	0	0	0	100	0	100
<b>Total</b>				<b>20</b>	<b>2</b>	<b>8</b>	<b>21</b>	<b>550</b>	<b>450</b>	<b>1000</b>

### SEMESTER V

S.No	Course Code	Course Title	Type	L	T	P	C	CIA	ESE	TOTAL
1.	19IT5201	Mobile Computing	PC	3	0	0	3	25	75	100
2.	19IT5202	Computer Networks	PC	3	0	0	3	25	75	100
3.	19IT5203	Microcontrollers and Embedded Systems	PC	3	0	0	3	25	75	100
4.	19IT5204	Artificial Intelligence and Machine Learning	PC	3	0	0	3	25	75	100
5.	19IT5205	Data Warehousing and Data Mining	PC	3	0	0	3	25	75	100
6.	19IT53XX	<b>Professional Elective-I</b>	PE	2	0	2	3	50	50	100
<b>PRACTICALS</b>										
7.	19IT5001	Machine Learning Laboratory	PC	0	0	3	1.5	50	50	100
8.	19IT5002	Mobile Application Development Laboratory	PC	0	0	3	1.5	50	50	100
<b>MANDATORY COURSES</b>										
9.	19HE5071	Soft Skills - I	EEC	1	0	0	1	100	0	100
10.	19HE5072	Design Thinking	EEC	1	0	0	1	100	0	100
<b>TOTAL</b>				<b>19</b>	<b>0</b>	<b>8</b>	<b>23</b>	<b>475</b>	<b>525</b>	<b>1000</b>

S.No.	Course Code	Course Title	Type	L	T	P	C	CIA	ESE	TOTAL
<b>PROFESSIONAL ELECTIVE I</b>										
1.	19IT5351R	Internet and Web Technology	PE	2	0	2	3	50	50	100
2.	19IT5352	Advanced Java Programming	PE	2	0	2	3	50	50	100
3.	19IT5353	C# and .Net Programming	PE	2	0	2	3	50	50	100
4.	19IT5354	Advanced Data Structure	PE	2	0	2	3	50	50	100
5.	19IT5355	Advanced Database Technology	PE	2	0	2	3	50	50	100
6.	19IT5356	Ethical Hacking	PE	2	0	2	3	50	50	100

**SEMESTER VI**

S.No	Course Code	Course Title	Type	L	T	P	C	CIA	ESE	TOTAL
<b>THEORY</b>										
1.	19IT6181	Software Project Management	HS	3	0	0	3	25	75	100
2.	19IT6201	Internet of Things	PC	3	0	0	3	25	75	100
3.	19IT6202R	Principles of Compiler Design	PC	3	0	0	3	25	75	100
4.	19IT63XX	Professional Elective II	PE	3	0	0	3	25	75	100
5.	19XX64XX	Open Elective I	OE	3	0	0	3	25	75	100
<b>THEORY AND LAB COMPONENT</b>										
6.	19IT6251	Cryptography and Network Security	PC	3	0	2	4	50	50	100
<b>PRACTICALS</b>										
7.	19IT6001	Internet of Things Laboratory	PC	0	0	3	1.5	50	50	100
8.	19IT6003	Project based Learning	PC	0	0	3	1.5	50	50	100
<b>MANDATORY COURSES</b>										
9.	19IT6701	Internship/Industrial Training	EEC	0	0	0	1	100	0	100
10.	19HE6071	Soft Skills - II	EEC	1	0	0	1	100	0	100
11.	19HE6072	Intellectual Property Rights (IPR)	EEC	1	0	0	1	100	0	100
<b>TOTAL</b>				<b>20</b>	<b>0</b>	<b>8</b>	<b>25</b>	<b>575</b>	<b>525</b>	<b>1100</b>

S.No.	Course Code	Course Title	Type	L	T	P	C	CIA	ESE	TOTAL
<b>PROFESSIONAL ELECTIVE II</b>										
1.	19IT6301	Business Intelligence and Analysis	PE	3	0	0	3	25	75	100
2.	19IT6302	Information Security	PE	3	0	0	3	25	75	100
3.	19IT6303	Software Design	PE	3	0	0	3	25	75	100
4.	19IT6304	Natural Language Processing	PE	3	0	0	3	25	75	100
5.	19IT6305	Soft Computing	PE	3	0	0	3	25	75	100
6.	19IT6307	Virtual Reality and Augmented Reality	PE	3	0	0	3	25	75	100
7.	19IT6308	Web Development - I	PE	0	0	3	3	50	50	100

**OPEN ELECTIVE**

S.No.	Course Code	Course Title	Type	L	T	P	C	CIA	ESE	TOTAL
1.	19IT6402	Machine Learning for Engineers	OE	3	0	0	3	25	75	100



**SEMESTER VII**

S.No	Course Code	Course Title	Type	L	T	P	C	CIA	ESE	TOTAL
<b>THEORY</b>										
1.	19IT7201R	Introduction to Distributed and Cloud Computing	PC	3	0	0	3	25	75	100
3.	19IT7203	Software Testing and Quality Assurance	PC	3	0	0	3	25	75	100
4.	19IT73XX/ 19CS7306	Professional Elective III/ AI Analyst	PE	3	0	0	3	25	75	100
5.	19XX74XX	Open Elective II	OE	3	0	0	3	25	75	100
<b>PRACTICALS</b>										
7.	19IT7002R	Data Analytics Laboratory	PC	0	0	3	1.5	50	50	100
<b>PROJECT WORK</b>										
8.	19IT7901	Project Work - Phase I	EEC	0	0	4	2	50	50	100
<b>TOTAL</b>				<b>15</b>	<b>0</b>	<b>10</b>	<b>20</b>	<b>275</b>	<b>525</b>	<b>800</b>

<b>PROFESSIONAL ELECTIVE III</b>										
S.No.	Course Code	Course Title	Type	L	T	P	C	CIA	ESE	TOTAL
1.	19IT7301	Social Network analysis	PE	3	0	0	3	25	75	100
2.	19IT7302	Cyber Forensics	PE	3	0	0	3	25	75	100
3.	19IT7303	Software Documentation	PE	3	0	0	3	25	75	100
4.	19IT7304	Principles of Management	PE	3	0	0	3	25	75	100
5.	19IT7305	Software Architecture	PE	3	0	0	3	25	75	100
6.	19IT7306	Green Computing	PE	3	0	0	3	25	75	100
7.	19IT7307	Web Development - II	PE	0	0	3	3	50	50	100

<b>OPEN ELECTIVE II - INFORMATION TECHNOLOGY</b>										
S.No.	Course Code	Course Title	Type	L	T	P	C	CIA	ESE	TOTAL
1.	19IT7401R	Cyber Security	OE	3	0	0	3	25	75	100

**SEMESTER VIII**

S.No	Course Code	Course Title	Type	L	T	P	C	CIA	ESE	TOTAL
<b>THEORY</b>										
1.	19FT83XX	Professional Elective –IV	PE	3	0	0	3	25	75	100
2.	19FT83XX	Professional Elective- V	PE	3	0	0	3	25	75	100
<b>PRACTICAL</b>										
3.	19IT8901	Project Work – Phase II	EEC	0	0	24	8	50	50	100
<b>Total</b>				<b>6</b>	<b>0</b>	<b>24</b>	<b>14</b>	<b>100</b>	<b>200</b>	<b>300</b>

<b>PROFESSIONAL ELECTIVE IV</b>										
S.No.	Course Code	Course Title	Type	L	T	P	C	CIA	ESE	TOTAL
1.	19IT8301	Graphics and Multimedia	PE	3	0	0	3	25	75	100
2.	19IT8302	Software Process	PE	3	0	0	3	25	75	100
3.	19IT8303	Service Oriented Architecture	PE	3	0	0	3	25	75	100
4.	19IT8304	Human Computer Interaction	PE	3	0	0	3	25	75	100
5.	19IT8305	Mobile Edge Systems	PE	3	0	0	3	25	75	100
6.	19IT8311	Robotics and its Applications	PE	3	0	0	3	25	75	100
7.	19IT8313	Cloud Computing (NPTEL)	PE	3	0	0	3	0	100	100

<b>PROFESSIONAL ELECTIVE V</b>										
S.No.	Course Code	Course Title	Type	L	T	P	C	CIA	ESE	TOTAL
1.	19IT8306	Information Retrieval Technologies	PE	3	0	0	3	25	75	100
2.	19IT8307	Block Chain Technology	PE	3	0	0	3	25	75	100
3.	19IT8308	Professional Ethics	PE	3	0	0	3	25	75	100
4.	19IT8309	Deep Learning Techniques	PE	3	0	0	3	25	75	100
5.	19IT8310	Management Information System	PE	3	0	0	3	25	75	100
6.	19IT8312	Quantum Computing	PE	3	0	0	3	25	75	100
7.	19IT8314	Web Development - III	PE	0	0	3	3	50	50	100

S.No.	Course Code	Course Title	Type	L	T	P	C	CIA	ESE	TOTAL
<b>LIFE SKILL COURSES</b>										
1.	19LSZ401	General Studies for Competitive Examinations	OE	3	0	0	3	25	75	100
2.	19LSZ402	Human Rights, Women's Rights and Gender Equality	OE	3	0	0	3	25	75	100
3.	19LSZ403	Indian Ethos and Human Values	OE	3	0	0	3	25	75	100
4.	19LSZ404	Indian Constitution and Political System	OE	3	0	0	3	25	75	100
5.	19LSZ405	Yoga for Human Excellence	OE	3	0	0	3	25	75	100

Sem. No.	Course Code	Course Title	L	T	P	C	CIA	ESE	TOTAL
<b>SKILLED / INTEGRATED COURSES OFFERED THROUGH CHOICE BASED CREDIT SYSTEM</b>									
1	19CS1152	Object oriented programming using Python	2	0	2	3	50	50	100
2	19CS2153	Java Fundamentals	2	0	2	3	50	50	100
3	19CS3253	Clean Coding and Devops	3	0	2	4	50	50	100
4	19CS4204	Data Visualization	3	0	0	3	25	75	100
4	19CS4003	Data Visualization Laboratory	0	0	3	1.5	50	50	100
5	19CS5251	Introduction to Design Thinking	2	0	2	3	50	50	100
6	19CS6253	Predictive Modeling	3	0	2	4	25	75	100
6	19CS6306	Development of Machine Learning models	3	0	0	3	25	75	100

#### SEMESTER-WISE CREDIT DISTRIBUTION

<b>B.E. / B.TECH. PROGRAMMES</b>										
S.No.	Course Area	Credits per Semester								Total Credits
		I	II	III	IV	V	VI	VII	VIII	
1	HS	04	04	-	-	-	03	-	-	11
2	BS	10	10	04	04	-	-	-	-	28
3	ES	06	08	-	-	-	-	-	-	11
4	PC	-	-	16	17	18	13	12	-	79
5	PE	-	-	-	-	03	03	03	06	15
6	OE	-	-	-	-	-	03	03	-	06
7	EEC	-	-	-	-	02	03	02	08	15
<b>Total</b>		<b>20</b>	<b>22</b>	<b>20</b>	<b>21</b>	<b>23</b>	<b>25</b>	<b>20</b>	<b>14</b>	<b>165</b>

#### CREDIT DISTRIBUTION R2019

Semester	I	II	III	IV	V	VI	VII	VIII	Total
Credits	20	22	20	21	23	25	20	14	165

Chairman BoS  
Chairman - BoS  
IT - HICET



Dean Academics  
Dean (Academics)  
HICET

Principal



# **SYLLABUS**



## SEMESTER VII

PROGRAMME	COURSE CODE	NAME OF THE COURSE	L	T	P	C
B.Tech	19IT7201R	Introduction to Distributed and Cloud Computing	3	0	0	3

The student should be made to:

**Course Objective**

1. To learn Distributed Communication
2. To understand Distributed Resource Management
3. To study the basics of Cloud Computing and Virtualization
4. To study both Cloud Platform and Thread Programming
5. To gain insight on Cloud Resource Management and Applications.

Unit	Description	Instructional Hours
I	<b>Distributed Communication:</b> Introduction to Distributed Systems- Characterization of Distributed Systems--Distributed Architectural Models-- Remote Invocation--Request-Reply Protocols --Remote Procedure Call- Remote Method Invocation--Group Communication	9
II	<b>Distributed Resource Management:</b> Time Ordering--Physical Clock Synchronization--Logical Time and Logical Clocks-Global States-- Distributed Mutual Exclusion--Election Algorithms-- Distributed Deadlock--Distributed File System Architecture	9
III	<b>Cloud Architecture:</b> NIST Cloud Computing Reference Architecture -IaaS – Examples of IaaS Providers – PaaS – Examples of PaaS Providers – SaaS – Examples of SaaS Providers – Public, Private and Hybrid Clouds – Basics of Virtualization – Types of Virtualization – Implementation Levels of Virtualization – Virtualization Structures – Tools and Mechanisms	9
IV	<b>Cloud Platform and Thread Programming:</b> Anatomy of the Aneka-Container – Building Aneka Clouds – Cloud Programming and Management –Programming Applications with Threads – Multithreading and Programming-Applications with Aneka Threads	9
V	<b>Resource Management and Cloud Applications:</b> Inter Cloud Resource Management – Resource Provisioning and Resource Provisioning Methods – Global Exchange of Cloud Resources - Applications: Amazon Web Applications – Google App Engine – Microsoft Azure.	9
<b>TOTAL INSTRUCTIONAL HOURS</b>		<b>45</b>

**Course Outcome**

- Upon completion of this course, the students will be able to
- CO1: Understand Distributed Communication
  - CO2: Design Distributed Resource Management
  - CO3: Familiar with basics of Cloud Computing and Virtualization
  - CO4: Learn about Cloud Platform and Thread Programming
  - CO5: Gain knowledge about Resource Management and Application in Cloud

**TEXT BOOKS:**

T1- George Coulouris, Jean Dollimore, Tim Kindberg, —Distributed Systems Concepts and Designl, Pearson Education , Fifth Edition, 2017. (UNIT 1 and 2)

T2. Kai Hwang, Geoffrey C. Fox, Jack G. Dongarra, "Distributed and Cloud Computing, From Parallel Processing to the Internet of Things", Morgan Kaufmann Publication, First Edition, 2013.

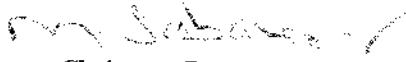
**REFERENCE BOOKS:**

R1- Rajkumar Buyya, Christian Vecchiola, S. Thamarai Selvi, —Mastering Cloud Computing, TataMcGraw Hill Publication, 2017.(UNIT 4)

R2-Rittinghouse, John W., and James F. Ransome, —Cloud Computing: Implementation, Management and Security, CRC Press, 2017. (UNIT 5)

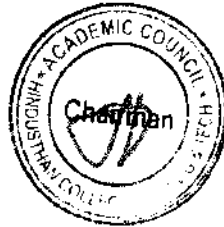
R3-Toby Velte, Anthony Velte, Robert Elsenpeter, "Cloud Computing - A Practical Approach, TataMcGraw Hill Publication, 2009.

R4-George Reese, "Cloud Application Architectures: Building Applications and Infrastructure in the Cloud, O'Reilly Media Publication, 2009.



**Chairman, Board of Studies**

**Chairman - BoS  
IT - HICET**



**Dean - Academics**

**Dean (Academics)  
HICET**



**PROGRAMME      COURSE CODE      NAME OF THE COURSE      L   T   P   C**

**The student should be made to:**

- Course Objective**
1. To know the Fundamental Concepts of Data Science and Analytics.
  2. To know about Data Merging and Spectral Analysis.
  3. To gain knowledge about Finite state machines and Recurrent models
  4. To learn Data analysis, Classification and Clustering
  5. To learn various NoSql Databases and Graph Processing.

Unit	Description	Instructional Hours
	<b>INTRODUCTION TO DATA SCIENCE AND BIG DATA</b>	
I	Data Science and Analytics - Big Data - Relations: Data Scales - Set and Matrix Representations-Relations - Similarity Measures - Dissimilarity Measures - Sequence Relations.	9
	<b>PREPROCESSING AND VISUALIZATION</b>	
II	Sampling and Quantization - Error Types - Error Handling - Filtering - Data Transformation - Data Merging - Diagrams - Principal Component Analysis - Multidimensional Scaling - Sammon Mapping - Auto associator - Histograms - Spectral Analysis.	9
	<b>CORRELATION, REGRESSION AND FORECASTING</b>	
III	Linear Correlation - Correlation and Causality - Chi-Square Test for Independence - Linear Regression -Non-Linear Substitution - Robust Regression - Neural Networks -Radial Basis Function Networks - Cross Validation - Feature Selection - Finite State Machines - Recurrent Models - Autoregressive Models.	9
	<b>CLASSIFICATION AND CLUSTERING</b>	
IV	Classification Criteria - Naive Bayes_ Classifier - Linear Discriminant Analysis - Support Vector Machine -Nearest Neighbour Classifier - Learning Vector Quantization - Decision Trees - Cluster Partitions - <b>Clustering:</b> Sequential - Prototype-Based - Fuzzy - Relational - Cluster Tendency Assessment-Cluster Validity - Self Organizing Maps	9
	<b>SYSTEM ARCHITECTURE AND APPLICATIONS</b>	
V	Lambda Architecture - Nosql Stores: Key-Value - Columnar - Document - Graph. Case Studies: Riak - Hbase - MongoDB - Neo4j. MapReduce - Graph Processing - EventProcessing-Hadoop-Giraph -Storm. Recommendation Systems - Time Series Analysis - Text Analysis.	9
<b>TOTAL INSTRUCTIONAL HOURS</b>		<b>45</b>

- Course Outcome**
- CO1 Understand the concepts of Data science and Analytics
  - CO2 Apply the Preprocessing and Visualization in applications
  - CO3 Implement the learning concepts and Machine Models
  - CO4 Apply the classification and clustering ideas in applications
  - CO5 Apply the system architecture in case studies

**TEXT BOOK:**

- T1 Marz N and Warren J,|Big Data|, Manning Publications, 2015
- T2 Runkler TA,|Data Analytics: Models and algorithms for intelligent data analysis|, Springer, 2012.

**REFERENCE:**

- R1 Dean J.|Big Data, Data Mining and Machine learning|, Wiley publications, 2014
- R2 Provost F and Fawcett T,|Data Science for Business|, O\_Reilly Media Inc, 2013.
- R3 Janert PK, Data Analysis with Open Source Tools|, O\_Reilly Media Inc, 2011

*[Signature]*  
**Chairman, Board of Studies**  
**Chairman - BoS**  
**IT - HICET**



*[Signature]*  
**Dean - Academics**  
**Dean (Academics)**  
**HICET**

PROGRAMME	COURSE CODE	NAME OF THE COURSE	L	T	P	C
B.E/B.Tech	19IT7203	SOFTWARE TESTING AND QUALITY ASSURANCE	3	0	0	3

The student should be made to:

- Course Objective**
1. To understand the Basic principles and categories of Defects in Software Testing.
  2. To familiar with the types and levels of Software Testing.
  3. To study the concepts related to Controlling and Monitoring Software Testing
  4. To familiar with the concepts related to Quality and Customer Satisfaction, Benchmark.
  5. To Learn the process of Certification and Standard Assessment

Unit	Description	Instructional Hours
I	<b>INTRODUCTION</b> Testing as an Engineering activity- Evolution -Testing as process- Overview of the Testing Maturity Model - Testing Fundamentals: Basic Definitions- Testing Principles- The tester's role in Software Development Organization- Origins of Defects - Defect Classes- Tester support for Developing a Defect Repository	9
II	<b>SOFTWARE TESTING METHODS AND TESTING LEVELS</b> Testing Design Strategies - Black Box methods: Random Testing-Equivalence Class Partitioning - Boundary Value Analysis-White box Testing: Data Flow- Loop Testing-Mutation Testing-Need for levels of testing-Unit Testing- Integration Testing- System Testing – Regression Testing -Alpha and Beta Testing - Acceptance Testing.	9
III	<b>CONTROLLING MONITORING AND REVIEW</b> Measurements and Milestones for Controlling and Monitoring, Status Meetings, Reports and Control Issues, Criteria for test completion, Software Configuration Management, Types of Reviews, developing a Review Program, the need for Review Policies, Components of Review Plans, Reporting Review Results.	9
IV	<b>INTRODUCTION TO SOFTWARE QUALITY</b> Defining Software Quality, Software Quality factors, Components of Software Quality Assurance system, Development and Quality Plans, Integrating Quality activities in Project Life Cycle.	9
V	<b>STANDARDS, CERTIFICATION AND ASSESSMENT</b> Need for standards, SQA Standards – ISO: 9001 Certification, Bootstrap methodology, V SPICE Project and Process Assessment, Management and its Role in Quality Assurance –SQA Unit & other actors in SQA systems	9
<b>TOTAL INSTRUCTIONAL HOURS</b>		<b>45</b>


- Course Outcome**
- Upon completion of this course, the students will be able to
- CO1: understand the basic Principles of Software Testing and types of Defects in Software Testing.
- CO2: apply the appropriate Testing methods for real time applications.
- CO3: understand How to Control, Monitor and review the Software Projects.
- CO4: understand basics of Quality Assurance and to develop quality plans.
- CO5: understand the process of Certification and Standard Assessment.

**TEXT BOOKS:**


- T1. Daniel Galin, —Software Quality Assurance: From Theory to Implementation, PearsonAddison-Wesley, Second Edition, 2012.  
T2. Ilene Burnstein, —Practical Software Testing, Springer International Edition 2003.

**REFERENCE BOOKS:**

- R1. M G Limaye, —Software Testing - Principles, Techniques and Tools, McGraw Hill,2017.  
R2.MilindLimaye, —Software Quality Assurance, McGraw Hill, 2011.  
R3. Glenford J. Myers, Corey Sandler, Tom Badgett, The Art of Software Testing, 3rd Edition, JohnWiley & Sons, Inc. 2011  
R4. Ron Patton, Software Testing, second edition. Pearson Education.2009.

  
**Chairman, Board of Studies**  
**Chairman - BOS**  
**IT - HICET**



  
**Dean - Academics**  
**Dean (Academics)**  
**HICET**



**The student should be made:**

**Course Objective**

1. To understand Basics, Techniques and Tools for Cloud Computing
2. To know about usage of Virtualization Concept
3. To use GAE as PaaS
4. To understand the working of version control systems commands
5. To gain knowledge about CloudSim Environment

**Expt. No.**

**Description of the Experiments**

1. Install VirtualBox with different flavours of Linux or Windows OS on top of Windows OS.
2. Install a C Compiler in the Virtual Machine created using Virtual Box and execute Simple Programs.
3. Create a VM image which has a C Compiler along with an Operating System and do the following experiments
  - a. Fibonacci Series
  - b. File Operations
4. Moving files between virtual machines
5. Install Google App Engine. Create hello World app and other simple web applications using Python/Java.
6. Use GAE launcher to launch the Web Applications.
7. Control systems command to CLONE, COMMIT, PUSH, FETCH, PULL, CHECKOUT. RESET and DELETE
8. Simulate a cloud scenario using CloudSim and run a Scheduling Algorithm not present in CloudSim

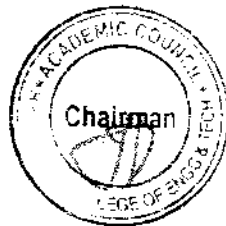
**Total Practical Hours      45**

**Upon completion of this course, the students will be able to**

**Course Outcome**

- |     |                                                                          |
|-----|--------------------------------------------------------------------------|
| CO1 | Understand Techniques and Tools used in cloud environment.               |
| CO2 | Design and implement Virtualization Concept in the Cloud Infrastructure. |
| CO3 | Use GAE as PaaS in Cloud Environment.                                    |
| CO4 | Apply version control system commands in Git repositories.               |
| CO5 | Gain knowledge about usage of CloudSim Simulation Environment.           |

*[Signature]*  
**Chairman, Board of Studies**  
**Chairman - BOS**  
**IT - HICET**



*[Signature]*  
**Dean - Academics**  
**Dean (Academics)**  
**HICET**

<b>Programme</b>	<b>Course Code</b>	<b>Name of the Course</b>	<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
<b>B.TECH</b>	<b>19IT7002R</b>	<b>DATA ANALYTICS LABORATORY</b>	<b>0</b>	<b>0</b>	<b>3</b>	<b>1.5</b>

**The student should be made:**

Course Objective

1. To Implement Map Reduce Programs For Processing Big Data
2. To Realize Storage Of Big Data Using H Base, Mongo Db
3. To analyse Big Data Using Linear Models
4. To analyse Big Data Using Machine Learning Techniques Such As Svm / Decision Tree Classification And Clustering

**Expt. No. Description of the Experiments**

- 1 Install, Configure and Run Hadoop and HDFS
- 2 Implement the following File Management tasks in Hadoop:  
•Adding Files and Directories  
•Retrieving Files  
•Deleting Files
- 3 Implementing Matrix Multiplication with Hadoop Map Reduce
- 4 Implement an MR program that processes a Weather Dataset.
- 5 To perform NoSQL database using mongodb to create, update and insert.
- 6 Create, load data to tables and manipulate the data in Hive
- 7 Create, load data to tables and manipulate the data in Hbase
- 8 Implement Linear and logistic Regression
- 9 Perform test on Normalization using R.
- 10 Visualize data Using any Plotting Framework

**Total Practical Hours 45**

Course Outcome

- Upon completion of this course, the students will be able to
- CO1: Process Big Data using Hadoop Framework.
  - CO2: Understand Installation of Hadoop and HIVE Setup.
  - CO3: Use MongoDB and Cassandra to StoreData.
  - CO4: Build and apply Linear And Logistic Regression Models and Perform Data Analysis With Machine Learning Methods.
  - CO5: Perform Graphical Data Analysis.

*M. Salem*  
Chairman, Board of Studies



**Chairman - BoS  
IT - HICET**

*[Signature]*  
Dean – Academics

**Dean (Academics)  
HICET**



**PROFESSIONAL  
ELECTIVE III**





PROGRAMME	COURSE CODE	NAME OF THE COURSE	L	T	P	C
B.E/B.Tech	19IT7301	SOCIAL NETWORK ANALYSIS	3	0	0	3

The student should be made:

- Course Objective**
- CO1: understand the concept of semantic web and related applications.
  - CO2: understand about web data and knowledge representation using ontology.
  - CO3: learn how to perform Modelling and aggregating social network data.
  - CO4: understand human behaviour in social web and related communities.
  - CO5: learn visualization and Real time applications of Social Networks.

Unit	Description	Instructional Hours
I	<b>INTRODUCTION</b> Introduction to Semantic Web: Limitations of current Web – Development of Semantic Web –Emergence of the Social Web – Social Network analysis: Development of Social Network Analysis – Key concepts and measures in network analysis	9
II	<b>WEB DATA AND KNOWLEDGE REPRESENTATION</b> Electronic sources for network analysis: Electronic discussion networks, Blogs and online communities – Web-based networks – Applications of Social Network Analysis. Ontology and their role in the Semantic Web: Ontology-based knowledge Representation –Ontology languages for the Semantic Web: Resource Description on Framework – Web Ontology Language-Comparison with UML, E/R model, XML and XML Schema..	9
III	<b>MODELLING AND AGGREGATING</b> Modeling and aggregating social network data: State-of-the-art in network data representation– Ontological representation of social individuals – Ontological representation of social relationships –Aggregating and reasoning with social network data -Developing social- semantic applications: Building Semantic Web applications with social network features.	9
IV	<b>MINING COMMUNITIES IN WEB SOCIAL NETWORKS</b> Detecting communities in social networks – Definition of community –Evaluating communities – Methods for community detection and mining – Applications of community mining algorithms – Tools for detecting communities social network infrastructures and communities –Decentralized online Social networks –Multi – Relational characterization of dynamic Social Network Communities.	9
V	<b>VISUALIZATION AND APPLICATIONS</b> Graph theory – Centrality – Clustering – Node-Edge Diagrams – Matrix representation – Visualizing online social networks, Visualizing social networks with matrix-based representations – Matrix and Node-Link Diagrams – Hybrid representations – Applications – Cover networks – Community welfare– Collaboration networks – Co-Citation networks.	9
<b>TOTAL INSTRUCTIONAL HOURS</b>		<b>45</b>

- Course Outcome**
- Upon completion of this course, the students will be able to
- CO1: develop Semantic Web related applications.
  - CO2: represent knowledge using ontology.
  - CO3: perform Modeling and Aggregating social network data
  - CO4: extract human behavior in social web and related communities.
  - CO5: visualize social networks and understand real time applications.

**TEXT BOOKS:**

T1 - Borko Furht, —Handbook of Social Network Technologies and Applications, 1st Edition, Springer, 2010.

T2 - Peter Mika, —Social Networks and the Semantic Web, First Edition, Springer 2007.


**REFERENCE BOOKS:**

R1 - Guandong Xu ,Yanchun Zhang and Lin Li, Web Mining and Social Networking –Techniques and applications, First Edition Springer, 2011.


R2 - Max Chevalier, Christine Julien and Chantal Soulé-Dupuy, —Collaborative and Social Information Retrieval and Access: Techniques for Improved user Modelling, IGI Global Snippet, 2009.

R3- John G. Breslin, Alexander Passant and Stefan Decker, -The Social Semantic Web, Springer, 2009.

R4- Dion Goh and Schubert Foo, —Social information Retrieval Systems: Emerging Technologies and Applications for Searching the Web Effectively, IGI Global Snippet, 2008.

  
Chairman, Board of Studies  
**Chairman - BOS**  
**IT - HICET**



  
Dean – Academics  
**Dean (Academics)**  
**HICET**

PROGRAMME	COURSE CODE	NAME OF THE COURSE	L	T	P	C
B.E/B.Tech	19IT7302	CYBER FORENSICS	3	0	0	3

The student should be made:

- Course Objective**
- CO1: Learn the Forensics and Investigation.
  - CO2: Be Exposed to Forensics Technology and Systems.
  - CO3: Learn About Evidence Collection and Forensic Tools.
  - CO4: Learn to Analyse and Validate Forensics Data.
  - CO5: Learn Ethical Hacking and System Hacking

Unit	Description	Instructional Hours
I	<b>INTRODUCTION TO CYBER FORENSICS:</b> The Goal of the Forensic Investigation: Why Investigate, Internet Exceeds Norm, How to Begin a Non-Liturgical Forensic Examination: Isolation of Equipment, Cookies, Cache, How to Correlate the Evidence, The Liturgical Forensic Examination: Tracing Activity on a Windows-Based Desktop	9
II	<b>COMPUTER FORENSICS TECHNOLOGY AND SYSTEMS:</b> Specialized Forensics Techniques - Spyware and Adware - Security and Wireless Technologies - Avoiding Pitfalls with Firewalls - Biometric Security Systems - Internet Security Systems - Intrusion Detection Systems - Firewall Security Systems.	9
III	<b>EVIDENCE COLLECTION AND FORENSICS TOOLS:</b> Processing Crime and Incident Scenes - Working with DOS and Windows Systems - Current Computer Forensics Tools: Software/ Hardware Tools.	9
IV	<b>ANALYSIS AND VALIDATION:</b> Validating Forensics Data - Data Hiding Techniques - Performing Remote Acquisition - Network Forensics - Email Investigations - Cell Phone and Mobile Devices Forensics.	9
V	<b>ETHICAL HACKING:</b> Introduction to Ethical Hacking - Footprinting and Reconnaissance - Scanning Networks - Enumeration - System Hacking - Malware Threats - Sniffing - Social Engineering.	9
<b>TOTAL INSTRUCTIONAL HOURS</b>		<b>45</b>

- Course Outcome**
- Upon completion of this course, the students will be able to
- CO1: Understand the forensics and investigation.
  - CO2: Gain knowledge about forensics technology and systems used.
  - CO3: To analyze digital evidence and use forensics tools.
  - CO4: Explain the principle of Network Forensics.
  - CO5: Understand the concept ethical hacking and system hacking

**TEXT BOOKS:**

- T1 - Albert J. Marcella, Robert S. Greenfield Cyber Forensics A Field Manual for Collecting, Examining, and Preserving Evidence of Computer Crimes, AUERBACH Publications, (Second Edition), 2007
- T2 - Bill Nelson, Amelia Phillips, Christopher Steuart, Guide to Computer Forensics and Investigations, Cengage Learning, Published: Fourth Edition, 2010

**REFERENCE BOOKS:**

- R1 - John R. Vacca, Computer forensics: Computer Crime Scene Investigation, 2nd Edition, Charles
- R2 - CEH official Certified Ethical Hacking Review Guide, Wiley India Edition, 2015.

  
Chairman, Board of Studies

Chairman - BOS  
IT - HICET



  
Dean - Academics

Dean (Academics)  
HICET

PROGRAMME	COURSE CODE	NAME OF THE COURSE	L	T	P	C
B.E/B.Tech	19IT7303	SOFTWARE DOCUMENTATION	3	0	0	3

The student should be made:

- Course Objective**
1. To Learn about the various Processes Involved in Software Documentation.
  2. To be Familiar about the Documentation Styles and to Standardize the Business Practices
  3. To Gain Knowledge of Commonly used Documented Artifacts Concerning Software Testing.
  4. To Design a Software Document with Effective UIs and Layouts.
  5. To Create Documents that clarify the Goals of the various Software Development teams

Unit	Description	Instructional Hours
	<b>INTRODUCTION</b>	
I	Need for Software Documentation - Understanding Task Orientation - Analyzing Users – Writing user scenarios - User Informational Needs - Document Goals - User Work Motivations – User Analysis Checklist - Constructing a Task List - Categorization - Writing steps as Actions - Task Analysis	9
	<b>DOCUMENTATION</b>	
II	Planning and Writing Documents - Task List and Schedule - Guidelines - Documentation Process -Documentation Plan - Document Review Form - Review Plan - Schedule -Checklist.	9
	<b>DOCUMENTATION TESTING</b>	
III	Usability Tests - Advantages of Field Testing - Editing and Fine Tuning -Problems - Designing for Task Orientation - Page Showing Elements of Document Design - Screen Showing Elements for Online Help Design - Solutions to the Design Problem for Printed and Online Documentation.	9
	<b>DOCUMENTATION LAYOUTS</b>	
IV	Laying Out Pages and Screens - Elements of Page and Screen Design - Designing Type – Effective Writing Style - Using Graphical that Support Decision Making - Functions of Graphics - Type and Elements of Graphics.	9
	<b>DOCUMENTATION GUIDELINES</b>	
V	Writing to Guide - Procedures - Guidelines - Writing to Support - Reference - Structural – ReferenceEntry - Checklist - Designing Index -User Oriented Index - Case Studies.	9
	<b>TOTAL INSTRUCTIONAL HOURS</b>	<b>45</b>

- Course Outcome**
- Upon completion of this course, the students will be able to
- CO1: Understand and Analyse Software Documentation.  
CO2: Develop a Documentation Style and Review Plan.  
CO3: Construct and Realize Commonly used Software Artifacts for Software Testing.  
CO4: Design a Software Documents and Layouts.  
CO5: Manage the Documentation Guidelines and Checklists

**TEXT BOOKS:**

T1 - Thomas T. Barker, "Writing Software Documentation - a Task Oriented approach", Allyn & Bacon Series of Technical Communication, 2002.

T2 - Andreas Ruping , Agile Documentation: A Pattern Guide to Producing Lightweight Documents for Software Projects, John Wiley & Sons, 2005

**REFERENCE BOOKS:**

R1 - Cyrille Martraire, Living Documentation: Continuous Knowledge Sharing by Design, First Edition, Addison- Wesley Professional, 2019

R2 - Gerardus Blokdyk, Software documentation, 5 STARCOOKS, 2018.

R3 - Edmond H. Weiss, How To Write Usable User Documentation, Second Edition , Oryx Press, 1991.

R4 - Patricia A. Williams, Pamela S. Beason, Writing Effective Software Documentation, LONGMAN, 1990.



Chairman, Board of Studies

**Chairman - BOS**  
**IT - HICET**



Dean, Academics  
**Dean (Academics)**  
**HICET**



PROGRAMME	COURSE CODE	NAME OF THE COURSE	L	T	P	C
B.Tech	19IT7304	PRINCIPLES OF MANAGEMENT	3	0	0	3

The student should be made:

- Course Objective**
1. To Understand the Evolution of Management
  2. To Study the Functions and Principles of Management
  3. To Learn the Application of the Principles in an Organization
  4. Be Exposed to Communication Process
  5. Be Familiar with various Budgetary Concepts

Unit	Description	Instructional Hours
	<b>INTRODUCTION TO MANAGEMENT AND ORGANIZATIONS</b>	
	Definition of Management – Science or Art – Manager Vs Entrepreneur	
I	– Types of Managers– Managerial Roles and Skills – Evolution of Management – Scientific, Human Relations, System and Contingency Approaches – Types of Business Organization – Sole Proprietorship, Partnership, Company-Public and Private Sector Enterprises –Organization Culture and Environment – Current Trends and Issues in Management.	9
	<b>PLANNING</b>	
II	Nature and Purpose of Planning – Planning Process – Types of Planning – Objectives –Setting Objectives – Policies – Planning Premises – Strategic Management – Planning Tools and Techniques – DecisionMaking Steps and Process	9
	<b>ORGANISING</b>	
III	Nature and Purpose – Formal and Informal Organization – Organization Chart – Organization Structure – Types – Line and Staff Authority – Departmentalization – Delegation of Authority– Centralization and Decentralization – Job Design – Human Resource Management – HR Planning, Recruitment, Selection, Training and Development, Performance Management, Career Planning and Management.	9
	<b>DIRECTING</b>	
IV	Foundations of Individual and Group Behavior – Motivation – Motivation Theories –Motivational Techniques – Job Satisfaction – Job Enrichment – Leadership – Types and Theories of Leadership – Communication – Process of Communication – Barrier in Communication – Effective Communication – Communication and IT.	9
	<b>CONTROLLING</b>	
V	System and Process of Controlling – Budgetary and Non-Budgetary Control Techniques – Use of Computers and IT in Management Control –Productivity Problems and Management – Control and Performance – Direct and Preventive Control – Reporting.	9
	<b>TOTAL INSTRUCTIONAL HOURS</b>	<b>45</b>

**Course  
Outcome**

**Upon completion of this course, the students will be able to**

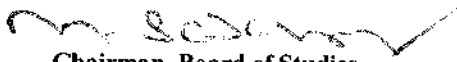
- CO1: Identify the concept of Management and Administration
- CO2: Apply the concept of Planning, Forecasting and Decision Making
- CO3: Select the Organizational Structures and Apply Staffing Concepts
- CO4: Analyze the Motivational and Leadership Theories
- CO5: Use Communication and Controlling Processes


**TEXT BOOKS:**

- T1: Stephen P. Robbins & Mary Coulter, —Managementl, Prentice Hall (India) Pvt. Ltd., (14thEdition), 2017.
- T2: JAF Stoner, Freeman R.E and Daniel R Gilbert —Managementl, Pearson Education, (6th Edition), 2011.

**REFERENCE BOOKS:**

- R1: Tripathy PC & Reddy PN, —Principles of Management, Tata McGraw Hill, (6th Edition),2017.
- R2: Harold Koontz & Heinz Wehrich —Essentials of management Tata McGraw Hill, (10thEdition), 2015.
- R3: Harold Koontz, Heinz Wehrich, —Essential of Management, Tata Mcgraw Hill, (10th Edition),2015.
- R4: Robert Kreitner & Mamata Mohapatra, —Management, Biztantra, (12th Edition), 2011

  
**Chairman, Board of Studies**  
**Chairman - BoS**  
**IT - HiCET**

  
**Dean - Academics**  
**Dean (Academics)**  
**HiCET**



<b>PROGRAMME</b> B.E/B.Tech	<b>COURSE CODE</b> 19IT7305	<b>NAME OF THE COURSE</b> SOFTWARE ARCHITECTURE	<b>L</b> 3	<b>T</b> 0	<b>P</b> 0	<b>C</b> 3
--------------------------------	--------------------------------	----------------------------------------------------	---------------	---------------	---------------	---------------

The student should be made:

**Course Objective**

1. Understand the Software Architectural Requirements and Drivers
2. Learn the Quality attributes for Software Architecture
3. Gain knowledge about various Architectural Views
4. Be exposed to Architectural Styles
5. Be familiar with Architectures for Emerging Technologies

<b>Unit</b>	<b>Description</b>	<b>Instructional Hours</b>
	<b>INTRODUCTION AND ARCHITECTURAL DRIVERS</b>	
<b>I</b>	Introduction –What is Software Architecture? – Standard Definitions – Architectural Structures –Influence of Software Architecture on Organization-both Business and Technical – Architecture Business Cycle- Introduction – Functional Requirements – Technical Constraints	9
	<b>QUALITY ATTRIBUTE WORKSHOP</b>	
<b>II</b>	Quality Attributes– Documenting Quality Attributes – Functionality and Quality Attributes -System Quality Attributes – Quality Attribute Scenarios -Six Part Scenarios – Case studies.	9
	<b>ARCHITECTURAL VIEWS</b>	
<b>III</b>	Introduction – Standard Definitions for Views – Structures and Views - Representing Views-Available Notations – Standard Views – 4+1 View of Rup, Siemens 4 Views, SEI's Perspectives and Views –Case Studies	9
	<b>ARCHITECTURAL STYLES</b>	
<b>IV</b>	Introduction – Data Flow Styles – Call-Return Styles – SharedInformation Styles – Event Styles – Case Studies for Each Style	9
	<b>DOCUMENTING THE ARCHITECTURE</b>	
<b>V</b>	Good practices – Documenting the Views using UML – Merits andDemerits of using Visual Languages– Need for Formal Languages - Architectural Description Languages – ACME – 9Case Studies.	9
	<b>TOTAL INSTRUCTIONAL HOURS</b>	<b>45</b>

Upon completion of this course, the students will be able to

CO1: Acquire the importance and role of Software Architecture in Large-Scale Software Systems.

**Course Outcome**

CO2: Assess the Quality Attributes of a System at the Architectural Level.

CO3: Use Appropriate Views to Specify Architecture

CO4: Recognize the major Software Architectural Styles

CO5: Design Document for a given Architecture.




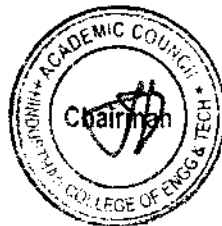
**TEXT BOOKS:**


- T1: Len Bass, Paul Clements, and Rick Kazman, —Software Architectures in Practices, Addison-Wesley, Third Edition, 2014  
T2: Anthony J Lattanze, —Architecting Software Intensive System. A Practitioner's Guide, Auerbach Publications, 2010.

**REFERENCE BOOKS:**

- R1: Paul Clements, Felix Bachmann, Len Bass, David Garlan, James Ivers, Reed Little, PauloMerson, Robert Nord, and Judith Stafford, —Documenting Software Architectures. Views andBeyond, Addison-Wesley, 2nd Edition, 2010.  
R2: Paul Clements, Rick Kazman, and Mark Klein, —Evaluating software architectures: Methods and Case Studies. Addison-Wesley, 2004.  
R3: Oliver Vogel, Ingo Arnold, Arif Chughtai, Timo Kehrer,—Software Architectures: A Comprehensive Framework and Guide for Practitioner, Springer 2011.  
R4: Flavio Oquendo, Jair Leite, Thais Batista, —Software Architecture in Action, Springer 2016

  
**Chairman, Board of Studies**  
Chairman - BOB  
IT - NICET



  
**Dean – Academics**  
Dean (Academics)  
NICET

Programme	Course code	Name of the course	L	T	P	C
B.TECH.	19IT7306	GREEN COMPUTING	3	0	0	3

**The student should be able**

- Course Objective**
- To learn the fundamentals of Green Computing.
  - To understand various green assets and Models
  - To analyze the Green computing Grid Framework.
  - To understand the issues related with Green compliance.
  - To study and develop various case studies.

Unit	Description	Instructional Hours
	<b>FUNDAMENTALS</b>	
I	<b>Green IT Fundamentals:</b> Business, IT, and the Environment – Green computing: carbon foot print, scoop on power – Green IT Strategies: Drivers, Dimensions, and Goals	9
	<b>GREEN ASSETS AND MODELING</b>	
II	Green Assets: Buildings, Data Centers, Networks, and Devices – Green Business Process Management: Modeling, Optimization, and Collaboration – Green Enterprise Architecture – Environmental Intelligence – Green Supply Chains	9
	<b>GRID FRAMEWORK</b>	
III	Virtualization of IT systems – Role of electric utilities, Telecommuting, teleconferencing and teleporting – Materials recycling – Best ways for Green PC – Green Data center – Green Grid framework.	9
	<b>GREEN COMPLIANCE</b>	
IV	Socio-cultural aspects of Green IT – Green Enterprise Transformation Roadmap – Green Compliance: Protocols, Standards, and Audits – Emergent Carbon Issues: Technologies and Future.	9
	<b>CASE STUDIES</b>	
V	The Environmentally Responsible Business Strategies (ERBS) – Case Study Scenarios for Trial Runs – Case Studies – Applying Green IT Strategies and Applications to a Home, Hospital, Packaging Industry and Telecom Sector	9
	<b>Total Instructional Hours</b>	<b>45</b>

Course Outcome	Description
CO1	Acquire knowledge to adopt green computing practices to minimize negative impacts on the environment
CO2	Enhance the skill in energy saving practices in their use of hardware.
CO3	Evaluate technology tools that can reduce paper waste and carbon footprint by the stakeholders
CO4	Understand the ways to minimize equipment disposal requirements
CO5	Experience various case studies and applications of Green computing

**TEXT BOOK:**

- T1 Bhuvan Unhelkar, "Green IT Strategies and Applications-Using Environmental Intelligence", CRC Press, June 2014.
- T2 Bud E. Smith, "Green Computing Tools and Techniques for Saving Energy, Money and Resources", CRC Press, 2018, ISBN 9781138374669

**REFERENCES:**

- R1 Woody Leonhard, Katherine Murray, —Green Home computing for dummies!, August 2012.
- R2 Bhuvan Unhelkar, Green IT Strategies and Applications-Using Environmental Intelligence, CRC Press, June 2011
- R3 Alin Gales, Michael Schaefer, Mike Ebbers, —Green Data Center: steps for the Journey!, Shroff/IBM rebook, 2011.
- R4 Carl Speshocky, —Empowering Green Initiatives with IT!, John Wiley & Sons, 2010.

*[Signature]*  
Chairman, Board of Studies

Chairman - HoS  
IT - HICET



*[Signature]*  
Dean – Academics  
Dean (Academics)  
HICET

PROGRAMME	COURSE CODE	NAME OF THE COURSE	L	T	P	C
B.Tech/B.E	19IT7307	WEB DEVELOPMENT - II	0	0	3	3

- Course Objective**
1. Understand the basic architecture of front end applications and create web Applications using React TypeScript front-end stack.
  2. Interaction between a client-side application and server-side app via an API.
  3. Industry practices for state management and usage of static types.
  4. Best practices with regard to the development of a modern client-side application.
  5. To build TypeScript projects from scratch to scale.

**Experiment No.**

**Description of the Experiments**

- 1 **React fundamentals** This module introduces students to development using TypeScript by setting up a development environment, introducing them to the TypeScript programming language and the React framework, and demonstrates some of the basic concepts that underpin the use of React for building dynamic reactive user interfaces.
- 2 **State management** This module introduces students to the Hooks feature of React, on the usage of callback functions and how to use them to build dynamic components that maintain an internal state. This module also demonstrates state management by building a form and accepting user input.
- 3 **A deeper dive into React Hooks** This module discusses the common pitfalls of state management, introduces in-browser persistent storage, demonstrates additional standard hooks and the creation and use of custom hooks.
- 4 **Client-side routing** This module covers the concept of client-side routing as a separate behaviour from server-side route management. It demonstrates the various aspects of client-side routing such as the use of path parameters, query parameters, programmatic navigation and the operation of links and URLs that are handled client-side.
- 5 **Types in depth and Variants** This module takes a deeper dive into TypeScript's type system, demonstrating concepts such as function types, custom-defined types, generics, and union types. It also instructs the student why the "any" type should be avoided in practice, and finishes up with a demonstration of TypeScript's type inference behaviour.
- 6 **Modelling and managing complex states** This module teaches students how to manage complex states using the state reducer pattern, and then demonstrates the pattern by implementing it using React's use Reducer hook.
- 7 **APIs and state modelling** Through this module, students are introduced to using APIs to interface their client-side code with the server-side, how to model types to allow this interaction to take place, how to maintain a session with the backend, and how to work with pageable APIs.
- 8 **Best practices and npm packages** This module covers the best practices of front-end development, including the importance of accessibility and WAI-ARIA standards, and use of third-party packages from the NodeJS ecosystem
- 9 **Production React Apps** This final module focuses on production-specific optimizations of a React application, best practices for its build & deployment process, and the configuration of a progressive web app.

**Total Instructional Hours 45**

**Upon completion of this course, the students will be able to**

- Course Outcome**
- CO1: Be able to create Single Page Web Applications (SPA) using React, Typescript and TailwindCSS.
  - CO2: Have a solid understanding of static types, and know how to port untyped JavaScript to TypeScript
  - CO3: Learn typed state management that is inline with a backend data model.

CO4: Able to Modelling and managing complex states  
CO5: Practice API and state Modelling

**TEXT BOOKS:**

This course does not require students to use physical textbooks. Instead, original course material (videos, text and images) has been prepared for students to go through and is open-sourced under Creative Commons Attribution-ShareAlike 4.0 International License © Freshworks Inc. & Pupilfirst Pvt. Ltd. This course material may include some third-party content with a compatible license, and external links for additional reading on the Internet. Students are also taught how to search for information on their own.

**REFERENCE BOOKS:**

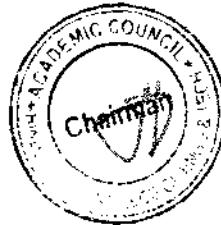
R1: Learning React: Functional Web Development with React and Redux 1st Edition by Alex Banks, Eve Porcello .O'REILLY publication.

R2: The Road to React: Your journey to master plain yet pragmatic React.js by Robin Wieruch



Chairman, Board of Studies

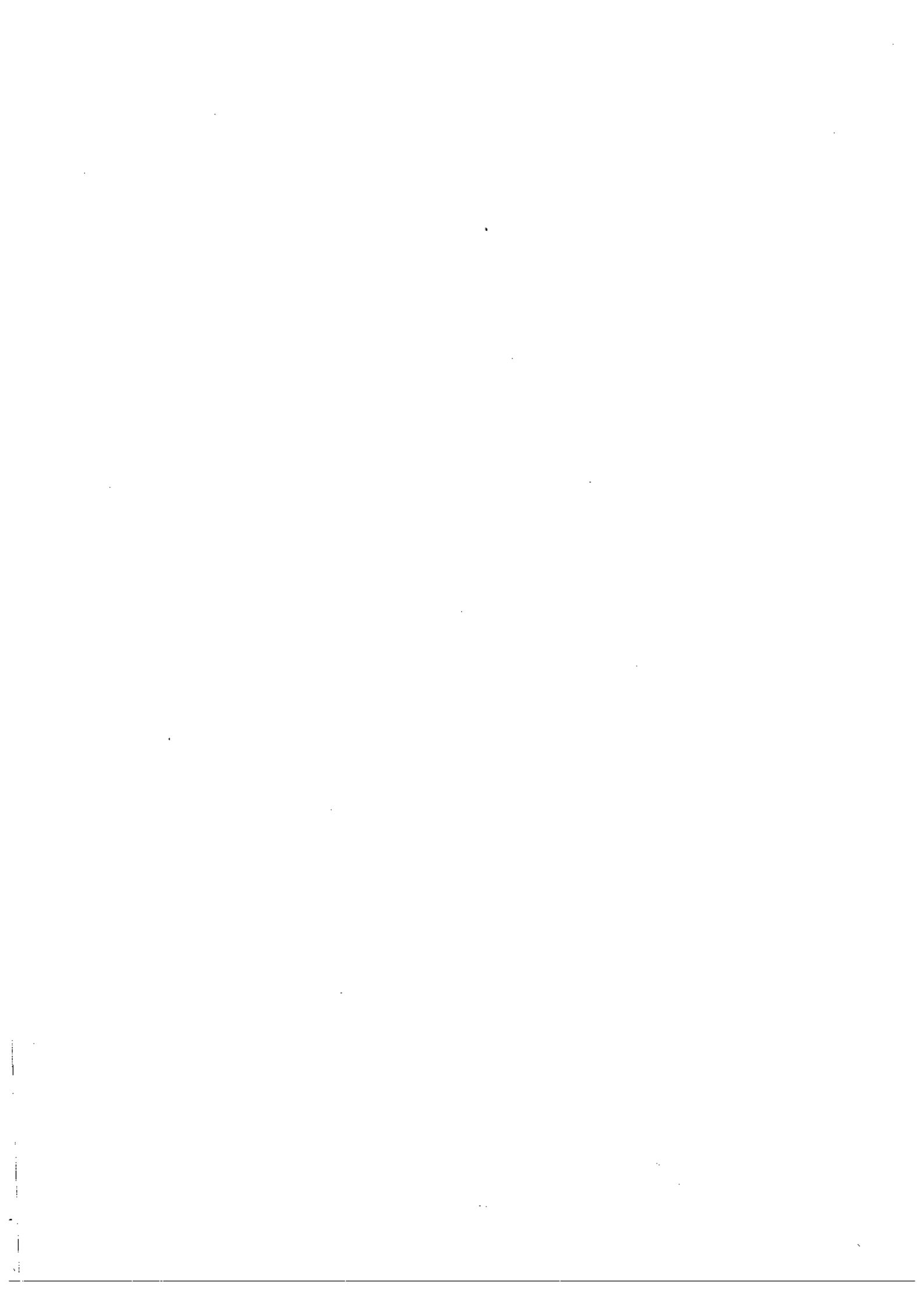
**Chairman - BoS  
HICET**



Dean – Academics

**Dean (Academics)  
HICET**

**SKILLED/  
INTEGRATED  
COURSE**



Programme	Course code	Name of the course	L	T	P	C
B.TECH.	19IT7401R	CYBER SECURITY	3	0	0	3

**The student should be able**

- Course Objective**
- 1 To know the importance of Information System Security.
  - 2 To explore various Cryptographic Techniques.
  - 3 To learn the basics of Cybercrime and Cyber Offences.
  - 4 To familiarize various Cyber Threats, Attacks, Vulnerabilities, Defensive Mechanisms.
  - 5 To understand the Organizational Implications on Cyber Security.

Unit	Description	Instructional Hours
	<b>INFORMATION SYSTEMS AND SECURITY</b>	
I	Information System Components, Information System Categories, Individuals in Information System, Information Security, Threats to Information systems, Cyber Security and Risk analysis, Database Security, Internet Security, Security technology, Intrusion Detection.	9
	<b>OVERVIEW OF SECURITY TECHNIQUES</b>	
II	Computer security concepts, OSI security architecture, Security attacks, Security services, Security mechanisms, Model for Network security, Symmetric cipher model, cryptography, Cryptanalysis and Brute-Force Attack, Caesar Cipher, Rail fence technique, Public-Key Cryptography: Principles, Applications, Public-Key Cryptanalysis, RSA algorithm.	9
	<b>CYBERCRIME AND CYBER OFFENCES</b>	
III	Introduction to Cybercrime, Classifications of Cybercrimes planning of attacks, social engineering: Human based, Computer based: Cyberstalking, Cybercafe and Cybercrimes.	9
	<b>CYBER THREATS, ATTACKS AND PREVENTION</b>	
IV	Phishing, Password cracking, Keyloggers and Spywares, DoS and DDoS attacks, SQL Injection Identity Theft (ID): Types of identity theft, Techniques of ID theft	9
	<b>CYBER SECURITY IMPLICATIONS</b>	
V	Lessons for Organizations, Web Threats for Organizations, Security and Privacy Implications, Risks in social media marketing, People's Privacy in the organization, Organizational Guidelines, Incident Handling, Best Practices for organizations, Media and asset protection, End point security	9
	<b>Total Instructional Hours</b>	<b>45</b>
<b>Course Outcome</b>	CO1 Understand the Information Systems and Security Fundamentals.	
	CO2 Gain knowledge on various Security Techniques.	
	CO3 CExpress fundamentals of cybercrimes and the cyber offenses.	
	CO4 Recognize the cyber threats, attacks, vulnerabilities and its defensive mechanism.	
	CO5 Learn the Organizational Implications on Cyber security.	

**TEXT BOOK:**

- T1 William Stallings, "Cryptography and Network Security: Principles and Practice", Seventh Edition, Pearson Education, 2017.
- T2 Nina Godbole, Sunit Belapure, "Cyber security: Understanding Cybercrime, Computer Forensics and Legal perspectives", Wiley India Pvt. Ltd, 2013.

**REFERENCES:**

- R1 Alfred Basta, Nadine Basta, Mary Brown, Ravinder Kumar, "Cyber Security and Cyber Laws", Cengage Learning India Pvt Ltd (1st Edition), 2018.
- R2 Mayank Bhusan, Rajkumar Singh Rathore, Aatif Jamshed, "Fundamental of Cyber Security: Principles, Theory and Practices", BPB Publications(1st Edition), 2017.
- R3 William Stallings, Lawrie Brown, "Computer Security: Principles and Practice", Pearson Education (3rd Edition), 2014.
- R4 McDonough, Bart R., "Cyber Smart: Five Habits to Protect Your Family, Money, and Identity from Cyber Criminals", John Wiley & Sons, Incorporated, 2019. ProQuest Ebook Central, <https://ebookcentral.proquest.com/lib/inflibnet-ebooks/detail.action?docID=5612908>.

*[Signature]*  
 Chairman, Board of Studies  
 Chairman - BoS  
 IT - HICET

*[Signature]*  
 Dean - Academics

Dean (Academics)  
 HICET







**CO'S, PO'S & PSO'S MAPPING**

**SEMESTER 1 - R 2022**

**AY2023-24 BATCH 2023**

**Course Code & Name : 22MA1101/MATRICES AND CALCULUS**

PO& PSO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	3	3	3	3	-	-	-	-	-	-	2	2	1	1
CO2	3	3	3	2	2	-	-	-	-	-	-	2	2	2	2
CO3	3	3	3	2	3	-	-	-	-	-	-	2	2	2	2
CO4	3	3	3	3	3	-	-	-	-	-	-	2	2	3	3
CO5	3	3	3	3	3	-	-	-	-	-	-	2	1	2	2
Avg	3	3	3	2.6	2.8	-	-	-	-	-	-	2	1.8	2	2

**Course Code & Name : 22HE1151 / ENGLISH FOR ENGINEERS**

PO& PSO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	2					1	2	2	2	3	1	1	1	2	2
CO2	2	1			1	1	1	2	2	3		2		2	2
CO3	2	1			1	1	2	3	3	3		1		2	2
CO4	2	1				1	2	2	2	3	1	1		2	2
CO5	2					1	1	2	3	3		1			
Avg	2	1	-	-	1	1	1.6	2.2	2.4	3	1	1.2	1	2	2

**Course Code & Name : 22CY1151/ CHEMISTRY FOR CIRCUIT ENGINEERING**

PO& PSO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	2	3	3	1	1	1	1	-	1	-	1	2	-	-	-
CO2	2	3	2	1	1	1	1	-	1	-	1	2	-	-	-
CO3	2	2	2	2	1	1	1	-	1	-	1	2	-	-	-
CO4	2	2	3	1	2	1	1	-	1	-	1	2	-	-	-
CO5	2	3	3	2	2	1	1	-	1	-	2	2	-	1	1
Avg	2	2.6	2.6	1.4	1.4	1	1	-	1	-	1.2	2	-	1	1

**Course Code & Name: 21IT1151/ Problem Solving using C programming**

PO& PSO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO 10	PO 11	PO 12	PSO1	PSO2	PSO3
CO1	3	1	0	0	1	0	0	0	0	0	1	1	1	2	2
CO2	1	1	1	0	1	0	0	0	1	0	0	1	1	2	2
CO3	1	1	1	0	1	0	0	0	0	1	0	1	0	1	1
CO4	1	1	1	0	0	0	0	0	1	0	1	1	0	1	1
CO5	1	1	1	0	0	0	0	0	0	1	1	1	1	1	1
Avg	1.4	1	1	0	0.6	0	0	0	0.4	0.4	0.6	1	0.6	1.4	1.4

**Course Code & Name: 22IT1152 Introduction to Web Application development**

PO& PSO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO 10	PO 11	PO 12	PSO1	PSO2	PSO3
CO1	3	3	3	0	0	1	1	0	0	0	0	1	1	0	0
CO2	3	3	3	1	2	1	1	0	0	0	1	1	1	1	1
CO3	3	2	3	2	1		2	0	1	0	2	2	3	2	2
CO4	3	3	3	1	0	1	2	0	1	0	0	2	2	3	3
CO5	3	3	3	0	2		2	0	1	0	1	3	3	3	3
Avg	3	2.8	3	0.8	1	1	1.6	0	0.6	0	0.8	1.8	2	1.8	1.8

**DEPARTMENT OF INFORMATION TECHNOLOGY**

**SEMESTER 1 - R 2022**

**AY2023-24 BATCH 2023**

**Mapping of Course Outcome and Programme Outcome:**

Year	Sem	Course code	Course Name	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
I	I	22MA1101	Matrices and Calculus	3	3	3	2.6	2.8	-	-	-	-	-	-	2	1.8	2	2
		22HE1151	English for Engineers	2	1	-	-	1	1	1.6	2.2	2.4	3	1	1.2	1	2	2
		22CY1151	Chemistry for Circuit Engineers	2	2.6	2.6	1.4	1.4	1	1	-	1	-	1.2	2	-	1	1
		22CS1151	Problem solving using C programming	1.4	1	1	0	0.6	0	0	0	0.4	0.4	0.6	1	0.6	1.4	1.4
		22IT1152	Introduction to Web Application Development	3	2.8	3	0.8	1	1	1.6	0	0.6	0	0.8	1.8	2	1.8	1.8

IT

4

**CO'S, PO'S & PSO'S MAPPING**

**SEMESTER III – R 2022**

**AY2023-24 – BATCH 2022**

**Course Code & Name: 22MA3101 Applied Statistics and Queuing Theory**

PO& PSO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3
CO1	2	2	3	3	2	-	-	-	-	-	-	3	2	3	3
CO2	2	3	3	3	3	-	-	-	-	-	-	3	2	3	3
CO3	2	2	2	2	2	-	-	-	-	-	-	3	2	3	3
CO4	2	3	3	2	3	-	-	-	-	-	-	2	2	2	2
CO5	2	3	3	3	2	-	-	-	-	-	-	2	2	2	2
Avg	2	2.6	2.8	2.6	2.4	-	-	-	-	-	-	3	1	3	3
												2.6	1.8	2.6	2.6

**Course Code & Name: 22IT3201 Data Structures**

PO& PSO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3
CO1	3	0	0	0	1	0	0	0	0	0	1	1	1	0	0
CO2	3	2	1	1	1	0	0	0	0	0	1	1	1	0	0
CO3	3	2	1	1	1	0	0	0	1	0	0	1	1	0	0
CO4	3	2	1	1	0	0	0	0	1	1	0	1	0	1	1
CO5	3	0	0	0	0	0	0	0	1	0	1	1	0	1	1
Avg	3	1	1	1	1	0	0	0	0	1	1	1	1	0	0

**Course Code & Name: 22IT3202 Operating System**

PO& PSO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3
CO1	3	2	0	0	2	0	0	0	0	0	1	2	3	0	0
CO2	3	2	1	0	1	0	0	0	0	0	1	2	3	0	0
CO3	3	2	0	0	3	0	0	0	0	0	0	3	2	0	0
CO4	3	3	1	0	0	0	0	0	0	1	0	2	0	0	0
CO5	3	3	0	0	0	0	0	0	0	0	1	2	0	0	0
Avg	3	2	0	0	1	0	0	0	0	1	1	3	1	0	0

Course Code & Name: 22IT3203 Digital Principles and Computer Organization

PO& PSO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3
CO1	2	3	0	0	0	0	0	0	0	0	1	3	3	2	2
CO2	2	1	1	0	0	0	0	0	0	0	0	1	2	2	2
CO3	2	1	2	0	0	0	0	0	0	1	0	2	0	2	2
CO4	3	3	1	0	0	0	0	0	0	0	1	1	0	2	2
CO5	3	1	1	0	0	0	0	0	0	1	1	1	1	2	2
Avg	2	2	1	0	0	0	0	0	0	0	1	2	1	2	2

Course Code & Name: 22IT3251 Java Programming

PO& PSO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3
CO1	3	3	2	2	1	1	0	1	0	1	1	3	0	0	0
CO2	3	3	2	2	2	2	0	1	0	1	0	1	0	2	2
CO3	3	3	2	2	2	2	0	1	0	1	1	1	0	1	1
CO4	3	3	2	2	2	2	0	1	0	1	1	1	0	2	2
CO5	3	3	2	2	2	2	0	1	0	1	1	2	0	1	1
Avg	3	3	2	2	2	2	0	1	0	1	1	2	0	1	1

Course Code & Name: 22IT3252 Data Visualization

PO& PSO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3
CO1	3	0	0	0	1	0	0	0	0	0	1	1	1	0	0
CO2	3	2	1	1	1	0	0	0	1	0	0	1	1	0	0
CO3	3	2	1	1	1	0	0	0	1	1	0	1	0	1	1
CO4	3	2	1	1	0	0	0	0	1	0	1	1	0	1	1
CO5	3	0	0	0	0	0	0	0	0	1	1	1	1	0	0
Avg	3	1	1	1	1	0	0	0	1	0	1	1	1	0	0

Course Code & Name: 22IT3001 Operating System Laboratory

PO& PSO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3
CO1	3	2	0	0	2	0	0	0	0	0	1	2	3	0	0
CO2	3	2	1	0	1	0	0	0	0	0	0	3	2	0	0
CO3	3	2	0	0	3	0	0	0	0	1	0	2	0	0	0
CO4	3	3	1	0	0	0	0	0	0	0	1	2	0	0	0
CO5	3	3	0	0	0	0	0	0	0	0	1	2	0	0	0
Avg	3	2	0	0	1	0	0	0	0	1	1	3	1	0	0

Course Code & Name: 2IT3002 Digital Principles and Computer Organization Laboratory

PO& PSO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3
CO1	3	3	3	0	0	1	1	0	0	0	0	1	1	0	0
CO2	3	3	3	1	2	1	1	0	0	0	1	1	1	0	0
CO3	3	2	3	2	1	1	2	0	0	0	1	1	1	1	1
CO4	3	3	3	1	0	1	2	0	1	0	2	2	3	2	2
CO5	3	3	3	0	2	1	2	0	1	0	0	2	2	3	3
Avg	3	2.8	3	0.8	1	1	1.6	0	0.6	0	0.8	1.8	2	1.8	1.8

Course Code & Name: 22IT3003 Data Structures Laboratory

PO& PSO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3
CO1	3	2	0	0	2	0	0	0	0	0	1	2	3	0	0
CO2	3	2	1	0	1	0	0	0	0	0	0	3	2	0	0
CO3	3	2	0	0	3	0	0	0	0	1	0	2	0	0	0
CO4	3	3	1	0	0	0	0	0	0	0	1	2	0	0	0
CO5	3	3	0	0	0	0	0	0	0	0	1	2	0	0	0
Avg	3	2	0	0	1	0	0	0	0	0	1	3	1	0	0

**DEPARTMENT OF INFORMATION TECHNOLOGY**

**SEMESTER III – R 2022**

**AY2023-24 – BATCH 2022**

**Mapping of Course Outcome and Programme Outcome:**

Year	Sem	Course code	Course Name	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3	
II	III	22MA3101	Applied Statistics and Queuing Theory	2	2.6	2.8	2.6	2.4	-	-	-	-	-	-	2.6	1.8	2.6	2.6	
		22IT3201	Data Structures	3	1	1	1	1	0	0	0	1	0	1	1	1	1	0	0
		22IT3202	Operating System	3	2	0	0	1	0	0	0	0	0	1	2	1	1	0	0
		22IT3203	Digital Principles and Computer Organization	2	2	1	0	0	0	0	0	0	0	1	2	1	2	1	2
		22IT3251	Java Programming	3	3	2	2	2	2	0	1	0	1	1	2	0	1	1	1
		22IT3252	Data Visualization (IBM)	3	1	1	1	1	0	0	0	1	0	1	1	1	1	0	0
		22IT3001	Operating System Laboratory	3	2	0	0	1	0	0	0	0	0	1	2	1	1	0	0
		22IT3002	Digital Principles and Computer Organization Laboratory	3	2.8	3	0.8	1	1	1.6	0	0.6	0	0.8	1.8	2	1.8	2	1.8
		22IT3003	Data Structures Laboratory	3	2	0	0	1	0	0	0	0	0	1	2	1	1	0	0



**CO'S, PO'S & PSO'S MAPPING**

**SEMESTER V – R 2019**

**AY2023-24 – BATCH 2021**

**Course Code & Name: 21IT5201 Mobile Computing**

PO& PSO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3
CO1	3	1	3	3	2	0	0	0	3	0	3	0	1	0	0
CO2	3	1	2	2	2	3	0	1	2	0	3	0	1	0	0
CO3	3	2	2	2	2	3	0	1	2	0	3	2	1	0	0
CO4	3	1	2	2	0	3	0	1	0	0	2	2	1	0	0
CO5	3	1	2	1	2	0	0	0	0	0	2	2	1	0	0
Avg	3	1	2	2	2	2	0	1	1	0	2	3	1	0	0

**Course Code & Name: 21IT5202 Computer Networks**

PO& PSO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3
CO1	3	3	1	3	2	1	0	0	2	0	0	1	1	0	0
CO2	3	2	1	3	2	3	0	1	2	0	0	1	1	0	0
CO3	3	3	1	3	2	1	0	1	2	0	0	2	1	1	1
CO4	3	2	1	3	0	1	0	1	0	0	0	1	1	1	1
CO5	3	1	1	3	2	2	0	0	2	0	0	2	1	1	1
Avg	3	2	1	3	2	2	0	1	2	0	0	1	1	0	0

**Course Code & Name: 21IT5203 Microcontrollers and Embedded Systems**

PO& PSO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3
CO1	3	3	3	3	2	0	0	0	3	0	3	0	1	0	0
CO2	3	1	2	2	2	3	0	1	2	0	3	0	1	0	0
CO3	3	3	2	2	2	3	0	1	2	0	3	2	1	0	0
CO4	3	1	2	2	0	3	0	1	0	0	2	2	1	0	0
CO5	3	1	2	1	2	0	0	0	0	0	2	2	1	0	0
Avg	3	2	2	2	2	2	0	1	1	0	2	3	1	0	0

Course Code & Name: 21IT5204 Artificial Intelligence and Machine Learning

PO& PSO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3
CO1	3	3	1	3	2	1	0	0	2	0	0	1	1	0	0
CO2	3	2	1	3	2	3	0	1	2	0	0	2	1	1	1
CO3	3	3	1	3	2	1	0	1	2	0	0	1	1	1	1
CO4	3	2	1	3	0	1	0	1	0	0	0	2	1	1	1
CO5	3	1	1	3	2	2	0	0	2	0	0	1	1	0	0
Avg	3	2	1	3	2	2	0	1	2	0	0	1	1	1	1

Course Code & Name: 21IT5205 Data Warehousing and Data Mining

PO& PSO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3
CO1	3	1	1	0	2	0	0	1	0	1	1	3	1	0	0
CO2	3	1	2	0	1	0	0	1	0	1	0	1	0	0	0
CO3	3	1	1	0	3	0	0	1	0	1	0	2	1	0	0
CO4	3	1	3	0	2	0	0	1	0	1	1	1	1	1	1
CO5	3	1	3	0	1	0	0	1	0	1	1	1	1	0	0
Avg	3	1	2	0	2	0	0	1	0	1	1	2	1	0	0

Course Code & Name: 21IT5001 Machine Learning Laboratory

PO& PSO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3
CO1	3	3	3	3	2	0	0	0	3	0	3	0	1	0	0
CO2	3	1	2	2	2	3	0	1	2	0	3	2	1	0	0
CO3	3	3	2	2	2	3	0	1	2	0	2	2	1	0	0
CO4	3	1	2	2	0	3	0	1	0	0	2	2	1	0	0
CO5	3	1	2	1	2	0	0	0	0	0	2	3	1	0	0
Avg	3	2	2	2	2	2	0	1	1	0	2	2	1	0	0

Course Code & Name: 21IT5002 Mobile Application Development Laboratory

PO& PSO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3
CO1	3	3	1	3	2	1	0	0	2	0	0	1	1	0	0
CO2	3	2	1	3	2	3	0	1	2	0	0	2	1	1	1
CO3	3	3	1	3	2	1	0	1	2	0	0	2	1	1	1
CO4	3	2	1	3	0	1	0	1	2	0	0	1	1	1	1
CO5	3	1	1	3	2	2	0	1	0	0	0	2	1	1	1
Avg	3	2	1	3	2	2	0	0	2	0	0	1	1	0	0

Course Code & Name: 21IT5351R Internet and Web Technology

PO& PSO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3
CO1	3	2	1	0	2	0	0	1	0	1	1	3	1	0	0
CO2	3	2	2	0	1	0	0	1	0	1	0	1	0	0	0
CO3	3	2	1	0	3	0	0	1	0	1	0	1	0	0	0
CO4	3	2	3	0	2	0	0	1	0	1	0	2	1	0	0
CO5	3	2	3	0	1	0	0	1	0	1	1	1	1	1	1
Avg	3	2	2	0	2	0	0	1	0	1	1	2	1	0	0

Course Code & Name: 21IT5352 Advanced Java Programming

PO& PSO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3
CO1	3	1	0	0	3	0	0	0	0	0	2	2	1	2	2
CO2	3	1	3	0	3	0	0	0	1	0	0	1	1	2	2
CO3	3	1	2	0	3	0	0	0	0	1	0	3	0	1	1
CO4	1	1	3	0	0	0	0	0	0	1	0	1	0	1	1
CO5	3	1	1	0	0	0	0	0	1	0	1	1	0	1	1
Avg	3	1	2	0	2	0	0	0	0	1	1	2	1	1	1

Course Code & Name: 21IT5353 C# and .Net Programming

PO& PSO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3
CO1	3	2	0	0	3	0	0	0	0	0	2	2	1	2	2
CO2	3	1	3	0	3	0	0	0	1	0	0	1	1	2	2
CO3	3	3	2	0	3	0	0	0	0	1	0	3	0	1	1
CO4	1	1	3	0	0	0	0	0	1	0	1	1	0	1	1
CO5	3	1	1	0	0	0	0	0	0	1	1	1	1	1	1
Avg	3	2	2	0	2	0	0	0	0	0	1	2	1	1	1

Course Code & Name: 21IT5354 Advanced Data Structure

PO& PSO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3
CO1	3	0	0	0	1	0	0	0	0	0	1	1	1	0	0
CO2	3	2	1	1	1	0	0	0	1	0	0	1	1	0	0
CO3	3	2	1	1	1	0	0	0	1	1	0	1	0	1	1
CO4	3	2	1	1	0	0	0	0	1	0	1	1	1	0	0
CO5	3	0	0	0	0	0	0	0	0	1	1	1	1	0	0
Avg	3	1	1	1	1	0	0	0	1	0	1	1	1	0	0

Course Code & Name: 21IT5355 Advanced Database Technology

PO& PSO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3
CO1	3	2	1	0	0	0	0	0	0	2	3	3	2	1	1
CO2	3	2	1	2	1	0	0	0	0	1	3	1	3	0	0
CO3	3	2	1	1	1	0	0	0	0	2	0	2	1	0	0
CO4	3	2	1	0	0	0	0	0	0	1	1	1	2	1	1
CO5	3	2	1	0	0	0	0	0	0	2	1	1	1	0	0
Avg	3	2	1	1	0	0	0	0	0	2	2	2	2	0	0

Course Code & Name: 21IT5356 Ethical Hacking

PO& PSO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3
CO1	3	3	1	3	2	1	0	0	2	0	0	1	1	0	0
CO2	3	2	1	3	2	3	0	1	2	0	0	2	1	1	1
CO3	3	3	1	3	2	1	0	1	2	0	0	1	1	1	1
CO4	3	2	1	3	0	1	0	1	0	0	0	2	1	1	1
CO5	3	1	1	3	2	2	0	0	2	0	0	1	1	0	0
Avg	3	2	1	3	2	2	0	1	2	0	0	1	1	1	1

**DEPARTMENT OF INFORMATION TECHNOLOGY**

**SEMESTER V – R 2019**

**AY2023-24 – BATCH 2021**

**Mapping of Course Outcome and Programme Outcome:**

Year	Sem	Course code	Course Title	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO 1	PSO 2	PSO 3	
III	V	21IT5201	Mobile Computing	3	1	2	2	2	2	0	1	1	0	2	2	1	0	0	
		21IT5202	Computer Networks	3	2	1	3	2	2	0	1	2	0	0	1	1	1	1	1
		21IT5203	Microcontrollers and Embedded Systems	3	2	2	2	2	2	0	1	1	0	2	2	1	0	0	0
		21IT5204	Artificial Intelligence and Machine Learning	3	2	1	3	2	2	0	1	2	0	0	1	1	1	1	1
		21IT5205	Data Warehousing and Data Mining	3	1	2	0	2	0	0	1	0	1	1	2	1	0	0	0
		21IT5001	Machine Learning Laboratory	3	2	2	2	2	2	0	1	1	0	2	2	1	0	0	0
		21IT5002	Mobile Application Development Laboratory	3	2	1	3	2	2	0	1	2	0	0	1	1	1	1	1
		<b>19IT53XX PROFESSIONAL ELECTIVE - I</b>																	
III	V	21IT5351 R	Internet and Web Technology	3	2	2	0	2	0	0	1	0	1	1	2	1	0	0	
		21IT5352	Advanced Java Programming	3	1	2	0	2	0	0	0	0	0	1	2	1	1	1	
		21IT5353	C# and .Net Programming	3	2	2	0	2	0	0	0	0	0	1	2	1	1	1	
		21IT5354	Advanced Data Structure	3	1	1	1	1	0	0	0	1	0	1	1	1	0	0	
		21IT5355	Advanced Database Technology	3	2	1	1	0	0	0	0	0	2	2	2	2	0	0	
		21IT5356	Ethical Hacking	3	2	1	3	2	2	0	1	2	0	0	1	1	1	1	



## CO'S, PO'S & PSO'S MAPPING

SEMESTER VII – R 2019

AY2023-24 – Batch 2020

Course Code & Name: 19IT7201R Introduction to Distributed and Cloud Computing

PO& PSO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3
CO1	3	3	1	3	2	1	0	0	2	0	0	1	1	2	3
CO2	3	3	1	3	2	3	0	1	2	0	0	2	1	0	0
CO3	3	3	1	3	2	1	0	1	2	0	0	1	1	1	1
CO4	3	3	1	3	0	1	0	1	0	0	0	2	1	1	1
CO5	3	2	1	3	2	2	0	0	2	0	0	1	1	0	0
Avg	3	3	1	3	2	2	0	1	2	0	0	1	1	1	1

Course Code & Name: 19IT7202R Data Science and Analytics

PO& PSO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3
CO1	3	1	3	3	2	0	0	0	3	0	3	0	1	2	3
CO2	3	1	2	2	2	3	0	1	2	0	3	2	1	0	0
CO3	3	1	2	2	2	3	0	1	2	0	2	2	1	0	0
CO4	3	1	2	2	0	3	0	1	0	0	2	2	1	0	0
CO5	3	1	2	1	2	0	0	0	0	0	2	3	1	0	0
Avg	3	1	2	2	2	2	0	1	1	0	2	2	1	0	0

Course Code & Name: 19IT7203 Software Testing and Quality Assurance

PO& PSO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3
CO1	3	3	1	3	2	1	0	0	2	0	0	1	1	2	3
CO2	3	2	1	3	2	3	0	1	2	0	0	2	1	0	0
CO3	3	3	1	3	2	1	0	1	2	0	0	1	1	1	1
CO4	3	2	1	3	0	1	0	1	0	0	0	2	1	1	1
CO5	3	1	1	3	2	2	0	0	2	0	0	1	1	0	0
Avg	3	2	1	3	2	2	0	1	2	0	0	1	1	1	1

Course Code & Name: 19IT7001R Distributed and Cloud Computing Laboratory

PO& PSO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3
CO1	3	3	1	1	2	0	0	0	0	0	0	1	1	0	0
CO2	3	2	1	1	2	0	0	1	0	0	0	2	1	1	1
CO3	3	3	1	1	2	0	0	1	0	0	0	1	1	1	1
CO4	3	2	1	1	0	0	0	1	0	0	0	2	1	1	1
CO5	3	1	1	1	2	0	0	0	0	0	0	1	1	0	0
Avg	3	2	1	1	2	0	0	1	0	0	0	1	1	1	1

Course Code & Name: 19IT7002R Data Analytics Laboratory

PO& PSO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3
CO1	3	2	1	0	0	0	0	0	0	2	3	3	2	1	1
CO2	3	2	1	2	1	0	0	0	0	1	3	1	3	0	0
CO3	3	2	1	1	1	0	0	0	0	2	0	2	1	0	0
CO4	3	2	1	0	0	0	0	0	0	1	1	1	2	1	1
CO5	3	2	1	0	0	0	0	0	0	2	1	1	1	0	0
Avg	3	2	1	1	0	0	0	0	0	2	2	2	2	0	0

Course Code & Name: 19IT7901 Project Work - Phase I

PO& PSO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3
CO1	3	3	3	3	2	0	0	0	3	0	3	0	1	0	0
CO2	3	1	2	2	2	3	0	1	2	0	3	2	1	0	0
CO3	3	3	2	2	2	3	0	1	2	0	2	2	1	0	0
CO4	3	1	2	2	0	3	0	1	0	0	2	2	1	0	0
CO5	3	1	2	1	2	0	0	0	0	0	2	3	1	0	0
Avg	3	2	2	2	2	2	0	1	1	0	2	2	1	0	0



**Course Code & Name: 19IT7301 Social Network analysis**

PO& PSO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3
CO1	3	3	1	0	2	0	0	0	2	0	0	1	1	0	0
CO2	3	2	1	0	2	0	0	1	2	0	0	2	1	1	1
CO3	3	3	1	0	2	0	0	1	2	0	0	1	1	1	1
CO4	3	2	1	0	0	0	0	1	0	0	0	2	1	1	1
CO5	3	1	1	0	2	0	0	0	2	0	0	1	1	0	0
Avg	3	2	1	0	2	0	0	1	2	0	0	1	1	1	1

**Course Code & Name: 19IT7302 Cyber Forensics**

PO& PSO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3
CO1	3	2	1	0	0	0	0	0	0	2	3	3	2	1	1
CO2	3	2	1	2	1	0	0	0	0	1	3	1	3	0	0
CO3	3	2	1	1	1	0	0	0	0	2	0	2	1	0	0
CO4	3	2	1	0	0	0	0	0	0	1	1	1	2	1	1
CO5	3	2	1	0	0	0	0	0	0	2	1	1	1	0	0
Avg	3	2	1	1	0	0	0	0	0	2	2	2	2	0	0

**Course Code & Name: 19IT7303 Software Documentation**

PO& PSO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3
CO1	3	3	1	0	1	0	0	0	0	1	3	0	1	1	1
CO2	2	2	1	0	1	1	0	1	0	0	3	1	3	0	0
CO3	3	3	1	0	1	1	0	1	0	0	0	2	1	1	1
CO4	1	2	1	0	0	1	0	1	0	0	1	1	2	1	1
CO5	3	2	1	0	0	0	0	0	0	0	1	1	1	0	0
Avg	2	2	1	0	1	1	0	1	0	0	2	1	2	1	1

Course Code & Name: 19IT7304 Principles of Management

PO& PSO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3
CO1	3	3	3	3	2	0	0	0	3	0	3	0	1	0	0
CO2	3	1	2	2	2	3	0	1	2	0	3	2	1	0	0
CO3	3	3	2	2	2	3	0	1	2	0	2	2	1	0	0
CO4	3	1	2	2	0	3	0	1	0	0	2	2	1	0	0
CO5	3	1	2	1	2	0	0	0	0	0	2	3	1	0	0
Avg	3	2	2	2	2	2	0	1	1	0	2	2	1	0	0

Course Code & Name: 19IT7305 Software Architecture

PO& PSO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3
CO1	3	2	1	0	0	0	0	0	0	2	3	3	2	1	1
CO2	3	2	1	2	1	0	0	0	0	1	3	1	3	0	0
CO3	3	2	1	1	1	0	0	0	0	2	0	2	1	0	0
CO4	3	2	1	0	0	0	0	0	0	1	1	1	2	1	1
CO5	3	2	1	0	0	0	0	0	0	2	1	1	1	0	0
Avg	3	2	1	1	0	0	0	0	0	2	2	2	2	0	0

Course Code & Name: 19IT7306 Green Computing

PO& PSO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3
CO1	3	3	1	0	1	0	0	0	0	1	3	0	1	1	1
CO2	2	2	1	0	1	1	0	1	0	0	3	1	3	0	0
CO3	3	3	1	0	1	1	0	1	0	0	0	2	1	1	1
CO4	1	2	1	0	0	1	0	1	0	0	1	1	2	1	1
CO5	3	2	1	0	0	0	0	0	0	0	1	1	1	0	0
Avg	2	2	1	0	1	1	0	1	0	0	2	1	2	1	1

Course Code & Name: 19IT7307 Web Development II

PO& PSO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3
CO1	3	3	3	2	3	1	1	-	1	-	2	3	1	1	1
CO2	3	3	2	2	1	1	1	-	1	-	2	3	1	1	1
CO3	3	3	2	-	2	1	1	-	1	-	2	2	1	1	1
CO4	3	2	-	1	3	1	1	-	1	-	1	2	1	1	1
CO5	3	2	3	1	2	1	1	-	1	-	1	2	1	1	1
Avg	3	3	3	2	2	1	1	-	1	-	2	2	1	1	1

Course Code & Name: 19IT7401R Cyber Security

PO& PSO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3
CO1	3	2	0	0	0	0	1	0	0	2	3	3	2	1	1
CO2	3	2	0	0	1	0	1	0	0	1	3	1	3	0	0
CO3	3	2	0	0	1	0	1	0	0	2	0	2	1	0	0
CO4	3	2	0	0	0	0	1	0	0	1	1	1	2	1	1
CO5	3	2	0	0	0	0	1	0	0	2	1	1	1	0	0
Avg	3	2	0	0	0	0	1	0	0	2	1	1	1	0	0

**DEPARTMENT OF INFORMATION TECHNOLOGY**

**SEMESTER VII – R 2019**

**AY2023-24 – Batch 2020**

**Mapping of Course Outcome and Programme Outcome:**

Year	Sem	Course code	Course Name	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
IV	VII	19IT7201R	Introduction to Distributed and Cloud Computing	3	3	1	3	2	2	0	1	2	0	0	1	1	1	1
		19IT7202R	Data Science and Analytics	3	1	2	2	2	2	0	1	1	0	2	2	1	0	0
		19IT7203	Software Testing and Quality Assurance	3	2	1	3	2	2	0	1	2	0	0	1	1	1	1
		19IT73XX	Professional Elective III															
		19XX74XX	Open Elective II															
		19IT7001R	Distributed and Cloud Computing Laboratory	3	2	1	1	2	0	0	1	0	0	0	1	1	1	1
		19IT7002	Data Analytics Laboratory	3	2	1	1	0	0	0	0	0	2	2	2	2	0	0
		19IT7901	Project Work - Phase I	3	2	2	2	2	2	0	1	1	0	2	2	1	0	0
<b>19IT73XX Professional Elective - III</b>																		
IV	VII	19IT7301	Social Network analysis	3	2	1	0	2	0	0	1	2	0	0	1	1	1	1
		19IT7302	Cyber Forensics	3	2	1	1	0	0	0	0	0	2	2	2	2	0	0

		19IT7303	Software Documentation	2	2	1	0	1	1	0	1	0	0	2	1	2	1	1
		19IT7304	Principles of Management	3	2	2	2	2	2	0	1	1	0	2	2	1	0	0
		19IT7305	Software Architecture	3	2	1	1	0	0	0	0	0	2	2	2	2	0	0
		19IT7306	Green Computing	2	2	1	0	1	1	0	1	0	0	2	1	2	1	1
<b>19ITXX74XX Open Elective - II</b>																		
<b>IV</b>	<b>VII</b>	19IT7401R	Cyber Security	3	2	0	0	0	0	1	0	0	2	2	2	2	0	0

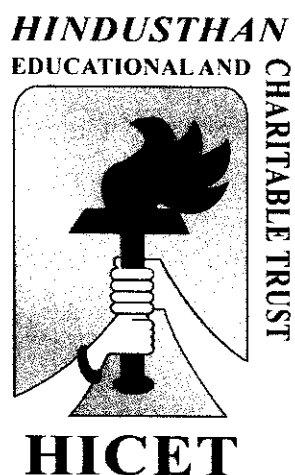
  
**Chairman - BoS**  
**IT - HICET**

  
**Dean (Academics)**  
**HICET**



***HINDUSTHAN COLLEGE OF ENGINEERING AND TECHNOLOGY***  
**(An Autonomous Institution Affiliated to Anna University, Chennai)**  
**(Approved by AICTE, New Delhi, Accredited by NAAC with 'A' Grade)**  
**Coimbatore - 641 032.**

**B.TECH. INFORMATION TECHNOLOGY**



**CHOICE BASED CREDIT SYSTEM**

**Revised Curriculum and Syllabus for the Even semester**  
**Academic year 2023-24**

**CURRICULUM**  
**R2019**



**DETAILS OF CHANGES CARRIED OUT IN CURRICULUM & SYLLABUS**

**CBCS PATTERN**

**UNDERGRADUATE PROGRAMMES**

**B.TECH. INFORMATION TECHNOLOGY (UG)**

**REGULATION-2019**

**For the students admitted during the academic year 2020-2021 and onwards**

**SEMESTER I**

S.No.	Course Code	Course Title	Type	L	T	P	C	CIA	ESE	TOTAL
<b>THEORY</b>										
1.	19HE1101	Technical English	HS	2	1	0	3	25	75	100
2.	19MA1101R	Calculus	BS	3	1	0	4	25	75	100
<b>THEORY &amp; LAB COMPONENT</b>										
3.	19PH1151	Applied Physics	BS	2	0	2	3	50	50	100
4.	19CY1151	Chemistry for Engineers	BS	2	0	2	3	50	50	100
5.	19CS1151	Python Programming and Practices	ES	2	0	2	3	50	50	100
6.	19EC1154	Basics of Electron Devices and Electric Circuits	ES	2	0	2	3	50	50	100
<b>PRACTICAL</b>										
7.	19HE1071	Language Competency Enhancement Course-I	HS	0	0	2	1	0	100	100
<b>MANDATORY COURSES</b>										
8.	19HE1072	Career Guidance Level – I Personality, Aptitude and Career Development	EEC	2	0	0	0	100	0	100
	19HE1073	Entrepreneurship & Innovation	EEC	1	0	0	0	100	0	100
<b>Total:</b>				<b>16</b>	<b>2</b>	<b>10</b>	<b>20</b>	<b>450</b>	<b>450</b>	<b>900</b>
<b>As Per AICTE Norms 3 Weeks Induction Programme is Added in The First Semester as an Audit Course</b>										

**SEMESTER II**

S.No.	Course Code	Course Title	Type	L	T	P	C	CIA	ESE	TOTAL
<b>THEORY</b>										
1.	19HE2101	Business English for Engineers	HS	2	1	0	3	25	75	100
2.	19MA2104	Differential Equations and Linear Algebra	BS	3	1	0	4	25	75	100
<b>THEORY &amp; LAB COMPONENT</b>										
3.	19IT2151	Programming in C	ES	2	0	2	3	50	50	100
4.	19ME2154	Engineering Graphics	ES	1	0	4	3	50	50	100
5.	19PH2151	Material Science	BS	2	0	2	3	50	50	100
6.	19CY2151	Environmental Studies	BS	2	0	2	3	50	50	100
<b>PRACTICALS</b>										
7.	19ME2001	Engineering Practices	ES	0	0	4	2	50	50	100
8.	19HE2071	Language Competency	HS	0	0	2	1	0	100	100

		Enhancement Course-II								
<b>MANDATORY COURSES</b>										
9.	19HE2072	<b>Career Guidance Level – II</b> Personality, Aptitude and Career Development	EEC	2	0	0	0	100	0	100
<b>Total:</b>				<b>14</b>	<b>2</b>	<b>16</b>	<b>22</b>	<b>400</b>	<b>500</b>	<b>900</b>

### SEMESTER III

S.No	Course Code	Course Title	Type	L	T	P	C	CIA	ESE	TOTAL
<b>THEORY</b>										
1.	19MA3151	Statistics and Queuing Theory	BS	3	0	2	4	50	50	100
2.	19IT3201	Data Structures and Algorithm Design	PC	3	0	0	3	25	75	100
3.	19IT3202	Object Oriented Programming Using C++	PC	3	0	0	3	25	75	100
4.	19IT3203	Computer Organization and Architecture	PC	3	0	0	3	25	75	100
<b>THEORY AND LAB COMPONENT</b>										
5.	19IT3251	Digital Principles and System Design	PC	3	0	2	4	50	50	100
<b>PRACTICALS</b>										
6.	19IT3001R	Data Structures and Algorithm Laboratory	PC	0	0	3	1.5	50	50	100
7.	19IT3002R	Object Oriented Programming using C++ Laboratory	PC	0	0	3	1.5	50	50	100
<b>MANDATORY COURSES</b>										
8.	19MC3191	Indian Constitution	MC	2	0	0	0	100	0	100
9.	19HE3071	<b>Career Guidance Level – III</b> Personality, Aptitude and Career Development	EEC	2	0	0	0	100	0	100
10.	19HE3073	Leadership Management Skills	EEC	1	0	0	0	100	0	100
<b>Total</b>				<b>20</b>	<b>0</b>	<b>10</b>	<b>20</b>	<b>575</b>	<b>425</b>	<b>1000</b>

### SEMESTER IV

S.No	Course Code	Course Title	Type	L	T	P	C	CIA	ESE	TOTAL
<b>THEORY</b>										
1.	19MA4102	Discrete Mathematics	BS	3	1	0	4	25	75	100
2.	19IT4201	Java Programming	PC	3	0	0	3	25	75	100
3.	19IT4202	Database Management Systems	PC	3	0	0	3	25	75	100
4.	19IT4203	Principles of Operating Systems	PC	3	1	0	4	25	75	100
<b>THEORY AND LAB COMPONENT</b>										
5.	19IT4251	Object Oriented Software Engineering	PC	3	0	2	4	50	50	100
<b>PRACTICALS</b>										
6.	19IT4001R	Java Programming Laboratory	PC	0	0	3	1.5	50	50	100
7.	19IT4002R	Database Management	PC	0	0	3	1.5	50	50	100

		Systems Laboratory								
<b>MANDATORY COURSES</b>										
8.	19AC4191	Essence of Indian tradition knowledge/Value Education	AC	2	0	0	0	100	0	100
9.	19HE4072	<b>Career Guidance Level</b> – IV Personality, Aptitude and Career Development	EEC	2	0	0	0	100	0	100
10.	19HE4073	Ideation Skills	EEC	1	0	0	0	100	0	100
<b>Total</b>				<b>20</b>	<b>2</b>	<b>8</b>	<b>21</b>	<b>550</b>	<b>450</b>	<b>1000</b>

#### SEMESTER V

S.No	Course Code	Course Title	Type	L	T	P	C	CIA	ESE	TOTAL
1.	19IT5201	Mobile Computing	PC	3	0	0	3	25	75	100
2.	19IT5202	Computer Networks	PC	3	0	0	3	25	75	100
3.	19IT5203	Microcontrollers and Embedded Systems	PC	3	0	0	3	25	75	100
4.	19IT5204	Artificial Intelligence and Machine Learning	PC	3	0	0	3	25	75	100
5.	19IT5205	Data Warehousing and Data Mining	PC	3	0	0	3	25	75	100
6.	19IT53XX	<b>Professional Elective-I</b>	PE	2	0	2	3	50	50	100
<b>PRACTICALS</b>										
7.	19IT5001	Machine Learning Laboratory	PC	0	0	3	1.5	50	50	100
8.	19IT5002	Mobile Application Development Laboratory	PC	0	0	3	1.5	50	50	100
<b>MANDATORY COURSES</b>										
9.	19HE5071	Soft Skills - I	EEC	1	0	0	1	100	0	100
10.	19HE5072	Design Thinking	EEC	1	0	0	1	100	0	100
<b>TOTAL</b>				<b>19</b>	<b>0</b>	<b>8</b>	<b>23</b>	<b>475</b>	<b>525</b>	<b>1000</b>

S.No.	Course Code	Course Title	Type	L	T	P	C	CIA	ESE	TOTAL
<b>PROFESSIONAL ELECTIVE I</b>										
1.	19IT5351R	Internet and Web Technology	PE	2	0	2	3	50	50	100
2.	19IT5352	Advanced Java Programming	PE	2	0	2	3	50	50	100
3.	19IT5353	C# and .Net Programming	PE	2	0	2	3	50	50	100
4.	19IT5354	Advanced Data Structure	PE	2	0	2	3	50	50	100
5.	19IT5355	Advanced Database Technology	PE	2	0	2	3	50	50	100
6.	19IT5356	Ethical Hacking	PE	2	0	2	3	50	50	100

**SEMESTER VI**

S.No	Course Code	Course Title	Type	L	T	P	C	CIA	ESE	TOTAL
<b>THEORY</b>										
1.	19IT6181	Software Project Management	HS	3	0	0	3	25	75	100
2.	19IT6201	Internet of Things	PC	3	0	0	3	25	75	100
3.	19IT6202R	Principles of Compiler Design	PC	3	0	0	3	25	75	100
4.	19IT63XX	Professional Elective II	PE	3	0	0	3	25	75	100
5.	19XX64XX	Open Elective I	OE	3	0	0	3	25	75	100
<b>THEORY AND LAB COMPONENT</b>										
6.	19IT6251	Cryptography and Network Security	PC	3	0	2	4	50	50	100
<b>PRACTICALS</b>										
7.	19IT6001	Internet of Things Laboratory	PC	0	0	3	1.5	50	50	100
8.	19IT6003	Project based Learning	PC	0	0	3	1.5	50	50	100
<b>MANDATORY COURSES</b>										
9.	19IT6701	Internship/Industrial Training	EEC	0	0	0	1	100	0	100
10.	19HE6071	Soft Skills - II	EEC	1	0	0	1	100	0	100
11.	19HE6072	Intellectual Property Rights (IPR)	EEC	1	0	0	1	100	0	100
<b>TOTAL</b>				<b>20</b>	<b>0</b>	<b>8</b>	<b>25</b>	<b>575</b>	<b>525</b>	<b>1100</b>

S.No.	Course Code	Course Title	Type	L	T	P	C	CIA	ESE	TOTAL
<b>PROFESSIONAL ELECTIVE II</b>										
1.	19IT6301	Business Intelligence and Analysis	PE	3	0	0	3	25	75	100
2.	19IT6302	Information Security	PE	3	0	0	3	25	75	100
3.	19IT6303	Software Design	PE	3	0	0	3	25	75	100
4.	19IT6304	Natural Language Processing	PE	3	0	0	3	25	75	100
5.	19IT6305	Soft Computing	PE	3	0	0	3	25	75	100
6.	19IT6307	Virtual Reality and Augmented Reality	PE	3	0	0	3	25	75	100
7.	19IT6308	Web Development - I	PE	0	0	3	3	50	50	100

**OPEN ELECTIVE**

S.No.	Course Code	Course Title	Type	L	T	P	C	CIA	ESE	TOTAL
1.	19IT6402	Machine Learning for Engineers	OE	3	0	0	3	25	75	100

**SEMESTER VII**

S.No	Course Code	Course Title	Type	L	T	P	C	CIA	ESE	TOTAL
<b>THEORY</b>										
1.	19IT7201R	Introduction to Distributed and Cloud Computing	PC	3	0	0	3	25	75	100
2.	19IT7202R	Data Science and Analytics	PC	3	0	0	3	25	75	100
3.	19IT7203	Software Testing and Quality Assurance	PC	3	0	0	3	25	75	100
4.	19IT73XX/ 19CS7306	Professional Elective III/ AI Analyst	PE	3	0	0	3	25	75	100
5.	19XX74XX	Open Elective II	OE	3	0	0	3	25	75	100
<b>PRACTICALS</b>										
6.	19IT7001R	Distributed and Cloud Computing Laboratory	PC	0	0	3	1.5	50	50	100
7.	19IT7002R	Data Analytics Laboratory	PC	0	0	3	1.5	50	50	100
<b>PROJECT WORK</b>										
8.	19IT7901	Project Work - Phase I	EEC	0	0	4	2	50	50	100
<b>TOTAL</b>				<b>15</b>	<b>0</b>	<b>10</b>	<b>20</b>	<b>275</b>	<b>525</b>	<b>800</b>

<b>PROFESSIONAL ELECTIVE III</b>										
S.No.	Course Code	Course Title	Type	L	T	P	C	CIA	ESE	TOTAL
1.	19IT7301	Social Network analysis	PE	3	0	0	3	25	75	100
2.	19IT7302	Cyber Forensics	PE	3	0	0	3	25	75	100
3.	19IT7303	Software Documentation	PE	3	0	0	3	25	75	100
4.	19IT7304	Principles of Management	PE	3	0	0	3	25	75	100
5.	19IT7305	Software Architecture	PE	3	0	0	3	25	75	100
6.	19IT7306	Green Computing	PE	3	0	0	3	25	75	100
7.	19IT7307	Web Development - II	PE	0	0	3	3	50	50	100

<b>OPEN ELECTIVE II - INFORMATION TECHNOLOGY</b>										
S.No.	Course Code	Course Title	Type	L	T	P	C	CIA	ESE	TOTAL
1.	19IT7401R	Cyber Security	OE	3	0	0	3	25	75	100

**SEMESTER VIII**

S.No	Course Code	Course Title	Type	L	T	P	C	CIA	ESE	TOTAL
<b>THEORY</b>										
1.	19FT83XX	Professional Elective –IV	PE	3	0	0	3	25	75	100
2.	19FT83XX	Professional Elective- V	PE	3	0	0	3	25	75	100
<b>PRACTICAL</b>										
3.	19IT8901	Project Work – Phase II	EEC	0	0	24	8	50	50	100
<b>Total</b>				<b>6</b>	<b>0</b>	<b>24</b>	<b>14</b>	<b>100</b>	<b>200</b>	<b>300</b>

<b>PROFESSIONAL ELECTIVE IV</b>										
S.No.	Course Code	Course Title	Type	L	T	P	C	CIA	ESE	TOTAL
1.	19IT8301	Graphics and Multimedia	PE	3	0	0	3	25	75	100
2.	19IT8302	Software Process	PE	3	0	0	3	25	75	100
3.	19IT8303	Service Oriented Architecture	PE	3	0	0	3	25	75	100
4.	19IT8304	Human Computer Interaction	PE	3	0	0	3	25	75	100
5.	19IT8305	Mobile Edge Systems	PE	3	0	0	3	25	75	100
6.	19IT8311	Robotics and its Applications	PE	3	0	0	3	25	75	100
7.	19IT8313	Cloud Computing (NPTEL)	PE	3	0	0	3	0	100	100

<b>PROFESSIONAL ELECTIVE V</b>										
S.No.	Course Code	Course Title	Type	L	T	P	C	CIA	ESE	TOTAL
1.	19IT8306	Information Retrieval Technologies	PE	3	0	0	3	25	75	100
2.	19IT8307	Block Chain Technology	PE	3	0	0	3	25	75	100
3.	19IT8308	Professional Ethics	PE	3	0	0	3	25	75	100
4.	19IT8309	Deep Learning Techniques	PE	3	0	0	3	25	75	100
5.	19IT8310	Management Information System	PE	3	0	0	3	25	75	100
6.	19IT8312	Quantum Computing	PE	3	0	0	3	25	75	100
7.	19IT8314	Web Development - III	PE	0	0	3	3	50	50	100

S.No.	Course Code	Course Title	Type	L	T	P	C	CIA	ESE	TOTAL
<b>LIFE SKILL COURSES</b>										
1.	19LSZ401	General Studies for Competitive Examinations	OE	3	0	0	3	25	75	100
2.	19LSZ402	Human Rights, Women's Rights and Gender Equality	OE	3	0	0	3	25	75	100
3.	19LSZ403	Indian Ethos and Human Values	OE	3	0	0	3	25	75	100
4.	19LSZ404	Indian Constitution and Political System	OE	3	0	0	3	25	75	100
5.	19LSZ405	Yoga for Human Excellence	OE	3	0	0	3	25	75	100

Sem. No.	Course Code	Course Title	L	T	P	C	CIA	ESE	TOTAL
<b>SKILLED / INTEGRATED COURSES OFFERED THROUGH CHOICE BASED CREDIT SYSTEM</b>									
1	19CS1152	Object oriented programming using Python	2	0	2	3	50	50	100
2	19CS2153	Java Fundamentals	2	0	2	3	50	50	100
3	19CS3253	Clean Coding and Devops	3	0	2	4	50	50	100
4	19CS4204	Data Visualization	3	0	0	3	25	75	100
4	19CS4003	Data Visualization Laboratory	0	0	3	1.5	50	50	100
5	19IT5251	Introduction to Design Thinking	2	0	2	3	50	50	100
6	19CS6253	Predictive Modeling	3	0	2	4	25	75	100
6	19CS6306	Development of Machine Learning models	3	0	0	3	25	75	100
7	19CS7306	AI Analyst	3	0	0	3	25	75	100

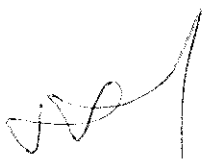
### SEMESTER-WISE CREDIT DISTRIBUTION


<b>B.E. / B.TECH. PROGRAMMES</b>										
S.No.	Course Area	Credits per Semester								Total Credits
		I	II	III	IV	V	VI	VII	VIII	
1	HS	04	04	-	-	-	03	-	-	11
2	BS	10	10	04	04	-	-	-	-	28
3	ES	06	08	-	-	-	-	-	-	11
4	PC	-	-	16	17	18	13	12	-	79
5	PE	-	-	-	-	03	03	03	06	15
6	OE	-	-	-	-	-	03	03	-	06
7	EEC	-	-	-	-	02	03	02	08	15
<b>Total</b>		<b>20</b>	<b>22</b>	<b>20</b>	<b>21</b>	<b>23</b>	<b>25</b>	<b>20</b>	<b>14</b>	<b>165</b>

### CREDIT DISTRIBUTION R2019

Semester	I	II	III	IV	V	VI	VII	VIII	Total
Credits	20	22	20	21	23	25	20	14	165

  
Chairman BoS

  
Dean Academics  
Dean (Academics)  
HICET

  
Principal  
**PRINCIPAL**  
Hindusthan College Of Engineering & Technology  
COIMBATORE - 41 032

**SEMESTER - VIII**  
**SYLLABUS**



**SEMESTER VIII**

**PROFESSIONAL ELECTIVES - IV**

Programme	Course code	Name of the course	L	T	P	C
B.TECH.	19IT8301	GRAPHICS AND MULTIMEDIA	3	0	0	3

**The student should be able**

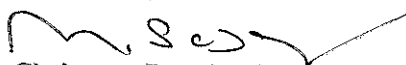
**Course Objective**

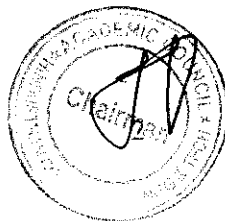
- 1 To Learn the basics of Computer Graphics System and Line Drawing Algorithms,
- 2 To Understand Two Dimensional Transformations and Clipping Algorithms.
- 3 Students familiar with Three-Dimensional Graphics and Three-Dimensional Transformations.
- 4 To Implement activities involving in Design, Development and Testing
- 5 To Study the Multimedia and various Compression Techniques.


Unit	Description	Instructional Hours
I	<b>Introduction:</b> Raster Scan Displays, Pixels, Frame Buffer, Vector & Character generation, Random Scan Systems, Graphics Primitives, Display Devices, Display File Structure, ScanI Conversion Techniques, Line Drawing: Simple DDA, Bresenham's Algorithm, Circle Drawing Algorithms. Scan Line Polygon Fill Algorithm, Boundary-Fill and Flood-Fill Algorithms.	9
II	<b>2D Transformation:</b> Translation, Rotation, Scaling, Shearing, Reflection. Inverse Transformation, Homogenous Coordinate System, Matrices Transformation, Composite Transformation. Windowing & Clipping: World Coordinate System, Screen Coordinate System, Viewing Transformation, Line Clipping, Cohen Sutherland, Midpoint Line Clipping Algorithms, Polygon Clipping: Sutherland -Hodgeman, Weiler-Atherton algorithms	9
III	<b>3D Transformations:</b> translation, rotation, scaling. Parallel & Perspective Projection, Types of Parallel & Perspective Projection. Hidden Surface elimination: Depth comparison, Back Face Detection Algorithm, Painters Algorithm, Z-buffer Algorithm. Curve generation, Bezier and B-spline methods.	9
IV	<b>Reflections and Shading:</b> Diffuse Reflection, Specular reflection, Phong Shading Gourand Shading, Ray Tracing, Color Models like RGB, YIQ, CMY, HSV.	9
V	<b>Multimedia System:</b> An Introduction, Multimedia Hardware, Multimedia System Architecture. Data & File Format Standards. i.e. RTF, TIFF, MIDI, JPEG, DIB, MPEG, Audio: Digital Audio, MIDI, Processing Sound, Sampling, Compression. Video: Avi, 3GP, MOV, MPEG, Compression Standards, Compression through spatial and Temporal Redundancy. Multimedia Authoring.	9
<b>Total Instructional Hours</b>		<b>45</b>

**Course Outcome**

- |     |                                                                                                                                                            |
|-----|------------------------------------------------------------------------------------------------------------------------------------------------------------|
| CO1 | Understand about Computer Graphics System, and Line Drawing Algorithms                                                                                     |
| CO2 | Familiar with Techniques of Clipping, Two-Dimensional Transformation                                                                                       |
| CO3 | The Computer Graphics Course Prepares Students for Activities involving in Design, Development and Testing of Modelling, Rendering, Shading and Animation. |
| CO4 | To Understand about various latest interactive Multimedia Devices, the basic concepts about Images and Image Format.                                       |
| CO5 | To Understand about Data, Image and Video Compression Techniques and Animation.                                                                            |

  
 Chairman, Board of Studies  
**Chairman - BoS**  
**IT - HICET**



  
 Dean - Academics  
**Dean (Academics)**  
**HICET**


**TEXT BOOK:**

- T1 Donald Hearn and M.P. Becker —Computer Graphics Pearson Publications, 3rd Edition,2012.
- T2 David.Rogers, "Procedural Elements of Computer Graphics", Tata McGraw Hill, 2nd Edition 2011.

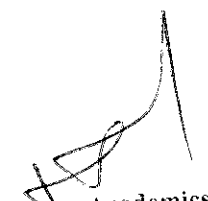
**REFERENCES:**

- R1 James D. Foley,Andries van Dam,StevenK.Feiner, John F.Hughes,Computer GraphicsPrinciple & Practice, Pearson Publications, 2nd Edition,2008.
- R2 Ranjan Parekh, Principles of Multimedia , Tata McGraw Hill, 2008.
- R3 F.S.Hill Jr. and Stephen M.Kelley, —Computer Graphics using Open GL,PHI Publication,3rd Edition,2010

PO & PSO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	3	3	3	3	2	1	-	2	3	2	2	1	1	3
CO2	3	3	3	3	3	2	1	-	2	3	2	2	1	2	2
CO3	3	2	2	3	3	2	1	-	2	3	1	1	1	2	3
CO4	3	3	3	3	3	2	1	-	2	3	2	2	2	1	2
CO5	3	3	3	3	3	2	1	-	2	3	2	2	2	1	2

  
Chairman, Board of Studies  
**Chairman - BoS**  
**IT - HICET**



  
Dean-Academics  
**Dean (Academics)**  
**HICET**

Programme	Course code	Name of the course	L	T	P	C
B.TECH.	19IT8302	SOFTWARE PROCESS	3	0	0	3

**The student should be able**

- Course Objective**
- 1 To acquire knowledge about the different activities involved in SoftwareProcess.
  - 2 To Identify and describe the key phases of Project Management.
  - 3 To Plan and manage projects at each stage of the Software Development LifeCycle (SDLC)
  - 4 To Apply the concepts of Project Implementation & Testing
  - 5 To develop the skills for particular role in a Software Process and to Practicethe Role of Professional Ethics in successful Software Development.

Unit	Description	Instructional Hours
	<b>Introduction</b>	
I	Software Engineering – Time Management – Tracking Time – Period and Product Planning –Product Planning – Product Size – Managing yourTime - Managing Commitments –Managing Schedules.	9
	<b>Planning</b>	
II	The Project Plan – The Software Development Process – Defects – Finding Defects – The Code Review Checklist – Design Defects –Product Quality – Process Quality	9
	<b>TSP Strategy</b>	
III	Team Software Process Overview – The logic of the Team SoftwareProcess – Launching a Team Project - The Development Strategy – The Development Plan – Defining the Requirement	9
	<b>PRODUCT IMPLEMENTATION</b>	
IV	Designing with Teams – Product Implementation – Integration & SystemTesting – The Postmortem.	9
	<b>TEAM MANAGEMENT</b>	
V	The Team Leader Role – Development Manager Role – The Planning Manager Role – The Quality – Process Manager Role – The Support Manager Role	9
	<b>Total Instructional Hours</b>	<b>45</b>
	CO1 To apply the process to be followed in the Software Development Life-CycleModels.	
	CO2 To design and to formalize a project based upon the deliverables.	
<b>Course Outcome</b>	CO3 To organize a Team Work through that address Real-World Challenges	
	CO4 To develop a Complete Project with the Latest Technologies.	
	CO5 To inculcate the Professional Ethics in a particular Role of the Environment.	

**TEXT BOOK:**

- T1 Watt S Humphrey, Introduction to Personal Software Process, Addison Wesley, 2002  
T2 Watt S Humphery, Introduction to Team Software Process, Addison Wesley, 2002.

**REFERENCES:**

- R1 William A.Florac and Anita D. Carleton, Measuring the Software Process: Statistical ProcessControl for Software Process Improvement, Addison-Wesley Professional, I Edition, 2000  
R2 Gopalaswamy Ramesh, Managing Global Software Projects: How to Lead GeographicallyDistributed Teams, Manage Processes and Use Quality Models, McGraw Hill Education.  
R3 Phillip G. Armour, The Laws of Software Process: A New Model for the Production and Management of Software, Auerbach Publications, I Edition,2003


  
Chairman, Board of Studies

**Chairman - BoS**  
**IT - HICET**




  
Dean - Academics  
**Dean (Academics)**  
**HICET**

PO & PSO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	2	2	1	2	2	-	-	-	1	1	1	2	2	2	2
CO2	2	1	-	1	1	-	-	-	2	1	1	2	2	3	1
CO3	2	2	1	2	2	1	1	-	1	2	1	3	2	2	3
CO4	3	2	2	1	2	-	-	-	1	1	2	2	3	3	2
CO5	2	2	1	2	2	-	-	-	1	1	1	2	2	2	2

  
 Chairman, Board of Studies  
**Chairman - BoS**  
**IT - NICET**



  
 Dean-Academics  
**Dean (Academics)**  
**HiCET**

Programme	Course code	Name of the course	L	T	P	C
B.TECH.	19IT8303	SERVICE ORIENTED ARCHITECTURE	3	0	0	3

Course Objective	The student should be able
	1 To learn XML fundamentals.
	2 Be exposed to build applications based on XML.
	3 Understand the key principles behind SOA.
	4 Be familiar with the web services technology elements for realizing SOA.
	5 To study various web service standards

Unit	Description	Instructional Hours
	<b>INTRODUCTION TO XML</b>	
I	XML Document Structure – Well-formed and Valid Documents –Namespaces – DTD – XMLSchema –X-Files.	9
	<b>BUILDING XML- BASED APPLICATIONS</b>	
II	Parsing XML – Using DOM, SAX – XML Transformation and XSL –XSL Formatting –Modeling Databases in XML.	9
	<b>SERVICE ORIENTED ARCHITECTURE</b>	
III	Characteristics of SOA, Comparing SOA with Client-Server and Distributed architectures –Benefits of SOA -- Principles of Service orientation – Service layers.	9
	<b>WEB SERVICES</b>	
IV	Web Services Framework –Services as Web Services-Service Descriptions – WSDL –Messaging with SOAP – Message Exchange Pattern- Atomic Transaction-Orchestration	9
	<b>BUILDING SOA-BASED APPLICATIONS</b>	
V	WS-Addressing - WS-Reliable Messaging - WS-Policy -- WS-Coordination – WS -Transactions - WS-Security.	9
	<b>Total Instructional Hours</b>	<b>45</b>


Course Outcome	CO1	CO2	CO3	CO4	CO5
	Understand XML Technologies.	Build application based on XML.	Know the basics of SOA	Develop web services using technology elements.	Construct SOA-based applications for intra-enterprise and inter-enterprise applications

#### TEXT BOOK:

- T1 Ron Schmelzer et al. XML and Web Services, Pearson Education, 2014.
- T2 Thomas Erl, Service Oriented Architecture: Concepts, Technology, and Design, Pearson Education, 2016.

#### REFERENCES:

- R1 James McGovern, Sameer Tyagi, Michael E Stevens, Sunil Mathew, Java Web Services Architecture, Elsevier, 2013.
- R2 Frank P.Coyle, XML, Web Services and the Data Revolution, Pearson Education, 2002 .
- R3 Sandeep Chatterjee and James Webber, Developing Enterprise Web Services:An Architect's Guidel, Prentice Hall,2004
- R4 James McGovern, Sameer Tyagi,Michael E Stevens, Sunil Mathew, Java Web Services Architecture,Elsevier,2003.

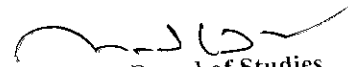
  
Chairman, Board of Studies  
Chairman - B o S  
IT - HICET




  
Dean Academics  
Dean (Academics)  
HICET

PO & PSO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	1	2	3	2	-	-	-	3	2	1	2	1	3	2
CO2	2	2	2	3	3	-	-	-	1	2	2	3	2	3	2
CO3	2	1	1	3	2	-	-	-	1	2	1	1	2	3	2
CO4	3	3	3	3	2	-	-	-	1	1	1	1	1	1	2
CO5	1	3	2	2	2	-	-	-	1	1	3	1	1	2	2



  
 Chairman, Board of Studies  
**Chairman - BoS**  
**IT - HICET**

  
 Dean - Academics  
**Dean (Academics)**  
**HICET**

Programme	Course code	Name of the course	L	T	P	C
B.TECH.	19IT8304	HUMAN COMPUTER INTERACTION	3	0	0	3

**The student should be able**

- Course Objective**
- 1 To learn the foundations of Human Computer Interaction.
  - 2 To become familiar with the Interaction model.
  - 3 To know about the designing process and guidelines of HCI.
  - 4 To study the models in User Interface.
  - 5 Be familiar with web HCI.

Unit	Description	Instructional Hours
<b>FOUNDATIONS OF HCI:</b>		
I	The Human: The Human: I/O channels – Memory – Reasoning and Problem solving; The Computer: Devices – Memory – Processing and Networks.	9
<b>INTERACTION AND SOFTWARE PROCESS:</b>		
II	Interaction: Models – Frameworks – Ergonomics – Styles – Elements – Interactivity-Paradigms. Interactive Design: Basics – Process – Scenarios – Navigation – Screen Design – Iteration and Prototyping.	9
<b>DESIGN &amp; SOFTWARE PROCESS:</b>		
III	HCI in Software process: Software Life Cycle – Usability Engineering – Prototyping in practice – Design Rationale. Design rules: Principles, Standards, Guidelines, Rules. Evaluation Techniques – Universal Design.	9
<b>MODELS AND THEORIES</b>		
IV	HCI Models: Cognitive Models: Socio-Organizational issues and Stakeholder Requirements – Communication and Collaboration models.	9
<b>HYPertext, MULTIMEDIA AND WWW:</b>		
V	Understanding Hypertext-Finding Things-Web Technology and issues-Static Web Content-Dynamic Web Content	9
<b>Total Instructional Hours</b>		<b>45</b>

- Course Outcome**
- CO1 Design effective dialog for HCI
  - CO2 Model effective HCI for individuals and persons with disabilities.
  - CO3 Assess the importance of user feedback.
  - CO4 HCI implications for designing multimedia/ ecommerce/ e-learning Web sites
  - CO5 Mobile Human computer Interaction

**TEXT BOOK:**

- T1 Alan Dix, Janet Finlay, Gregory Abowd, Russell Beale, Human Computer Interaction, 3rd Edition, Pearson Education, 2004.
- T2 Andrew Sears, Julie A. Jocko, Human-Computer Interaction: Development Process-CRC Press, 2017.
- T3 Handbook of Human-Computer Interaction,

**REFERENCES:**


- R1 James McGovern, Sameer Tyagi, Michael E Stevens, Sunil Mathew, Java Web Services Architecture, Elsevier, 2013.
- R2 Frank P. Coyle, XML, Web Services and the Data Revolution, Pearson Education, 2002.
- R3 Sandeep Chatterjee and James Webber, Developing Enterprise Web Services: An Architect's Guide!, Prentice Hall, 2004
- R4 James McGovern, Sameer Tyagi, Michael E Stevens, Sunil Mathew, Java Web Services Architecture, Elsevier, 2003.

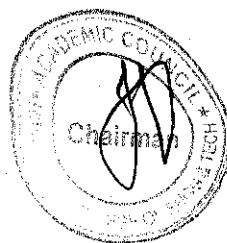


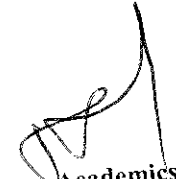
*[Signature]*  
 Chairman, Board of Studies  
 Chairman - BoS  
 IT - HICET

*[Signature]*  
 Dean - Academics  
 Dean (Academics)  
 HICET

PO & PSO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	3	3	3	3	2	1	-	2	3	2	2	1	3	2
CO2	3	3	3	3	3	2	1	-	2	3	2	2	2	3	2
CO3	3	3	3	3	3	2	1	-	2	3	2	2	2	3	2
CO4	3	3	3	3	3	2	1	-	2	3	2	2	1	1	2
CO5	3	3	3	3	3	2	1	-	2	3	2	2	1	2	2

  
 Chairman, Board of Studies  
**Chairman - BoS**



  
 Dean Academics  
**Dean (Academics)**  
**HICET**



Programme	Course code	Name of the course	L	T	P	C
B.TECH.	19IT8305	MOBILE EDGE SYSTEMS	3	0	0	3

**The student should be able**

**Course Objective**

- 1 Learn the basics of edge computing.
- 2 Understand evolution of computing architecture.
- 3 Learn the various concepts in mobile edge computing and its services.
- 4 Gain knowledge about Edge computing in Internet of Things.
- 5 Learn various standards and role of open source and IoT.

Unit	Description	Instructional Hours
	<b>INTRODUCTION</b>	
I	Edge Computing-Concept-Basic Characteristics and Attributes-Benefits of Edge Computing-CROSS values of Edge Computing- Collaboration of Edge Computing and Cloud Computing-Fog and Edge Computing-Use cases of Edge Computing-Drawbacks of Edge Computing	9
	<b>EVOLUTION OF COMPUTING MODELS</b>	
II	Shared and central resources Vs Exclusive and local computation-IoT disrupts the cloud-Characteristics of new computing model-Blueprint of edge computing intelligence-High level architecture-Key drivers of Edge Computing-Application areas.	9
	<b>MOBILE EDGE COMPUTING</b>	
III	Mobile cloud computing-Cloudlets-Mobile edge computing-Edge Computing Reference Architecture: Model-Driven Reference Architecture-Multi-View Display-ECNs, Development frameworks and Product Implementation-Edge Computing Domain Models-Services	9
	<b>EDGE COMPUTING IN IoT</b>	
IV	Introduction-Key Benefits of Edge for the IoT-Unique Requirements of Edge for IoT-Usecase-IoT Foundation-Device Management-Security- service Enablement- Message Prioritization-Data Replication-Cloud Enablement IoT Solutions	9
	<b>STANDARDS AND ROLE OF OPEN SOURCE</b>	
V	Standards for Self-organization, self-configuration, self-discovery-E/W communication standards between multiple ECNs-Open standard for implementation of algorithms for machine learning-Role of open source- IIoT using Edge Computing-Introduction-Use case Industry oriented- Technical Analytics	9
	<b>Total Instructional Hours</b>	<b>45</b>

**Course Outcome**

- CO1 Learn the basics of edge computing
- CO2 Understand evolution of computing architecture and its concepts.
- CO3 Implement the concepts of mobile edge computing and its services in realtime.
- CO4 Learn the concepts of Edge computing in Internet of Things.
- CO5 Learn various standards and role of open source and IIoT

**TEXT BOOK:**

T1 Ajit Singh. Edge Computing: Simple in Depth. Shroff Publishers and Distributors Private Limited, 1st Edition, 2019.

T2 Jie Cao, Quan Zhang, Weisong Shi, Edge Computing: A Primer, Springer, 1st Edition, 2018.

**REFERENCES:**

*[Signature]*  
Chairman, Board of Studies

**Chairman - BoS  
IT - HICET**

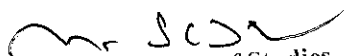


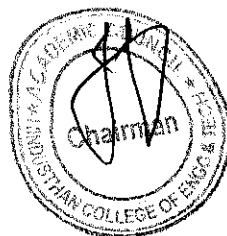
*[Signature]*  
Dean - Academics


**Dean (Academics)  
HICET**

- R1 Rajkumar Buyya, Satish Narayana Srirama, Fog and Edge Computing, Principles and Paradigms, Wiley Series on Parallel and Distributed Computing, 1st Edition, 2019.
- R2 Arshdeep Bahga, Vijay Madisetti, Internet of Things – A hands-on approach, Universities Press, 1st Edition, 2015.
- R3 David Hanes, Gonzalo Salgueiro, Patrick Grossetete, Robert Barton, Jerome Henry IoT Fundamentals: Networking Technologies, Protocols, and Use Cases for the Internet of Things, 1st Edition, 2017.
- R4 Amir M. Rahmani, Fog Computing in the Internet of Things: Intelligence at the Edge, Lifestyle, 1st Edition, 2019.

PO & PSO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	1	2	3	2	-	-	-	3	2	1	2	1	3	2
CO2	2	2	2	3	3	-	-	-	1	2	2	3	2	3	2
CO3	2	1	1	3	2	-	-	-	1	2	1	1	2	3	2
CO4	3	3	3	3	2	-	-	-	1	1	1	1	1	1	2
CO5	1	3	2	2	2	-	-	-	1	1	3	1	1	2	2

  
 Chairman, Board of Studies  
**Chairman - BoS**  
**IT - HICET**



  
 Dean (Academics)  
**HICET**

Programme	Course code	Name of the course	L	T	P	C
B.TECH.	19IT8311	ROBOTICS AND ITS APPLICATIONS	3	0	0	3

**The student should be able**

- Course Objective**
- 1 To learn the basic working concepts of Robots.
  - 2 To introduce localization in robots
  - 3 To know more about the path planning of robot
  - 4 To explore about Robotics Vision
  - 5 To discuss the applications and implementation of robots

Unit	Description	Instructional Hours
I	<b>INTRODUCTION</b> Introduction, brief history, components of robotics, classification, workspace, work-envelop, motion of robotic arm, end-effectors and its types, service robot and its application, Artificial Intelligence in Robotics. Types of actuators-purpose of sensor-internal and external sensor-common sensors-encoders tachometers-strain gauge base	9
II	<b>LOCALIZATION</b> Self-localizations and mapping - Challenges in localizations – IR based Localizations – vision based localizations – Ultrasonic based localizations - GPS localization systems.	9
III	<b>PATH PLANNING</b> Introduction, path planning-overview-road map path planning-cell decomposition path planning-potential field path planning-obstacle avoidance-case studies.	9
IV	<b>VISION SYSTEM</b> Robotic vision systems-image representation-object recognition and categorization-depth measurement- image data compression-visual inspection-Software considerations.	9
V	<b>APPLICATION</b> Ariel robots-collision avoidance robots for agriculture-mining-exploration-underwater-civilian- and military applications-nuclear applications-space applications-Industrial robots-artificial intelligence in robots-application of robots in material handling-continuous arc welding-spot welding-spray painting- assembly operation-cleaning-etc.	9
<b>Total Instructional Hours</b>		<b>45</b>

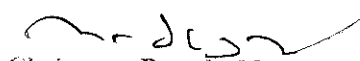
Course Outcome	Description
CO1	Understand the basic working concepts of robots CO2: Gain the knowledge about localization in Robotics
CO2	Gain the knowledge about localization in Robotics
CO3	Express fundamentals of path planning of robot using robotic vision
CO4	Use the advanced techniques for robot processing
CO5	Understand the applications and implementation of robots

**TEXT BOOK:**


- T1 Richared D.Klafter, Thomas Achmielewski and Mickael Negin, Robotic Engineering and Integrated Approach, Prentice Hall India-Newdelhi-2001.
- T2 Saeed B.Nikku, Introduction to Robotics, Analysis, Control and Applications, Wiley-India, 2<sup>nd</sup> Edition 2020.

**REFERENCES:**

- R1 Nicholas G Odrey, Mikell P Groover, Mitchell Weiss, Roger N Nagel, "Industrial Robotic

  
Chairman, Board of Studies  
Chairman - BoS  
IT - NICET




  
Dean (Academics)  
NICET

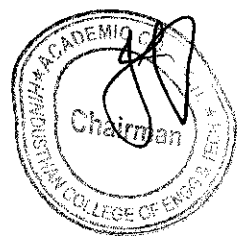
Technology-Programming and Application”, Mc Graw-Hill 2017.

R2 S. R. Deb, Sankha Deb, “Robotics Technology and Flexible Automation”, McGraw Hill Education, 2nd Edition, 2017.

R3 R M Murray, Z. Li and SS Sastry, “A Mathematical Introduction to Robotic Manipulation”, RC Press, 1994

PO & PSO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	1	3	2	1	-	-	-	1	1	3	3	1	3	2
CO2	3	3	3	3	3	-	-	-	2	2	1	2	1	3	2
CO3	3	3	2	3	1	-	-	-	3	2	1	1	3	2	2
CO4	3	1	2	2	3	-	-	-	1	3	3	3	1	3	2
CO5	1	3	2	3	2	-	-	-	2	3	2	1	1	2	2

  
 Chairman, Board of Studies  
**Chairman - BoS**  
**IT - HICET**



  
 Dean (Academics)  
**HICET**

**SEMESTER VIII**

**PROFESSIONAL ELECTIVES - V**

Programme	Course code	Name of the course	L	T	P	C
B.TECH.	19IT8306	INFORMATION RETRIEVAL TECHNOLOGIES	3	0	0	3

**The student should be able**

**Course Objective**

- 1 To understand the basics of Information Retrieval.
- 2 To acquire knowledge in Query Languages in Information Retrieval.
- 3 To analyze various Search Engine System Operations.
- 4 To use different information retrieval techniques in various application areas.
- 5 To apply IR principles to locate relevant information large collections of data.

Unit	Description	Instructional Hours
	<b>Information Retrieval: Motivation and Modeling</b>	
I	Motivation – Information Vs Data Retrieval – Formal Characterization of IR Models – Classical Information Retrieval – Set Theoretic Model – Algebraic Model – Probabilistic Models – Structured Text Retrieval Model.	9
	<b>Retrieval Evaluation Query Languages</b>	
II	Retrieval Performance Evaluation – Query Languages: Keyword Based Querying – Pattern Matching Structural Queries – Query Protocols – Query Operations: User Relevance Feedback – Automatic Local Analysis – Automatic Global Analysis	9
	<b>Indexing and Searching</b>	
III	Inverted Files – Boolean Queries – Sequential Searching – Pattern Matching – Parallel and Distributed IR – Searching the Web – Characteristics of Web – Search Engines – Browsing Tools – Meta Searches- Digital Libraries – Architectural Issues – Document Models, Representation and Access – Prototypes Standards	9
	<b>Text Classification and Vector Based Classification</b>	
IV	Text Based Classification Problem – Naïve Bayes Text Classification – The Bernoulli Model – Properties of Naïve Bayes – Feature Selection – Vector Space Classification: Rocchio Classification – k nearest neighbor – Linear vs Non-linear Classifiers	9
	<b>Web crawling and Link analysis</b>	
V	Overview – Crawling - Distributing indexes - Connectivity servers - Linkanalysis: The Web as a graph V PageRank - Markov chains - The PageRank computation- Topic-specific PageRank - Hubs and Authorities - Choosing the subset of the Web	9
	<b>Total Instructional Hours</b>	<b>45</b>

**Course Outcome**

- CO1 Apply different Information Retrieval Techniques in various Application Areas
- CO2 Design Effective Query for Information Retrieval
- CO3 Design an Efficient Search Engine and analyse the Web Content Structure
- CO4 Analyse various Machine Learning Techniques for Text Classification and Mining.
- CO5 Apply IR principles to locate Relevant Information Large Collections of data

**TEXT BOOK:**

- T1 Ricardo Baeza-Yates and Berthier Ribeiro-Neto, Modern Information Retrieval: The Concepts and Technology behind Search, Second Edition. ACM Press Books, 2011.

*[Signature]*  
Chairman, Board of Studies

**Chairman - IT**  
IT - Board



*[Signature]*  
Dean - Academics

**Dean (Academics)**  
**HICET**

T2 C. Manning, P. Raghavan, and H. Schütze, Introduction to Information Retrieval, Cambridge University Press, 2009.

**REFERENCES:**

- R1 Stefan Buettcher, Charles L. A. Clarke and Gordon V. Cormack, Information Retrieval: Implementing and Evaluating Search Engines, The MIT Press, 2016.
- R2 David A Grossman and Ophir Frieder, Information Retrieval: Algorithms and Heuristics, 2nd Edition, Springer, 2004.
- R3 Bruce Croft, Donald Metzler and Trevor Strohman, —Search Engines: Information Retrieval in Practice, Addison Wesley, (1st Edition) 2009.
- R4 Mark Levene, —An Introduction to Search Engines and Web Navigation, Wiley Publications, 2<sup>nd</sup> edition, 2010

PO & PSO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	1	1	1	1	1	-	-	1	2	1	2	3	2	1
CO2	3	2	3	2	2	-	-	-	2	1	2	1	3	2	1
CO3	2	2	3	2	2	-	-	-	3	2	2	2	3	2	1
CO4	2	2	3	1	1	-	-	-	2	2	2	2	3	2	1
CO5	2	2	2	1	1	-	-	-	2	1	1	1	3	2	1



*[Signature]*  
 Chairman, Board of Studies  
 IT - HICET

*[Signature]*  
 Dean - Academics  
 Dean (Academics)  
 HICET

Programme	Course code	Name of the course	L	T	P	C
B.TECH.	19IT8307	BLOCK CHAIN TECHNOLOGY	3	0	0	3

**The student should be able**

- Course Objective**
- 1 To Understand Blockchain's Fundamental Components, and Examine Decentralization Using Blockchain
  - 2 To Explain how Cryptocurrency works, from when a Transaction is created to when it is considered part of the Blockchain.
  - 3 To Explain the Components of Ethereum and Programming Languages for Ethereum.
  - 4 To Study the basics of Hyperledger and Web3.
  - 5 To Know about alternative Blockchains and Blockchain Projects in Different Domains.

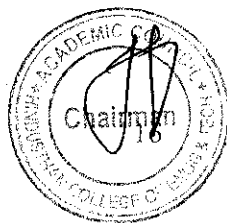
Unit	Description	Instructional Hours
	<b>INTRODUCTION TO BLOCKCHAIN</b>	
I	History of Blockchain – Types of Blockchain – Consensus – Decentralization using Blockchain – Blockchain and Full Ecosystem, Decentralization – Platforms for Decentralization	9
	<b>INTRODUCTION TO CRYPTOCURRENCY</b>	
II	Bitcoin – Digital Keys and Addresses – Transactions – Mining – Bitcoin Networks and Payments – Wallets – Alternative Coins – Theoretical Limitations – Bitcoin limitations – Name Coin – Prime Coin – Zcash – Smart Contracts – Ricardian Contracts.	9
	<b>ETHEREUM</b>	
III	The Ethereum Network – Components of Ethereum Ecosystem – Ethereum Programming Languages: Runtime Byte Code, Blocks and Blockchain, Fee Schedule – Supporting Protocols – Solidity Language	9
	<b>WEB3 AND HYPERLEDGER</b>	
IV	Introduction to Web3 – Contract Deployment – POST Requests – Development Frameworks – Hyperledger as a Protocol – The Reference Architecture – Hyperledger Fabric – Distributed Ledger – Corda.	9
	<b>ALTERNATIVE BLOCKCHAINS AND NEXT EMERGING TRENDS</b>	
V	Kadena – Ripple – Rootstock – Quorum – Tendermint – Scalability – Privacy – Other Challenges – Blockchain Research – Notable Projects – Miscellaneous Tools.	9

**Total Instructional Hours 45**

Course Outcome	Description
CO1	Understand the Technology Components of Blockchain and how it works.
CO2	Understand Bitcoin and its Limitations by Comparing with other Alternative Coins.
CO3	Devise Solution using the Ethereum Model.
CO4	Understand and use Hyperledger and its Development Framework. CO4 -Track alternative Blockchains and Emerging Trends in Blockchain

**TEXT BOOK:**

*[Signature]*  
 Chairman, Board of Studies  
 Chairman - BOS  
 IT - HICET



*[Signature]*  
 Dean - Academics  
 Dean (Academics)  
 HICET

- T1 Imran Bashir, Mastering Block chain: Distributed Ledger Technology, Decentralization and Smart Contracts Explained,( Second Edition), Packt Publishing, 2018.
- T2 S.Shukla,M.Dhawan,S.Sharma,S.Venkatesan, Blockchain Technology: Cryptocurrency

**REFERENCES:**

- R1 ArshdeepBahga, Vijay Madiseti, Blockchain Applications: A Hands-on Approach, VPT, 2017
- R2 Alex Leverington, Ethereum Programming| Packt Publishing, 2017.
- R3 Roger Wattenhofer, The Science of the Blockchain| CreateSpace Independent Publishing,2016.
- R4 A. Narayanan, J. Bonneau, E. Felten, A. Miller, S. Goldfeder, Bitcoin and Cryptocurrency Technologies: A Comprehensive Introduction, Princeton University Press, 2016.

PO & PSO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	1	1	1	1	-	-	-	1	2	1	2	3	2	1
CO2	3	2	3	2	2	-	-	-	2	1	2	1	3	2	1
CO3	2	2	3	2	2	-	-	-	3	2	2	2	3	2	1
CO4	2	2	3	1	1	-	-	-	2	2	2	2	3	2	1
CO5	2	2	2	1	1	-	-	-	2	1	1	1	3	2	1



*[Signature]*  
 Chairman, Board of Studies  
**Chairman - BoS**  
**IT - HICET**

*[Signature]*  
 Dean - Academics  
**Dean (Academics)**  
**HICET**



Programme	Course code	Name of the course	L	T	P	C
B.TECH.	19IT8308	PROFESSIONAL ETHICS	3	0	0	3

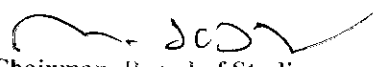
**The student should be able**

Course Objective	Description
1	To provide basic knowledge about engineering Ethics, Variety of moral issues and Moral dilemmas, Professional Ideals and Virtues.
2	To provide basic familiarity about Engineers as responsible Experimenters, Codes of Ethics.
3	To provide basic knowledge on Industrial Standards, Exposure to Safety, Risk Benefit Analysis.
4	To have an idea about the Collegiality and Loyalty, Confidentiality, Occupational Crime, Professional, Employee, Intellectual Property Rights.
5	To have an adequate knowledge about MNC's, Business, Environmental, Computer Ethics, Honesty, Moral Leadership, sample Code of Conduct.


Unit	Description	Instructional Hours
<b>HUMAN VALUES</b>		
I	Morals, values and Ethics – Integrity – Work ethic – Service learning – Civic virtue – Respect for others – Living peacefully – Caring – Sharing – Honesty – Courage – Valuing time – Cooperation – Commitment – Empathy – Self-confidence – Character – Spirituality – Introduction to Yoga and meditation for professional excellence and stress management	9
<b>ENGINEERING ETHICS</b>		
II	Senses of Engineering Ethics – Variety of moral issues – Types of inquiry – Moral dilemmas – Moral Autonomy – Kohlberg's theory – Gilligan's theory – Consensus and Controversy – Models of professional roles – Theories about right action – Self-interest – Customs and Religion – Uses of Ethical Theories	9
<b>ENGINEERING AS SOCIAL EXPERIMENTATION</b>		
III	Engineering as Experimentation – Engineers as responsible Experimenters – Codes of Ethics – A Balanced Outlook on Law.	9
<b>SAFETY, RESPONSIBILITIES AND RIGHTS</b>		
IV	Safety and Risk – Assessment of Safety and Risk – Risk Benefit Analysis and Reducing Risk – Respect for Authority – Collective Bargaining – Confidentiality – Conflicts of Interest – Occupational Crime – Professional Rights – Employee Rights – Intellectual Property Rights (IPR) – Discrimination	9
<b>GLOBAL ISSUES</b>		
V	Multinational Corporations – Environmental Ethics – Computer Ethics – Weapons Development – Engineers as Managers – Consulting Engineers – Engineers as Expert Witnesses and Advisors – Moral Leadership – Code of Conduct – Corporate Social Responsibility	9

**Total Instructional Hours 45**

Course Outcome	CO1	The students will understand the basic perception of profession, professional ethics, various moral issues & uses of ethical theories.
----------------	-----	----------------------------------------------------------------------------------------------------------------------------------------

  
 Chairman, Board of Studies  
 Chairman - BOS  
 IT - RICET



  
 Dean - Academics  
 Dean (Academics)  
 RICET

- CO2 The students will understand various social issues, industrial standards, code of ethics and role of professional ethics in engineering field.
- CO3 The students will be aware of responsibilities of an engineer for safety and risk benefit analysis.
- CO4 The students will be aware of professional rights and responsibilities of an engineer. The students will acquire knowledge about various roles of engineers in variety of global issues and able to apply ethical principles to resolve situations that arise in their professional lives
- CO5

**TEXT BOOK:**

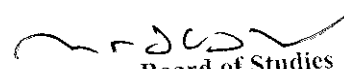
T1 Mike W. Martin and Roland Schinzinger, Ethics in Engineering, Tata McGrawHill, New Delhi, 2004

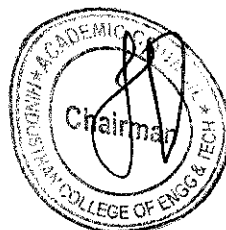
T2 Govindarajan M, Natarajan S, Senthil Kumar V. S, Engineering Ethics, Prentice Hall of India, New Delhi, 2004.

**REFERENCES:**

- R1 Charles B. Fleddermann, Engineering Ethics I, Pearson Prentice Hall, New Jersey, 2004.
- R2 Charles E. Harris, Michael S. Pritchard and Michael J. Rabins, Engineering Ethics – Concepts and Cases I, Cengage Learning, 2009.
- R3 John R Boatright, Ethics and the Conduct of Business I, Pearson Education, New Delhi, 2003

PO & PSO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	3	3	3	3	2	1	-	2	3	2	2	1	3	2
CO2	3	3	3	3	3	2	1	-	2	3	2	2	2	3	2
CO3	3	3	3	3	3	2	1	-	2	3	2	2	2	3	2
CO4	3	3	3	3	3	2	1	-	2	3	2	2	1	1	2
CO5	3	3	3	3	3	2	1	-	2	3	2	2	1	2	2

  
Chairman, Board of Studies  
**Chairman - BoS**  
**IT - HICET**



  
Dean - Academics  
**Dean (Academics)**  
**HICET**

Programme	Course code	Name of the course	L	T	P	C
B.TECH.	19IT8309	DEEP LEARNING TECHNIQUES	3	0	0	3

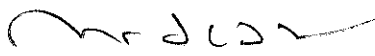
**The student should be able**

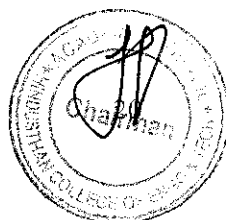
- Course Objective**
- 1 To learn the basics about Neural Networks and Neuron.
  - 2 To understand the basics of Deep Learning and enable the students to know Deep Learning Techniques to support Real-Time Applications.
  - 3 To Analyze ANN learning and Memory Based Learning.
  - 4 To Understand Deep Learning and Deep Network Architectures.
  - 5 To Learn Neural Networks in Tensor Flow for Solving Problems

Unit	Description	Instructional Hours
I	<b>Neural Networks:</b> Building Intelligent Machines-The Limits of Traditional Computer Programs. The Mechanics of Machine Learning- The Neuron-Expressing Linear Perceptions as Neurons- Feed-Forward Neural Networks -Linear Neurons and Their Limitations-Sigmoid,Tanh, and ReLU Neurons-SoftMax Output Layers.	9
II	<b>Basics of Deep learning:</b> Convolutional Neural Networks : Neurons in Human Vision-The Shortcomings of Feature Selection-Vanilla Deep Neural Networks Don't Scale-Filters and Feature Maps-Full Description of the Convolutional Layer-Max Pooling-Full Architectural Description of Convolution Networks-Closing the Loop on MNIST with Convolutional Networks-Image Preprocessing Pipelines Enable More Robust Models-Accelerating Training with Batch Normalization-Building a Convolutional Network for CIFAR-10-Visualizing Learning in Convolutional Networks-Leveraging Convolutional Filters to Replicate Artistic Styles.	9
III	<b>Memory Augmented Neural Networks:</b> Neural Turing Machines-Attention-Based Memory Access-NTM Memory Addressing Mechanisms- Differentiable Neural Computers-Interference-Free Writing in DNCs-DNC Memory Reuse-Temporal Linking of DNC Writes-Understanding the DNC Read Head-The DNCController Network Visualizing the DNC in Action- Implementing the DNC in Tensor Flow-Teaching a DNC to Read and Comprehend.	9
IV	<b>Deep Reinforcement Learning:</b> Deep Reinforcement Learning Masters Atari Games -What Is Reinforcement Learning? -Markov Decision Processes (MDP)- Explore Versus Exploit- Policy versus Value Learning-Pole-Cart with Policy Gradients-Q-Learning and Deep Q-Networks- Improving and Moving Beyond DQN.	9
V	<b>Tensor Flow:</b> Implementing Neural Networks in Tensor Flow : What Is Tensor Flow?-How Does Tensor Flow Compare to Alternatives?- Installing Tensor Flow-Creating and Manipulating Tensor Flow Variables-Tensor Flow Operations-Placeholder Tensors-Sessions in Tensor Flow-Navigating Variable Scopes and Sharing Variables- Managing Models over the CPU and GPU-Specifying the Logistic Regression Model in Tensor Flow-Logging and Training the Logistic Regression Model-Leveraging Tensor Board to Visualize Computation Graphs and Learning-Building a Multilayer Model for MNIST in Tensor Flow.	9
<b>Total Instructional Hours</b>		<b>45</b>

**Course** CO1 Model Neuron and Neural Network.

**Outcome** CO2 Develop Algorithms Simulating Human Brain.

  
Chairman, Board of Studies  
Chairman - BoS  
IT - HICET



  
Dean Academics  
Dean (Academics)  
HiCET

- CO3 Analyze ANN learning and Memory Based Learning.  
 CO4 Explore the Essentials of Deep Learning and Deep Network Architectures.  
 CO5 Implement various Deep Learning Models.


**TEXT BOOK:**

- T1 Nikhil Buduma, Nicholas Locascio, Fundamentals of Deep Learning: Designing Next-Generation Machine Intelligence Algorithms, O'Reilly Media, 2017.  
 T2 Simon Haykins, —Neural Network- A Comprehensive Foundationl, Pearson Prentice Hall (2nd Edition), 2001


**REFERENCES:**

- R1 Ian Goodfellow, Yoshua Bengio, Aaron Courville, Deep Learning : Adaptive Computation and Machine Learning series, MIT Press, 2017.  
 R2 Jeff Heaton, Artificial Intelligence for Humans: Deep Learning and Neural Network, Lightning Source Inc, 2015.  
 R3 M T Hagan, H B Demoth, M Beale, —Neural Networks Design, Thomson Learning, 2002.  
 R4 Zurada and Jacek M, Introduction to Artificial Neural Systems, West Publishing Company, 1992.

PO & PSO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	1	3	3	2	0	0	0	3	0	3	0	1	0	0
CO2	3	1	2	2	2	3	0	1	2	0	3	2	1	0	0
CO3	3	2	2	2	2	3	0	1	2	0	2	2	1	0	0
CO4	3	1	2	2	0	3	0	1	0	0	2	2	1	0	0
CO5	3	1	2	1	2	0	0	0	0	0	2	3	1	0	0

  
 Chairman, Board of Studies  
**Chairman - BoS**  
 HICET



  
 Dean - Academics  
**Dean (Academics)**  
**HICET**

Programme	Course code	Name of the course	L	T	P	C
B.TECH.	19IT8310	MANAGEMENT INFORMATION SYSTEM	3	0	0	3

**The student should be able**

- |                         |   |                                                                                                      |
|-------------------------|---|------------------------------------------------------------------------------------------------------|
| <b>Course Objective</b> | 1 | To understand the Role and Importance of MIS                                                         |
|                         | 2 | To identify the Process of MIS to support in the Management Activities                               |
|                         | 3 | To extend the concept of Decision Making in MIS to identify the QualityProduct                       |
|                         | 4 | To design and analyze the system for determining the requirements                                    |
|                         | 5 | To infer the concept of Deterministic System and Enterprise ResourcePlanning in various applications |

Unit	Description	Instructional Hours
<b>I</b>	<b>INTRODUCTION:</b> Technology of Information Systems, concepts, definition; role and impact of MIS; role and importance of management; approaches to management; functions of the manager; management as a control system; concepts of data models; database design; client-server architecture	9
<b>II</b>	<b>PROCESS OF MANAGEMENT:</b> Planning, organization, staffing, coordination and controlling; management by exception; MIS as a support to management; organization structure and theory; basic model and organization structure; organizational behavior.	9
<b>III</b>	<b>DECISION MAKING AND INFORMATION:</b> Decision making concepts, methods, tools and procedures; behavioral concepts in decision making; organizational decision making; information concepts as a quality product; classification of the information; methods of data and information collection; value of the information; organization and information system concepts, control types; handling system complexity; post implementation problems in systems.	9
<b>IV</b>	<b>SYSTEM ANALYSIS AND DESIGN:</b> Need for system analysis; system analysis of existing system; new requirement; system development model; structured system analysis and design; computer system design; development of MIS; development of long range plans of the MIS; ascertaining the class of the information; determining the information requirement; development and implementation of the MIS; management of quality; MIS factors of success and failure.	9
<b>V</b>	<b>DECISION SUPPORT SYSTEMS:</b> Deterministic systems; artificial intelligence; knowledge-based systems; MIS and the role of DSS; enterprise management systems; enterprise resource planning (ERP); ERP features and benefits; implementation factors of ERP; Internet and Web based information system; Electronic Commerce	9
<b>Total Instructional Hours</b>		<b>45</b>

<b>Course Outcome</b>	CO1	Identify the Role and Importance of MIS
	CO2	Ability to understand the Process of MIS to support in the Management activities
	CO3	Apply the concept of Decision Making in MIS to identify the Quality Product
	CO4	Design and Analyze the system for determining the requirements
	CO5	Utilize Deterministic System and Enterprise Resource Planning in various applications

**TEXT BOOK:**

*[Signature]*  
Chairman, Board of Studies  
Chairman - PDS



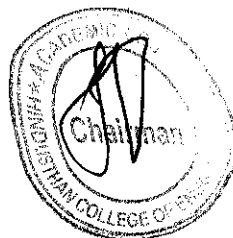
*[Signature]*  
Dean-Academics  
**Dean (Academics)**  
**HICET**

- T1 Waman S Jawadekar, Management Information Systems: A Global Digital Enterprise Perspective, McGraw-Hill (2nd ed.) 2013.  
 T2 Gordon B. Davis, Margrethe H Olson, Management information systems: conceptual

**REFERENCES:**

- R1 Kenneth C. Laudon, Jane P. Laudon, Management Information Systems: Managing the Digital Firm, Pearson Publication, (16th edition), 2019.  
 R2 Ramesh Behl, James A. O'Brien, George Marakas, Management Information Systems, McGraw-Hill (11th Ed.), 2019.  
 R3 Goyal D.P, Management Information Systems: Managerial Perspectives, Vikas Publication, (4th Edition), 2014.  
 R4 Gerald V. Post, David L. Anderson, Management Information Systems: Solving Business

PO & PSO	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO3
CO1	2	-	-	-	-	-	-	-	-	-	2	-	2	2	2
CO2	3	-	2	-	3	-	-	-	1	-	1	-	2	2	2
CO3	3	3	3	2	3	-	-	-	1	-	2	-	2	2	2
CO4	3	3	3	2	2	-	-	-	1	-	3	-	2	-	2
CO5	3	3	3	2	2	-	-	-	1	-	1	-	2	2	2



*[Signature]*  
 Chairman, Board of Studies  
**Chairman - BoS**  
 HICET

*[Signature]*  
 Dean - Academics  
**Dean (Academics)**  
 HICET

Programme	Course code	Name of the course	L	T	P	C
B.TECH.	19IT8312	QUANTUM COMPUTING	3	0	0	3

**The student should be able**

- |                         |   |                                                                       |
|-------------------------|---|-----------------------------------------------------------------------|
| <b>Course Objective</b> | 1 | To Provide the Essentials of Quantum Computing.                       |
|                         | 2 | To Learn basic quantum mechanics and correlations                     |
|                         | 3 | To understand the concepts of quantum information and cryptography    |
|                         | 4 | To impart the knowledge of Quantum algorithms.                        |
|                         | 5 | To understand quantum computational complexity and Error corrections. |

Unit	Description	Instructional Hours
<b>INTRODUCTION TO QUANTUM COMPUTATION</b>		
I	Overview of traditional computing – Church-Turing thesis – Quantum bits, Bloch sphere representation of a qubit, multiple qubits– Dirac notation and Hilbert Spaces – dual vectors – operators – the spectral theorem – functions of operators – tensor products – Schmidt decomposition theorem	9
<b>BACKGROUND MATHEMATICS AND PHYSICS</b>		
II	Hilber space, Probabilities and measurements, entanglement, density operators and correlation, basics of quantum mechanics, Measurements in bases other than computational basis.	9
<b>QUANTUM INFORMATION AND CRYPTOGRAPHY</b>		
III	Comparison between classical and quantum information theory. Bell states. Quantum teleportation. Quantum Cryptography, no cloning theorem	9
<b>QUANTUM ALGORITHMS</b>		
IV	Classical computation on quantum computers. Relationship between quantum and classical complexity classes. Deutsch’s algorithm, Deutsch’s-Jozsa algorithm, Shor factorization, Grover search	9
<b>QUANTUM COMPUTATIONAL COMPLEXITY AND ERROR CORRECTION</b>		
V	Computational complexity – black-box model – lower bounds for searching – general black-box lower bounds – polynomial method – block sensitivity – adversary methods – Classical error correction – classical three-bit code – fault tolerance – quantum error correction – three- and nine- qubit quantum codes – fault-tolerant quantum computation	9
<b>Total Instructional Hours</b>		<b>45</b>

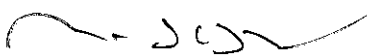
<b>Course Outcome</b>	CO1	Provide the Essentials of Quantum Computing
	CO2	Learn basic quantum mechanics and correlations
	CO3	Understand the concepts of quantum information and cryptography
	CO4	Acquire the knowledge of Quantum algorithms.
	CO5	Understand quantum computational complexity and Error corrections

**TEXT BOOK:**


- T1 P. Kaye, R. Laflamme, and M. Mosca, “An introduction to Quantum Computing”, Oxford University Press, 2007
- T2 Nielsen M. A., Quantum Computation and Quantum Information, Cambridge University Press. 2011

**REFERENCES:**

- R1 V. Sahni, “Quantum Computing”, Tata McGraw-Hill Publishing Company, 2007.

  
 Chairman, Board of Studies  
**Chairman - BoS**  
**IT - HICET**



  
 Dean - Academics  
**Dean (Academics)**  
**HICET**

- R2 Benenti G., Casati G. and Strini G., Principles of Quantum Computation and Information, Vol. I: Basic Concepts, Vol II: Basic Tools and Special Topics, World Scientific. 2005.
- R3 Pittenger A. O., An Introduction to Quantum Computing Algorithms, Hamilton Printing, NY, 2006
- R4 John Gribbin, "Computing with Quantum Cats: From Colossus to Qubits", Prometheus Books, March 2014
- R5 Riley Tipton Perry, "Quantum Computing From The Ground Up", World Scientific Publishing Co Pte Ltd, Sep 2012

PO & PSO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	2	2	2	2	-	-	-	-	-	-	1	1	1	1
CO2	2	1	2	1	2	-	-	-	-	-	-	1	1	3	3
CO3	2	1	2	1	2	-	-	-	-	-	-	1	1	2	2
CO4	3	3	3	1	2	-	-	-	-	-	-	1	3	3	3
CO5	3	3	2	3	2	-	-	-	-	-	-	1	2	2	2



*JCS*  
 Chairman, Board of Studies  
**Chairman - BoS**  
**IT - NICET**

*[Signature]*  
 Dean - Academics  
**Dean (Academics)**  
**HICET**




PROGRAMME	COURSE CODE	NAME OF THE COURSE	L	T	P	C
B.TECH/B.E Course Objective	19IT8314	WEB DEVELOPMENT-III	0	0	3	3

- To allow the student to learn more about production-ready deployments.

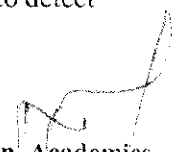
Experiment  
No.

Description

- Workflow using pull-requests**  
This module acts as an advanced guide to the usage of git in development teams, where the norm is to develop on branches, perform peer-reviews, and to re-work based on reviews before merging. Since this cycle is most often performed using online tooling that uses pull requests to achieve this workflow, students are taught how to open a pull request, make changes, submit work for review and then update code based on review.
- JS Bundling - integration of JS into non-JS backends**  
This module covers the history of why "bundling" as a process exists for the JS ecosystem, the most common bundling tools, and the general methodology. This module also covers the new "import maps" feature that allows for similar capability without the use of a bundling tool.
- Compile to JS languages - options & approaches**  
This module covers the reason why languages that compile to JS exist, the different purposes that they serve, and demonstrate a few of the most popular options and the differences between each.
- Testing**  
This module covers the importance of testing, the different approaches to testing such as unit testing, integration testing, and hybrid testing. It should also cover popular libraries that are used to help with testing, and also common pitfalls in the practice of testing and how to avoid them.
- CI/CD - Continuous integration & delivery**  
This module teaches students about modern development processes that enable teams to release changes quickly and often, by leading them through the process of setting up an automated system that detects changes to code to run tests and then linking that to the deployment of code that passes its test suite to a remote server.
- Application environments**  
This module teaches students about the different environments in which an application is expected to run. This module explains the differences between the environments that a student has already operated in - development, testing & production, and also introduces the concept of a staging environment which acts as a gateway to the production environment.
- Containerization**  
This module covers the field of containerization - where complex applications are packaged to run in isolated spaces called containers. The approach for covering this topic involves the use of the popular Docker (OCI) standard, teaching students how to build a Docker image for their web application, and how to deploy this image to different targets.
- Internationalisation and localization**  
This module covers i18n, teaching students the basics of setting up their web applications to support users who prefer or require a language different from the default language of the app, and/or live in a timezone that is different from the default. This module also covers L10n, teaching students how to use the i18n framework to customise their web application for another locale.
- Error logging & debugging**  
This module covers the practice of logging and notification of runtime errors that occur on a deployed application. This module also covers the process that is followed to detect

  
Chairman, Board of Studies  
Chairman - B.E  
IT - 19IT8314



  
Dean (Academics)  
HiCET

the source of a bug, and how testing can be used to ensure a fix and to prevent recurrences.

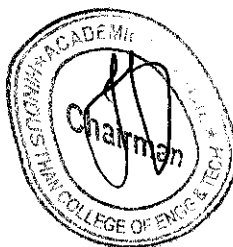
**Total Practical Hours 45**

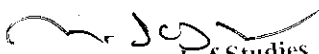
**Course  
Outcome**

- CO1: Be able to bundle a codebase with non-trivial JS dependencies and code.
- CO2: Know how to differentiate between popular JS flavours and pick one that is suitable for a task.
- CO3: Understand why testing is important, what TDD is, and be able to write both unit and integration tests for Rails applications that use JS in the front-end.
- CO4: Be able to set up a CI/CD pipeline for a server-side application, ensuring the code reaches production automatically after tests pass.
- CO5: Know how to organise & communicate development work using pull requests.
- CO6: Be aware of container-based deployments, be able to build a Docker image for their web application and then deploy that image to a web server
- CO7: Know how to set up a web application to support localization
- CO8: Set up error-logging for their web application to capture runtime errors - both in the back-end and in the front-end. They'll also know how to write tests that replicate errors before implementing a fix to prevent regressions

**TEXT BOOKS:**

This course does not require students to use physical textbooks. Instead, original course material (videos, text and images) has been prepared for students to go through and is open-sourced under Creative Commons Attribution-ShareAlike 4.0 International License © Freshworks Inc. & Pupilfirst Pvt. Ltd. This course material may include some third-party content with a compatible license, and external links for additional reading on the Internet. Students are also taught how to search for information on their own.

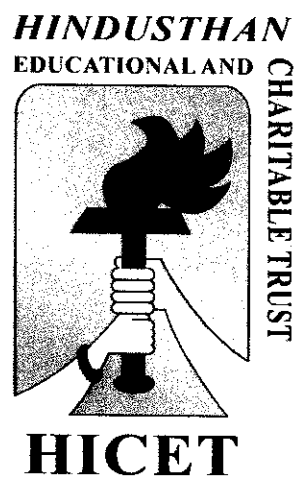


  
Chairman, Board of Studies  
**Chairman - BoS**  
HICET

  
Dean-Academics  
**Dean (Academics)**  
HICET

***HINDUSTHAN COLLEGE OF ENGINEERING AND TECHNOLOGY***  
**(An Autonomous Institution Affiliated to Anna University, Chennai)**  
**(Approved by AICTE, New Delhi, Accredited by NAAC with 'A' Grade)**  
**Coimbatore - 641 032.**

**B.TECH. INFORMATION TECHNOLOGY**



**CHOICE BASED CREDIT SYSTEM**

**Revised Curriculum and Syllabus for the Odd semester**  
**Academic year 2023-24**

# **CURRICULUM**

## **R2019**

**DETAILS OF CHANGES CARRIED OUT IN CURRICULUM & SYLLABUS**

**CBCS PATTERN**

**UNDERGRADUATE PROGRAMMES**

**B.TECH. INFORMATION TECHNOLOGY (UG)**

**REGULATION-2019**

**For the students admitted during the academic year 2021-2022 and onwards**

**The course code 21 indicates that the students joined in the academic year 2021**

**SEMESTER I**

S.No.	Course Code	Course Title	Type	L	T	P	C	CIA	ESE	TOTAL
<b>THEORY</b>										
1.	21HE1101	Technical English	HS	2	1	0	3	40	60	100
2.	21MA1101	Calculus	BS	3	1	0	4	40	60	100
<b>THEORY &amp; LAB COMPONENT</b>										
3.	21PH1151	Applied Physics	BS	2	0	2	3	50	50	100
4.	21CY1151	Chemistry for Engineers	BS	2	0	2	3	50	50	100
5.	21CS1151	Python Programming and Practices	ES	2	0	2	3	50	50	100
6.	21EC1154	Basics of Electron Devices and Electric Circuits	ES	2	0	2	3	50	50	100
<b>PRACTICAL</b>										
7.	21HE1071	Language Competency Enhancement Course-I	HS	0	0	2	1	100	0	100
<b>MANDATORY COURSES</b>										
8.	21HE1072	Career Guidance Level – I Personality, Aptitude and Career Development	EEC	2	0	0	0	100	0	100
9.	21HE1073	Entrepreneurship & Innovation	EEC	1	0	0	0	100	0	100
<b>Total:</b>				<b>16</b>	<b>2</b>	<b>10</b>	<b>20</b>	<b>580</b>	<b>320</b>	<b>900</b>

**SEMESTER II**

S.No.	Course Code	Course Title	Type	L	T	P	C	CIA	ESE	TOTAL
<b>THEORY</b>										
1.	21HE2101	Business English for Engineers	HS	2	1	0	3	40	60	100
2.	21MA2104	Differential Equations and Linear Algebra	BS	3	1	0	4	40	60	100
<b>THEORY &amp; LAB COMPONENT</b>										
3.	21IT2151*	Programming in C	ES	2	0	2	3	50	50	100
4.	21ME2154	Engineering Graphics	ES	1	0	4	3	50	50	100
5.	21PH2151	Material Science	BS	2	0	2	3	50	50	100
6.	21CY2151	Environmental Studies	BS	2	0	2	3	50	50	100
<b>PRACTICALS</b>										
7.	21ME2001	Engineering Practices	ES	0	0	4	2	50	50	100
8.	21HE2001	Language Competency	HS	0	0	2	1	100	0	100

		Enhancement Course-II								
<b>MANDATORY COURSES</b>										
9.	21HE2072	Career Guidance Level – II Personality, Aptitude and Career Development	EEC	2	0	0	0	100	0	100
<b>Total:</b>				<b>14</b>	<b>2</b>	<b>16</b>	<b>22</b>	<b>530</b>	<b>370</b>	<b>900</b>

### SEMESTER III

S.No.	Course Code	Course Title	Type	L	T	P	C	CIA	ESE	TOTAL
<b>THEORY</b>										
1.	21MA3151	Statistics and Queuing Theory	BS	3	0	2	4	50	50	100
2.	21IT3201	Data Structures and Algorithm Design	PC	3	0	0	3	40	60	100
3.	21IT3202	Object Oriented Programming Using C++	PC	3	0	0	3	40	60	100
4.	21IT3203	Computer Organization and Architecture	PC	3	0	0	3	40	60	100
<b>THEORY &amp; LAB COMPONENT</b>										
5.	21IT3251*	Digital Principles and System Design	PC	3	0	2	4	50	50	100
<b>PRACTICALS</b>										
6.	21IT3001	Data Structures and Algorithm Laboratory	PC	0	0	3	1.5	50	50	100
7.	21IT3002	Object Oriented Programming using C++ Laboratory	PC	0	0	3	1.5	50	50	100
<b>MANDATORY COURSES</b>										
8.	21MC3191	Indian Constitution	AC	2	0	0	0	100	0	100
9.	21HE3071	Career Guidance Level – III Personality, Aptitude and Career Development	EEC	2	0	0	0	100	0	100
10.	21HE3073	Leadership Management Skills	EEC	1	0	0	0	100	0	100
<b>Total:</b>				<b>20</b>	<b>0</b>	<b>10</b>	<b>20</b>	<b>575</b>	<b>425</b>	<b>1000</b>

### SEMESTER IV

S.No.	Course Code	Course Title	Type	L	T	P	C	CIA	ESE	TOTAL
<b>THEORY</b>										
1.	21MA4102	Discrete Mathematics	BS	3	1	0	4	40	60	100
2.	21IT4201	Java Programming	PC	3	0	0	3	40	60	100
3.	21IT4202	Advanced Database Management Systems	PC	3	0	0	3	40	60	100
<b>THEORY &amp; LAB COMPONENT</b>										
4.	21IT4251*	Object Oriented Software Engineering	PC	3	0	2	4	50	50	100
5.	21IT4253	Principles of Operating Systems	PC	3	0	2	4	50	50	100
<b>PRACTICALS</b>										
6.	21IT4001	Java Programming Laboratory	PC	0	0	3	1.5	50	50	100
7.	21IT4002	Database Management Systems Laboratory	PC	0	0	3	1.5	50	50	100
<b>MANDATORY COURSES</b>										
8.	21AC4191	Essence of Indian tradition knowledge/Value Education	AC	2	0	0	0	100	0	100

9.	21HE4072	Career Guidance Level – IV Personality, Aptitude and Career Development	EEC	2	0	0	0	100	0	100
10.	21HE4073	Ideation Skills	EEC	1	0	0	0	100	0	100
<b>Total:</b>				<b>20</b>	<b>2</b>	<b>8</b>	<b>21</b>	<b>620</b>	<b>380</b>	<b>1000</b>

### SEMESTER V

S. No	Course Code	Course Title	Category	L	T	P	C	CIA	ESE	Total
1.	21IT5201	Mobile Computing	PC	3	0	0	3	40	60	100
2.	21IT5202	Computer Networks	PC	3	0	0	3	40	60	100
3.	21IT5209	Embedded Systems Design	PC	3	0	0	3	40	60	100
4.	21IT5204	Artificial Intelligence and Machine Learning	PC	3	0	0	3	40	60	100
5.	21IT5205	Data Warehousing and Data Mining	PC	3	0	0	3	40	60	100
<b>Theory with Lab Component</b>										
6.	21IT53XX* /21IT5358	Professional Elective-I/ Business Intelligence Analyst	PE/ ICC	2	0	2	3	50	50	100
<b>PRACTICALS</b>										
7.	21IT5001	Machine Learning Laboratory	PC	0	0	3	1.5	50	50	100
8.	21IT5002	Mobile Application Development Laboratory	PC	0	0	3	1.5	50	50	100
<b>MANDATORY COURSES</b>										
9.	21HE5071	Soft Skills - I	EEC	1	0	0	1	100	0	100
10.	21HE5072	Design Thinking	EEC	1	0	0	1	100	0	100
<b>TOTAL</b>				<b>19</b>	<b>0</b>	<b>8</b>	<b>23</b>	<b>550</b>	<b>450</b>	<b>1000</b>

S.No.	Course Code	Course Title	Type	L	T	P	C	CIA	ESE	TOTAL
<b>PROFESSIONAL ELECTIVE I</b>										
1	21IT5351R	Internet and Web Technology	PE	2	0	2	3	50	50	100
2	21IT5352	Advanced Java Programming	PE	2	0	2	3	50	50	100
3	21IT5353	C# and .Net Programming	PE	2	0	2	3	50	50	100
4	21IT5354	Advanced Data Structure	PE	2	0	2	3	50	50	100
5	21IT5355	Advanced Database Technology	PE	2	0	2	3	50	50	100
6	21IT5356	Ethics and AI	PE	2	0	2	3	50	50	100

**SEMESTER VI**

S. No	Course Code	Course Title	Category	L	T	P	C	CIA	ESE	Total
<b>THEORY</b>										
1.	21IT6181	Software Project Management	HS	3	0	0	3	40	60	100
2.	21IT6201	Internet of Things	PC	3	0	0	3	40	60	100
3.	21IT6202	Principles of Compiler Design	PC	3	0	0	3	40	60	100
4.	21IT63XX / 21IT6309	Professional Elective II / Predictive Modeling	PE	3	0	0	3	40	60	100
5.	21XX64XX	Open Elective I	OE	3	0	0	3	40	60	100
<b>THEORY &amp; LAB COMPONENT</b>										
6.	21IT6251 /21IT6252	Cryptography and Network Security / Data Sciences	PC	3	0	2	4	50	50	100
<b>PRACTICALS</b>										
7.	21IT6001	Internet of Things Laboratory	PC	0	0	3	1.5	50	50	100
8.	21IT6003	Project Based Learning	PC	0	0	3	1.5	50	50	100
<b>MANDATORY COURSES</b>										
9.	21IT6701	Internship/Industrial Training	EEC	0	0	0	1	100	0	100
10.	21HE6071	Soft Skill-II	EEC	1	0	0	1	100	0	100
11.	21HE6072	Intellectual Property Rights (IPR)	EEC	1	0	0	1	100	0	100
<b>TOTAL</b>				<b>20</b>	<b>0</b>	<b>8</b>	<b>25</b>	<b>575</b>	<b>525</b>	<b>1100</b>

S.No.	Course Code	Course Title	Type	L	T	P	C	CIA	ESE	TOTAL
<b>PROFESSIONAL ELECTIVE II</b>										
1	21IT6301	Business Intelligence And Analysis	PE	3	0	0	3	40	60	100
2	21IT6302	Information Security	PE	3	0	0	3	40	60	100
3	21IT6303	Software Design	PE	3	0	0	3	40	60	100
4	21IT6304	Natural Language Processing	PE	3	0	0	3	40	60	100
5	21IT6305	Soft Computing	PE	3	0	0	3	40	60	100
6	21IT6307	Virtual Reality and Augmented Reality	PE	3	0	0	3	40	60	100
7.	21IT6308	Web Development - I	PE	0	0	3	3	50	50	100

**OPEN ELECTIVE**

S.No.	Course Code	Course Title	Type	L	T	P	C	CIA	ESE	TOTAL
1.	21IT6402	Machine Learning for Engineers	OE	3	0	0	3	40	60	100



**SEMESTER VII**

S. No	Course Code	Course Title	Category	L	T	P	C	CIA	ESE	Total
<b>THEORY</b>										
1.	21IT7201	Distributed and Cloud Computing	PC	3	0	0	3	40	60	100
2.	21IT7202*	Data Science and Analytics	PC	3	0	0	3	40	60	100
3.	21IT7203	Software Testing and Quality Assurance	PC	3	0	0	3	40	60	100
4.	21IT73XX	Professional Elective III	PE	3	0	0	3	40	60	100
5.	21XX74XX	Open Elective – II	OE	3	0	0	3	25	75	100
<b>PRACTICALS</b>										
6.	21IT7001R	Distributed and Cloud Computing Laboratory	PC	0	0	3	1.5	50	50	100
7.	21IT7002R*	Data Analytics Laboratory	PC	0	0	3	1.5	50	50	100
<b>PROJECT WORK</b>										
8.	21IT7901	Project Work - Phase I	EEC	0	0	4	2	50	50	100
<b>TOTAL</b>				<b>15</b>	<b>0</b>	<b>10</b>	<b>20</b>	<b>335</b>	<b>465</b>	<b>800</b>

<b>PROFESSIONAL ELECTIVE III</b>										
S.No.	Course Code	Course Title	Type	L	T	P	C	CIA	ESE	TOTAL
1.	21IT7301	Social Network analysis	PE	3	0	0	3	40	60	100
2.	21IT7302	Cyber Forensics	PE	3	0	0	3	40	60	100
3.	21IT7303	Software Documentation	PE	3	0	0	3	40	60	100
4.	21IT7304	Principles of Management	PE	3	0	0	3	40	60	100
5.	21IT7305	Software Architecture	PE	3	0	0	3	40	60	100
6.	21IT7306	Green Computing	PE	3	0	0	3	40	60	100
7.	21IT7307	Web Development - II	PE	0	0	3	3	50	50	100

<b>OPEN ELECTIVE - II</b>										
S.No.	Course Code	Course Title	Type	L	T	P	C	CIA	ESE	TOTAL
1.	21IT7401	Cyber Security	OE	3	0	0	3	40	60	100

**SEMESTER VIII**

S.No	Course Code	Course Title	Type	L	T	P	C	CIA	ESE	TOTAL
<b>THEORY</b>										
1.	21IT83XX	Professional Elective –IV	PE	3	0	0	3	25	75	100
2.	21IT83XX	Professional Elective- V	PE	3	0	0	3	25	75	100
<b>PRACTICAL</b>										
3.	21IT8901	Project Work – Phase II	EEC	0	0	24	8	50	50	100
<b>TOTAL</b>				<b>6</b>	<b>0</b>	<b>24</b>	<b>14</b>	<b>100</b>	<b>200</b>	<b>300</b>

PROFESSIONAL ELECTIVE IV										
1.	21IT8301	Graphics and Multimedia	PE	3	0	0	3	40	60	100
2.	21IT8302	Software Process	PE	3	0	0	3	40	60	100
3.	21IT8303	Service Oriented Architecture	PE	3	0	0	3	40	60	100
4.	21IT8304	Human Computer Interaction	PE	3	0	0	3	40	60	100
5.	21IT8305	Mobile Edge Systems	PE	3	0	0	3	40	60	100
6.	21IT8311	Robotics and its Applications	PE	3	0	0	3	40	60	100
PROFESSIONAL ELECTIVE V										
S.No.	Course Code	Course Title	Type	L	T	P	C	CIA	ESE	TOTAL
1.	21IT8306	Information Retrieval Technologies	PE	3	0	0	3	40	60	100
2.	21IT8307	Block Chain Technology	PE	3	0	0	3	40	60	100
3.	21IT8308	Professional Ethics	PE	3	0	0	3	40	60	100
4.	21IT8309	Deep Learning Techniques	PE	3	0	0	3	40	60	100
5.	21IT8310	Management Information System	PE	3	0	0	3	40	60	100
6.	21IT8312	Quantum Computing	PE	3	0	0	3	40	60	100
7.	21IT8314	Web Development - III	PE	0	0	3	3	50	50	100

LIFE SKILL COURSES										
1.	21LSZ401	General Studies for Competitive Examinations	OE	3	0	0	3	40	60	100
2.	21LSZ402	Human Rights, Women's Rights and Gender Equality	OE	3	0	0	3	40	60	100
3.	21LSZ403	Indian Ethos and Human Values	OE	3	0	0	3	40	60	100
4.	21LSZ404	Indian Constitution and Political System	OE	3	0	0	3	40	60	100
5.	21LSZ405	Yoga for Human Excellence	OE	3	0	0	3	40	60	100

#### Enrollment for B.E. / B. TECH. (HONOURS) / Minor Degree (optional)

A student can also optionally register for additional courses (18 credits) and become eligible for the award of B.E. / B. Tech. (Honours) or Minor Degree. For B.E. / B. Tech. (Honours), a student shall register for the additional courses (18 credits) from semester V onwards. These courses shall be from the same vertical or a combination of different verticals of the same programme of study only. For minor degree, a student shall register for the additional courses (18 credits) from semester V onwards. All these courses have to be in a particular vertical from any one of the other programmes.

Clause 4.10 of Regulation 2022 is applicable for the Enrolment of B.E. / B. TECH. (HONOURS) / Minor Degree (Optional).

## VERTICALS FOR MINOR DEGREE

- Heads are requested to provide one vertical from their program to offer for other program students to register for additional courses (18 Credits) to become eligible for the B.E./B.Tech. Minor Degree.

Note: Each programme should provide verticals for minor degree

S. NO.	COURSE CODE	COURSE TITLE	CATEGORY	PERIODS PER WEEK			TOTAL CONTACT PERIODS	CREDITS
				L	T	P		
1.	21IT5601	Sem 5: Database System	MDC	3	0	0	3	3
2.	21IT6601	Sem 6: Foundation of Data Science	MDC	3	0	0	3	3
3.	21IT6602	Sem 6: Artificial Intelligence and Expert Systems	MDC	3	0	0	3	3
4.	21IT7601	Sem 7: Data Exploration and Visualization	MDC	3	0	0	3	3
5.	21IT7602	Sem 7: Business Intelligence	MDC	3	0	0	3	3
6.	21IT8601	Sem 8: Cyber Security	MDC	3	0	0	3	3

\*MDC – Minor Degree Course

In addition to the above the following additional courses for Minor Degree can also be given to the student's common to all the branches.

Vertical I - Fintech and Block Chain								
S. NO.	COURSE CODE	COURSE TITLE	CATEGORY	PERIODS PER WEEK			TOTAL CONTACT PERIODS	CREDITS
				L	T	P		
1.	21CS5602	Financial Management	MDC	3	0	0	3	3
2.	21XXXXXX	Fundamentals of Investment	MDC	3	0	0	3	3
3.	21XXXXXX	Banking, Financial Services and Insurance	MDC	3	0	0	3	3
4.	21XXXXXX	Introduction to Blockchain and its Applications	MDC	3	0	0	3	3
5.	21XXXXXX	Fintech Personal Finance and Payments	MDC	3	0	0	3	3
6.	21XXXXXX	Introduction to Fintech	MDC	3	0	0	3	3

Vertical II - Entrepreneurship								
S. NO.	COURSE CODE	COURSE TITLE	CATEGORY	PERIODS PER WEEK			TOTAL CONTACT PERIODS	CREDITS
				L	T	P		
1.	21BA5601	Foundation of Entrepreneurship	MDC	3	0	0	3	3
2.	21BA6601	Introduction to Business Venture	MDC	3	0	0	3	3
3.	21BA6602	Team Building & Leadership Management for Business	MDC	3	0	0	3	3

4.	21BA7601	Creativity & Innovation in Entrepreneurship	MDC	3	0	0	3	3
5.	21BA7602	Principles of Marketing Management for Business	MDC	3	0	0	3	3
6.	21BA8601	Human Resource Management for Entrepreneurs	MDC	3	0	0	3	3
7.	21BA8602	Financing New Business Ventures	MDC	3	0	0	3	3

Vertical III - Environment and Sustainability								
S. NO.	COURSE CODE	COURSE TITLE	CATE GORY	PERIODS PER WEEK			TOTAL CONTACT PERIODS	CREDITS
				L	T	P		
1.	22CEXXXX	Sustainable infrastructure Development	MDC	3	0	0	3	3
2.	22CEXXXX	Sustainable Agriculture and Environmental Management	MDC	3	0	0	3	3
3.	22CEXXXX	Sustainable Bio Materials	MDC	3	0	0	3	3
4.	22CEXXXX	Materials for Energy Sustainability	MDC	3	0	0	3	3
5.	22CEXXXX	Green Technology	MDC	3	0	0	3	3
6.	22CEXXXX	Environmental Quality Monitoring and Analysis	MDC	3	0	0	3	3

## VERTICALS FOR HONOURS DEGREE

### B.Tech. (Hons) Information Technology (Artificial Intelligence and Machine Learning)

S.No.	Course Code	Course Title	Category	Periods per Week				TCP	CIA	ESE	Total
				L	T	P	C				
1.	21IT5206	Foundation of Machine Learning	PC	3	0	0	3	4	40	60	100
2.	21IT6203	Knowledge Engineering	PC	2	0	2	3	4	40	60	100
3.	21IT6204	Deep Learning	PC	3	0	0	3	4	40	60	100
4.	21IT7205	Game Theory	PC	3	0	0	3	4	40	60	100
5.	21IT7206	Natural Language Processing	PC	3	0	0	3	4	40	60	100
6.	21IT8201	Generative Artificial Intelligence	PC	3	0	0	3	4	40	60	100

### B.Tech. (Hons) Information Technology (Cyber Security and Data Privacy)

S.No.	Course Code	Course Title	Category	Periods per Week				TCP	CIA	ESE	Total
				L	T	P	C				
1.	21IT5207	Ethical Hacking	PC	3	0	0	3	3	40	60	100
2.	21IT6205	Digital and Mobile Forensics	PC	3	0	0	3	3	40	60	100

3.	21IT6207	Social Network Security	PC	3	0	0	3	3	40	60	100
4.	21IT7207	Engineering Secure Software Systems	PC	3	0	0	3	3	40	60	100
5.	21IT7208	Cryptocurrency and Blockchain Technologies	PC	3	0	0	3	3	40	60	100
6.	21IT8202	Network Security	PC	3	0	0	3	3	40	60	100

### B.Tech. (Hons) Information Technology (BlockChain Technology)

S.No.	Course Code	Course Title	Category	Periods per Week				TCP	CIA	ESE	Total
				L	T	P	C				
1.	21IT5208	Fundamentals of Blockchain Technology	PC	3	0	0	3	3	40	60	100
2.	21IT6208	Blockchain Architecture and Design	PC	3	0	0	3	3	40	60	100
3.	21IT6209	Building Private Blockchain	PC	3	0	0	3	3	40	60	100
4.	21IT7209	Blockchain Business Models	PC	3	0	0	3	3	40	60	100
5.	21IT7210	Blockchain and IoT	PC	3	0	0	3	3	40	60	100
6.	21IT8203	Blockchain and AI	PC	3	0	0	3	3	40	60	100

Note: Each programme should provide verticals for Honors degree


Sem. No.	Course Code	Course Title	L	T	P	C	CIA	ESE	TOTAL
<b>SKILLED / INTEGRATED COURSES OFFERED THROUGH CHOICE BASED CREDIT SYSTEM</b>									
1	21CS1152	Object Oriented Programming Using Python	2	0	2	3	50	50	100
2	21IT2153	Relational Database Management System	2	0	2	3	50	50	100
3	21IT3252	Data Visualization	3	0	2	4	50	50	100
4	21IT4252	Design Thinking	3	0	0	4	50	50	100
5	21IT5357	Business Intelligence Analyst	2	0	2	3	50	50	100
6	21IT6309	Predictive Modeling	3	0	0	3	40	60	100
6	21IT6252	Data Science	3	0	2	4	50	50	100
7	21IT7204	Big Data with Security	3	0	0	3	40	60	100
7	21IT7003	Big Data with Security Laboratory	0	0	3	1.5	50	50	100


**SEMESTER-WISE CREDIT DISTRIBUTION**


<b>B.E. / B.TECH. PROGRAMMES</b>										
<b>S.No.</b>	<b>Course Area</b>	<b>Credits per Semester</b>								<b>Total Credits</b>
		<b>I</b>	<b>II</b>	<b>III</b>	<b>IV</b>	<b>V</b>	<b>VI</b>	<b>VII</b>	<b>VIII</b>	
1	HS	04	04	-	-	-	03	-	-	11
2	BS	10	10	04	04	-	-	-	-	28
3	ES	06	08	-	-	-	-	-	-	11
4	PC	-	-	16	17	18	13	12		79
5	PE	-	-	-	-	03	03	03	06	15
6	OE	-	-	-	-	-	03	03	-	06
7	EEC	-	-	-	-	02	03	02	08	15
<b>Total</b>		<b>20</b>	<b>22</b>	<b>20</b>	<b>21</b>	<b>23</b>	<b>25</b>	<b>20</b>	<b>14</b>	<b>165</b>

**CREDIT DISTRIBUTION R2019**

<b>Semester</b>	<b>I</b>	<b>II</b>	<b>III</b>	<b>IV</b>	<b>V</b>	<b>VI</b>	<b>VII</b>	<b>VIII</b>	<b>Total</b>
<b>Credits</b>	20	22	20	21	23	25	20	14	165

  
**Chairman BoS**  
**Chairman - BoS**  
**IT - HICET**

  
**Dean Academics**  
**Dean (Academics)**  
**HICET**

  
**Principal**  
**PRINCIPAL**  
**Hindusthan College Of Engineering & Technolog**  
**COIMBATORE - 641 032.**

S. No	Year	Semester	Course Code & Title	Existing Syllabus	Revised Syllabus	% of change
1.	III	VI	21IT6201 Internet of things	<p><b>Unit III - DEVELOPING IOTs</b> IoT design methodology - Motivation for using Python- Logical Design using Python — ControlFlow — Packages — File Handling — Classes — Packages used for connectivity-Python Packages of Interest for IoT -Case Study on IoT System for Weather Monitoring.</p> <p><b>Unit IV - IOT PHYSICAL DEVICES AND PHYSICAL SERVER</b> IoT Device — Raspberry Pi — Raspberry Interfaces — Programming Raspberry Pi with Python —Other IoT Devices —Cloud Storage Models and Communication APIs - WAMP — Xively Cloudfor IoT— Django — Amazon Web Services for IoT — SkyNet IoT Messaging Platform - Case Study.</p> <p><b>Unit V - DOMAIN SPECIFIC IOTs</b> IoT Application- Home Automation- Smart and connected Cities - Public safety- Agriculture -Environment — Industry -Health and Lifestyle.</p>	<p><b>Unit III - DEVELOPING IOTs</b> IoT design methodology - Motivation for using Python- Logical Design using Python — ControlFlow — Packages — File Handling — Classes — Python Packages of Interest for IoT -Case Study on IoT System for Weather Monitoring.</p> <p><b>Unit IV - IOT PHYSICAL DEVICES AND PHYSICAL SERVER</b> IoT Device — Raspberry Pi — Raspberry Interfaces — Programming Raspberry Pi with Python —Other IoT Devices —Cloud Storage Models and Communication APIs - WAMP — Xively Cloudfor IoT— Django — Amazon Web Services for IoT — SkyNet IoT Messaging Platform .</p> <p><b>Unit V - DOMAIN SPECIFIC IOTs</b> IoT Application- Home Automation- Smart and connected Cities - Agriculture -Environment — Industry -Health and Lifestyle.</p>	20

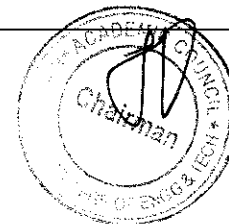
2.	III	VI	<p align="center"><b>21IT6303 &amp; SOFTWARE DESIGN</b></p>	<p><b>Unit I - DESIGN FUNDAMENTALS:</b> The Basic Concepts of Design – Characteristics of Design Activities – Essential Elements of Design – The Factors that Affect the Design -Design Principles: Basic Rules of Software Design – Design Processes.</p> <p><b>Unit II SOFTWARE DESIGN PRINCIPLES:</b> The Nature of the Design Process - The Software Design Process - Design in the Software Development Process - Design Qualities.</p> <p><b>Unit III DESIGN METHODOLOGIES:</b> Design Practices – Stepwise Refinement – Incremental Design – Structured System Analysis and Design – Jackson Structured Programming – Jackson System Development – Designing with Objects – Component-Based Design.</p> <p><b>Unit IV SOFTWARE ARCHITECTURE DESIGN:</b> Notion of Architecture – Notion of Software Architecture - Architectural Styles – Description of Software Architecture –Visual Notation – Examples.</p> <p><b>Unit V ARCHITECTURAL DESIGN:</b> Typical Architectural Design – Data Flow – Independent Components – Call and Return – Using Styles in Design – Choices of Style – Combination of Styles – Architectural Design Space – Theory of Design Spaces – Design Space of Architectural Elements – Design Space of Architectural Styles.</p>	<p><b>Unit I - GENERAL DESIGN FUNDAMENTALS</b> The nature of Design process – Objectives – Building Models – Constructs, Designqualities – Assessing the design – Design viewpoints for software – The object Model – Classes and Objects – Complexity – Classification – Notation – Process – Pragmatics.</p> <p><b>Unit II - STRUCTURED SYSTEM ANALYSIS AND DESIGN</b> Structured Design – Design Principles – Problem Partitioning and Hierarchy –Abstraction, Modularity – Top-down and Bottom-up Strategies – Transformation of a DFD to a Structure Chart – Transform Analysis – Transaction Analysis – Coupling –Cohesion – Multiple types of Cohesion in a module – Data Design – Normalization – Denormalization – Procedural Design</p> <p><b>Unit III - OBJECT ORIENTED ANALYSIS AND DESIGN</b> Overview of Object Oriented Analysis – Shaler/Mellor – Coad/ Yourdon – Rumbaugh –Booch – UML – Use case – Conceptual model – Behaviour – Class Analysis Patterns – Overview – Diagrams – Aggregation – UML – Diagrams – Collaboration – Sequence –Class – Design patterns and Frameworks – Comparison with other design methods – Managing analysis and design – Evaluation testing – Coding – Maintenance – Metrics.</p> <p><b>Unit IV - SOFTWARE DESIGN</b> The Architecture Concepts – Design Methods – Design Patterns – Rationale forMethods – Design Processes and Strategies – Design by Template – Designing with Patterns – Stepwise Refinement – Incremental Design – Prototyping – DSDM –Structured Systems Analysis and Structured Design – JSP – JSD.</p> <p><b>Unit V - CASE STUDIES</b> Domain Name System – Email – World Wide Web (HTTP) – Simple Network Management Protocol – File Transfer Protocol – Security – Multimedia applications.</p>	60
----	-----	----	---------------------------------------------------------------------	---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------	--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------	----



3	III	VI	<p align="center"><b>21IT6181 &amp; SOFTWARE PROJECT MANAGEMENT</b></p>	<p><b>Unit I - INTRODUCTION TO SOFTWARE PROJECT MANAGEMENT</b> Project Definition - Importance of Software Project Management – Activities Methodologies-Categorization of Software Projects - Setting Objectives - Management Control – Management Control – Stepwise: An Overview of Project Planning.</p> <p><b>Unit II - PROGRAM MANAGEMENT AND PROJECT EVALUATION</b> <del>Introduction</del> - Project Portfolio Management - Evaluation of Individual Projects - Cost Benefit Evaluation Techniques - Managing the Allocation of Resources within Programmes – <del>Strategic Programme Management</del> - Creating a Programme - Aids to Programme Management - Benefits Management.</p> <p><b>Unit III - ACTIVITY PLANNING AND RISK MANAGEMENT</b> Objective(s) – Project Schedule – Sequencing and Scheduling Activities – Network Planning Models– Forward Pass Backward Pass – Critical Path – Activity Float – Shortening Project Duration – Activity on Arrow Networks - Risk Identification, Assessment, Planning, Management -Evaluating Risks to the Schedule.</p> <p><b>Unit IV - MONITORING , CONTROL</b> Creating Framework – Collecting the Data – Visualizing Progress – Cost Monitoring – Earned ValueAnalysis– Prioritizing Monitoring – Getting Project Back to Target – Change Control – ManagingContracts - Introduction – Types of Contract – Stages in Contract Placement – Typical Terms of a Contract – Contract Management – Acceptance.</p> <p><b>Unit V - MANAGING PEOPLE AND ORGANIZING TEAMS</b> Introduction – Understanding Behavior – Organizational Behavior: A Background – Selecting the Right Person for The Job – Instruction in The Best Methods – Motivation– The Oldman – Hackman Job Characteristics Model – Stress - Working in Groups – Becoming a Team –Decision Making – Leadership – Organizational Structures.</p>	<p><b>Unit I - INTRODUCTION TO SOFTWARE PROJECT MANAGEMENT</b> Project Definition - Importance of Software Project Management–Activities-Categorization of Software Projects - Setting Objectives - Management – Management Control – Stepwise: An Overview of Project Planning.</p> <p><b>Unit II - PROJECT EVALUATION AND PROGRAMME MANAGEMENT</b> A business case - Project portfolio management - Evaluation of individual projects - Cost-benefit evaluation techniques - Programme management - Managing the allocation of resources within programmes - Creating a programme - Aids to programme management - Benefits management.</p> <p><b>Unit III - ACTIVITY PLANNING AND RISK MANAGEMENT</b> Objective(s) – Project Schedule – Sequencing and Scheduling Activities – Network Planning Models-Forward Pass -Backward Pass – Critical Path – Activity Float – Shortening Project Duration –Activity on Arrow Networks - Risk management - Risk identification,assessment,planning-Evaluating risks to the schedule.</p> <p><b>Unit IV - MONITORING , CONTROL AND MANAGING CONTRACTS</b> Creating Framework – Collecting the Data – Visualizing Progress – Cost Monitoring – Earned ValueAnalysis– Prioritizing Monitoring – Getting Project Back to Target – Change Control – ManagingContracts - Introduction – Types of Contract – Stages in Contract Placement – Typical Terms of a Contract – Contract Management – Acceptance.</p> <p><b>Unit V - MANAGING PEOPLE AND ORGANIZING TEAMS</b> Introduction – Understanding Behavior – Organizational Behavior: A Background – Selecting theRight Person for The Job – Instruction in The Best Methods – Motivation– The Oldman – Hackman Job Characteristics Model – Working in Groups – Becoming a Team – Decision Making – Organizational Structures.</p>	20
---	-----	----	-------------------------------------------------------------------------------------	----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------	----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------	----

*Scz*  
Chairman BOS  
IT - HICET

*Scz*  
Dean (Academics)  
HICET



*Scz*  
PRINCIPAL  
Hindusthan College Of Engineering & Technology  
COIMBATORE - 641 032.

**SEMESTER - VI**  
**SYLLABUS**

## SEMESTER VI

Programme	Course code	Name of the course	L	T	P	C
B.TECH.	21IT6181	SOFTWARE PROJECT MANAGEMENT	3	0	0	3

**The student should be made to**

- Course Objective**
- 1 Develop an awareness of the need for project planning and management.
  - 2 Learn the concepts on project management and evaluation.
  - 3 Plan and monitor projects for the risk management.
  - 4 Learn about project monitoring and control mechanisms.
  - 5 Manage people and organization of teams.

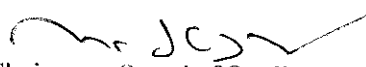
Unit	Description	Instructional Hours
	<b>INTRODUCTION TO SOFTWARE PROJECT MANAGEMENT</b>	
I	Project Definition - Importance of Software Project Management – Activities - Categorization of Software Projects - Setting Objectives - Management-Management Control – Stepwise: An Overview of Project Planning.	9
	<b>PROJECT EVALUATION AND PROGRAMME MANAGEMENT</b>	
II	A business case - Project portfolio management - Evaluation of individual projects - Cost-benefit evaluation techniques - Programme management - Managing the allocation of resources within programmes - Creating a programme - Aids to programme management - Benefits management.	9
	<b>ACTIVITY PLANNING AND RISK MANAGEMENT</b>	
III	Objective(s) – Project Schedule – Sequencing and Scheduling Activities – Network Planning Models-Forward Pass -Backward Pass – Critical Path – Activity Float – Shortening Project Duration –Activity on Arrow Networks - Risk management - Risk identification, assessment, planning- Evaluating risks to the schedule.	9
	<b>MONITORING , CONTROL AND MANAGING CONTRACTS</b>	
IV	Creating Framework – Collecting the Data – Visualizing Progress – Cost Monitoring – Earned Value Analysis– Prioritizing Monitoring – Getting Project Back to Target – Change Control – Managing Contracts - Introduction – Types of Contract – Stages in Contract Placement – Typical Terms of a Contract–Contract Management – Acceptance.	9
	<b>MANAGING PEOPLE AND ORGANIZING TEAMS</b>	
V	Introduction – Understanding Behavior – Organizational Behavior: A Background – Selecting the Right Person for The Job – Instruction in The Best Methods – Motivation – The Oldman – Hackman Job Characteristics Model – Working in Groups – Becoming a Team – Decision Making – Organizational Structures	9
	<b>Total Instructional Hours</b>	<b>45</b>

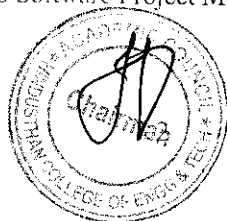
**Upon Completion of the course, the student will be made to**

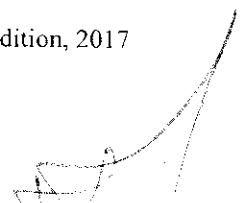
- Course Outcome**
- CO1 Construct and realize software design or software deployment.
  - CO2 Develop a budget, schedule or work plan
  - CO3 Apply cost monitoring and control strategies for software projects.
  - CO4 Understand the interdependencies between the processes of the system
  - CO5 Outline the organizational behaviour of people working in teams.

**TEXT BOOK:**

- T1 Bob Hughes, Mikecatterell, 'Software Project Management', Tata McGraw Hill.Sixth edition, 2017  
 T2 Adolfo Villafiorita, 'Introduction to Software Project Management', CRC Press,2014.

  
 Chairman, Board of Studies  
**Chairman - BoS**  
**IT - HICET**

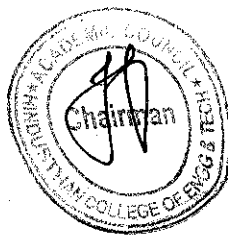


  
 Dean - Academics  
**Dean (Academics)**  
**HICET**

**REFERENCES:**

- R1 Murali k. chemuturi, Thomas M. cagly, 'Mastering Software Project Management,- Best Practices Tools and Techniques', 2010
- R2 Richard E. Fairly, —'Managing and Leading Software Projects', Wejilly and Sons, 2009
- R3 Jalote, —'Software Project Management in Practice', Pearson Education, 2014
- R4 Ashfaque Ahmed, 'Software Project Management Process Driven Approach, Auerbach Publications, 2011

PO & PSO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	3	3	-	-	-	-	3	3	-	2	3	2	2	2
CO2	3	3	3	2	-	-	2	1	2	-	2	3	1	1	1
CO3	3	3	3	1	3	-	2	-	1	-	2	3	3	2	1
CO4	3	3	3	2	3	-	2	1	2	1	2	3	3	2	1
CO5	3	3	3	2	3	-	3	2	1	1	2	3	3	2	2



Chairman, Board of Studies  
**Chairman - BOS**  
**IT - HICET**

Dean-Academics  
**Dean (Academics)**  
**HICET**

Programme	Course code	Name of the course	L	T	P	C
B.TECH.	21IT6201	INTERNET OF THINGS	3	0	0	3

- The student should be able**
- Course Objective**
- 1 To understand the basics of IoT Technologies.
  - 2 To study various Application Protocols related to IoT.
  - 3 To infer the Design Methodologies of IoT.
  - 4 To summarize various Packages, Frameworks and Cloud Services.
  - 5 To listen to some of the application areas where Internet of Things can be applied.


Unit	Description	Instructional Hours
	<b>INTRODUCTION</b>	
I	Introduction -Definition and Characteristics of IoT - Physical design of IoT- Logical design of IoT -IoT enabling technologies- IoT levels and Deployment	9
	<b>PROTOCOLS &amp; THINGS IN IOTs</b>	
II	Smart Objects: The —Things in IoT -Sensors, Actuators, Smart Objects, Sensor Networks Protocols: M2M and WSN Protocols – SCADA and RFID Protocols – IEEE 802.15.4 – BACNet Protocol–Modbus – KNX – Zigbee –MQTT..	9
	<b>DEVELOPING IOTs</b>	
III	IoT design methodology - Motivation for using Python- Logical Design using Python — Control Flow — Packages — File Handling — Classes —Python Packagesof Interest for IoT –Case Study on IoT System for Weather Monitoring	9
	<b>IOT PHYSICAL DEVICES AND PHYSICAL SERVER</b>	
IV	IoT Device — Raspberry Pi — Raspberry Interfaces — Programming Raspberry Pi with Python —Other IoT Devices —Cloud Storage Models and Communication APIs - WAMP -- Xively Cloudfor IoT— Django — Amazon Web Services for IoT — SkyNet IoT Messaging Platform.	9
	<b>DOMAIN SPECIFIC IOTs</b>	
V	IoT Application- Home Automation- Smart and connected Cities - Agriculture - Environment – Industry -Health and Lifestyle.	9
	<b>Total Instructional Hours</b>	<b>45</b>
<b>Course Outcome</b>	CO1 Explain the Characteristics and Enabling Technologies of IoT	
	CO2 Analyse the various Application Protocols related to IoT	
	CO3 Design IoT based simple applications using Python.	
	CO4 Describe the different Packages, Frameworks and Cloud Services	
	CO5 Implement small IoT based Real Time applications	

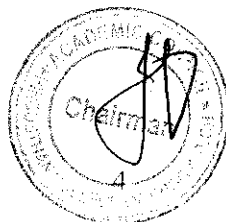
**TEXT BOOK:**

- T1 Arshdeep Bahga, Vijay Madiseti, —Internet of Things – A hands-on approach, Universities Press,2015.
- T2 David Hanes, CCIE No. 3491, Gonzalo Salgueiro, CCIE No. 4541, Patrick Grossetete, Robert Barton, CCIE No. 6660, CCDE No. 2013:6, Jerome Henry, CCIE No. 24750, IoT Fundamentals: Networking Technologies, Protocols, and Use Cases for the Internet of Things Cisco Press, Jun 13, 2017.

**REFERENCES:**

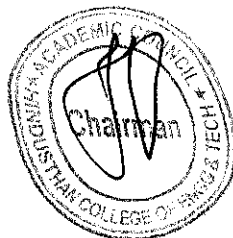
- R1 Gaston C.Hillar, —Internet of things with python, Packt Publishing Limited, 2016.
- R2 Honbo Zhou, "The Internet of Things in the Cloud: A Middleware Perspective", CRC Press, 1st edition, 2013
- R3 Andrian McEwen, Hakim Cassimally, —Designing the Internet of Things", John Wiley & Sons Ltd, 1st edition, 2014

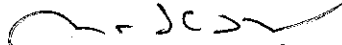
  
 Chairman, Board of Studies  
**Chairman - BoS**  
**IT - HICET**

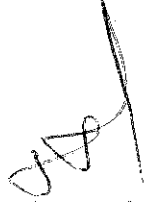


  
 Dean - Academics  
**Dean (Academics)**  
**HICET**

PO & PSO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	1	2	2	-	-	-	-	-	-	1	-	-	-	-	-
CO2	2	2	2	-	-	-	-	-	-	-	-	-	-	-	-
CO3	3	2	3	2	2	2	2	2	3	1	2	-	3	-	1
CO4	3	2	2	2	2	2	-	-	-	-	-	-	-	-	1
CO5	3	3	2	3	2	3	2	2	3	1	2	-	3	3	-



  
 Chairman, Board of Studies  
 Chairman - BOS  
 IT - HICET

  
 Dean-Academics  
 Dean (Academics)  
 HICET

Programme	Course code	Name of the course	L	T	P	C
B.TECH.	21IT6202	PRINCIPLES OF COMPILER DESIGN	3	0	0	3


The student should be made to

- Course Objective**
- 1 Learn the various phases of compiler and lexical analyzer.
  - 2 Learn the diverse parsing techniques
  - 3 Understand intermediate code generation
  - 4 Gain knowledge about run time environment and storage allocations.
  - 5 Learn how to optimize and effectively generate machine codes.


Unit	Description	Instructional Hours
	<b>INTRODUCTION TO COMPILERS</b>	
I	The structure of a compiler - Role of Lexical Analyzer – Input Buffering – Specification of Tokens – Recognition of Tokens – Finite Automata – Regular Expressions to Automata – Minimizing DFA	9
	<b>SYNTAX ANALYSIS</b>	
II	Role of the Parser-Context Free Grammars -Writing a Grammar-Top Down Parsing -Recursive-Descent parsing-Non recursive Descent Parsing-Bottom'up parsing-Shift Reduce Parser-LR Parser - LR (0) Item Construction of SLR Parsing Table - Introduction to LALR Parser - Error Handling and Recovery in Syntax Analyzer	9
	<b>INTERMEDIATE CODE GENERATION</b>	
III	Syntax Directed Definitions, Evaluation Orders for Syntax Directed Definitions, Intermediate Languages: Syntax Tree, Three Address Code, Types and Declarations, Translation of Expressions, Type Checking.	9
	<b>RUN – TIME ENVIRONMENT:</b>	
IV	Storage Organization- Static Versus Dynamic Storage Allocation- Access to non-local Data on the Stack-Stack Allocation of Space- Heap Management-Introduction to Garbage collection-Introduction to Trace based collection.	9
	<b>CODE OPTIMIZATION AND GENERATION</b>	
V	Code optimization: Introduction, The principle sources of optimization Loop optimization and Peephole optimization, DAG- optimization of basic blocks. Code generation: Issues in Code Generation –Target Language –Address in the Target Code- Design of a simple Code Generator.	9
<b>Total Instructional Hours</b>		<b>45</b>

Upon completion of this course, students will be able to

- Course Outcome**
- CO1 Understand regular expressions, apply them effectively in practical scenarios, and construct a minimized Deterministic Finite Automaton (DFA) for a given regular expression, showcasing proficiency in the conversion of abstract expressions into a tangible automaton representation.
- CO2 Proficient in constructing parsing tables for Context-Free Grammars (CFGs), showcasing the ability to systematically analyze and generate parsing tables for diverse grammatical structures.
- CO3 Write intermediate code for syntax-directed translation, showcasing proficiency in translating high-level language constructs into intermediate code representations
- CO4 Proficiently design and implement memory-efficient runtime environments, demonstrating a comprehensive understanding of static and dynamic storage allocation, stack and heap management, and garbage collection techniques.

  
Chairman. Board of Studies  
Chairman - BoS  
IT - RICET



  
Dean - Academics  
Dean (Academics)  
HICET

CO5 Design and implement optimized code, achieving a measurable improvement in program efficiency through the application of recognized code optimization techniques

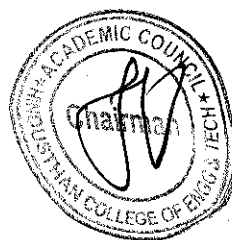
**TEXT BOOK:**

T1 Aho, Ravi Sethi, JD Ullman, 'Compilers Principles, Techniques and Tools', Pearson Education/Prentice Hall of India, 2<sup>nd</sup> Edition, 2014

**REFERENCES:**

R1 V. Raghavan, 'Principles of Compiler Design', Tata McGraw Hill Education Publishers, 5<sup>th</sup> Edition, 2017.  
 R2 Douglas Thain, 'Introduction to Compilers and Language Design', LULU Press, 2<sup>nd</sup> Edition, 2020.

PO & PSO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	3	3	-	-	-	-	3	3	-	-	3	2	2	2
CO2	3	3	3	2	-	-	2	1	2	-	-	3	1	1	1
CO3	3	3	3	1	-	-	2	-	1	-	-	3	3	2	1
CO4	3	3	3	2	-	-	2	1	2	1	-	3	3	2	1
CO5	3	3	3	2	-	-	3	2	1	1	-	3	3	2	2



*[Signature]*  
 Chairman, Board of Studies  
 Chairman - BOS  
 IT - HICET

*[Signature]*  
 Dean-Academics  
 Dean (Academics)  
 HICET

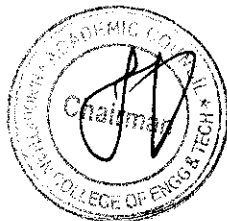


Programme	Course code	Name of the course	L	T	P	C
B. TECH	21IT6309	PREDICTIVE MODELING (IBM)	3	0	0	3

**The student should be able**

- Course Objective**
- 1 To learn how to develop models to predict categorical and continuous outcomes, using such techniques as neural networks, decision trees, logistic regression, support vector machines and Bayesian network models.
  - 2 To know the use of the binary classifier and numeric predictor nodes to automate model selection.
  - 3 To advice on when and how to use each model. Also learn how to combine two or more models to improve prediction

Unit	Description	Instructional Hours
<b>I</b>	<b>INTRODUCTION TO PREDICTIVE MODELLING</b> What is Predictive Analytics? - What does a predictive model do? - Descriptive v/s Predictive v/s Prescriptive Analytics - The need for a methodology CRISP-DM (Cross-Industry Standard Process for Data Mining). <i>Illustrative program: Collect and understand the data</i>	9
<b>II</b>	<b>INTRODUCTION TO SPSS MODELER</b>  IBM SPSS Modeler (Nodes, Streams), Manager Pane and Project Pane-collecting Initial Data-Understand data- Set the unit of Analysis (DISTINCT, AGGREGATE, SETTOFLAG)- Integrate data (APPEND, MERGE), Relationship between a categorical and continuous field, Relationship between two continuous fields. <i>Illustrative program: Set the unit of analysis for the data</i> a. Remove duplicate records b. Aggregate transactional data c. Create flag fields and aggregate the data Integrate data a. Appending Report b. Merge field	9
<b>III</b>	<b>USING FUNCTIONS IN SPSS</b>  Date and Time Functions-Conversion Functions-String Functions-Statistical Functions, Measure of Central Tendency, Measures of Variability-Missing Value Functions, Undefined and Blank Values Function. <i>Illustrative program:</i> Identify relationships in the data a. Examine the relationship between categorical fields b. Examine the relationship between a categorical and continuous field Predict customer churn in telecom dataset a. Build Model using CHAID b. Examine the CHAID Model c. Apply the model to new data	9
<b>IV</b>	<b>DATA FIELD TRANSFORMATION</b>  Field transformation- Additional Field Transformation-Sequence, Data-Sampling-balancing- partitioning data, Derive, Binning, Reclassify, Control Language for Expression Manipulation (CLEM), Filler, Transform, Sequence Functions, Restructure Data.	9



*[Signature]*  
Chairman, Board of Studies  
Chairman - BoS  
IT - HICET

*[Signature]*  
Dean Academics  
Dean (Academics)  
HICET

*Illustrative program: Create a Segmentation Model  
 Create homogeneous groups (clusters) of customers based on usage patterns.  
 Using functions in IBM SPSS Modeler*

- a. *Date and Time Functions*
- b. *String Functions*
- c. *Statistical Functions*
- d. *Missing Value*

*Function Add fields to the data*

- a. *Derive fields as formula*
- b. *Derive fields as flag or nominal*
- c. *Reclassify categorical fields*
- d. *Bin a continuous field into a categorical field with equal counts*

**INTRODUCTION TO MODEL**

V Modelling Algorithms-Supervised Models- Partition the data- Segmentation Models- Creating a model in IBM SPSS Modeler-Introduction to Linear Regression- Introduction to Logistic Regression-Introduction to Neural Networks- Multilayer Perceptron (MLP)-Radial Basis Function (RBF). 9

*Illustrative program: Create a Linear Regression Model to Predict Employee Salaries. Use Logistic Regression to Predict Response to a Charity Promotion Campaign. Predicting Credit Risk using Neural Networks*

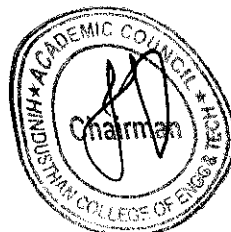
**Total Instructional Hours 45**

<b>Course Outcome</b>	CO1	Understand design, build, evaluate and implement predictive models for various business applications.
	CO2	Compare the underlying predictive modeling techniques.
	CO3	Select appropriate predictive modeling approaches.
	CO4	Apply predictive modeling approaches using a suitable package such as SPSS Modeler. To advice on when and how to use each model. Also learn how to combine two or more models to improve prediction
	CO5	Understand design, build, evaluate and implement predictive models for various business applications.

**REFERENCES:**

- R1 IBM Courseware
- R2 Fundamentals of Machine Learning for Predictive Data Analytic, by John D Kelleher
- R3 Applied Predictive Modeling, by Max Kuhn
- R4 IBM SPSS Modeler Essentials, by Jesus Salcedo, Keith McCormick

PO & PSO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	1	3	3	2	0	0	0	3	0	3	0	1	0	0
CO2	3	1	2	2	2	3	0	1	2	0	3	2	1	0	0
CO3	3	2	2	2	2	3	0	1	2	0	2	2	1	0	0
CO4	3	1	2	2	0	3	0	1	0	0	2	2	1	0	0
CO5	3	1	2	1	2	0	0	0	0	0	2	3	1	0	0



*[Signature]*  
 Chairman, Board of Studies  
**Chairman - BoS**  
**IT - HICET**

*[Signature]*  
 Dean - Academics  
**Dean (Academics)**  
**HICET**

Programme	Course code	Name of the course	L	T	P	C
B.TECH.	21IT6251	CRYPTOGRAPHY AND NETWORK SECURITY	3	0	2	4

**The student should be able**

- Course Objective**
- 1 Understand the basic concept of OSI Security Architecture and Classical Encryption Techniques.
  - 2 Identify the concept of Symmetric and Asymmetric Ciphers.
  - 3 To learn how to understand the Hash Functions and Digital Signature.
  - 4 To provide Symmetric and Asymmetric Algorithms related to Cryptography.
  - 5 To apply the Security Applications in the field of Internet Security Protocols

Unit	Description	Instructional Hours
	<b>INTRODUCTION AND SYMMETRIC CIPHERS</b>	
I	Computer Security Concepts - The OSI Security Architecture - Security attacks, services and mechanisms – A Model for Network Security– Classical Encryption Techniques (Substitution Techniques, Transposition Techniques, Steganography).	9
	<b>SYMMETRIC AND ASYMMETRIC CIPHERS</b>	
II	Fermat's and Euler's Theorems - The Chinese Remainder Theorem – DES – AES - Block Cipher Modes - Public Key Cryptography and RSA	10
	<b>AUTHENTICATION AND HASH FUNCTION</b>	
III	Cryptographic Hash Functions - Applications of Cryptographic Hash Functions - Hash Functions Based on Cipher Block Chaining - Secure Hash Algorithm (SHA)- Message Authentication Codes - Message Authentication Requirements -Message Authentication Functions - MACs Based on Hash Functions: HMAC	9
	<b>MUTUAL TRUST</b>	
IV	Key Management and Distribution: Symmetric Key Distribution Using Symmetric Encryption, Asymmetric Encryption - Distribution of Public Keys - X.509 Certificates	9
	<b>NETWORK AND INTERNET SECURITY PROTOCOLS</b>	
V	Basic Concepts, Secure Sockets Layer (SSL), - Transport Layer Security (TLS) - HTTPS - Secure Shell (SSH) –Electronic mail Security: Pretty Good Privacy (PGP) - S/MIME	8
	<b>Total Instructional Hours</b>	<b>45</b>

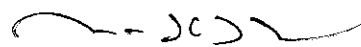
S.No	List of Experiments	Total Instructional Hours
1	Program for Encryption and Decryption using the following Substitution Techniques(i) Ceaser cipher, (ii) Playfair cipher iii) Hill Cipher	
2	Program for DES and RSA algorithm for practical applications.	
3	To Calculate the message digest of a text using the SHA-1 algorithm	
4	Demonstrate intrusion detection system (ids) using any tool e.g. Snort or any other s/w.	
5	Defeating Malware Function: i) Building Trojans ii) Rootkit Hunter	
	<b>Total Instructional Hours</b>	<b>15</b>

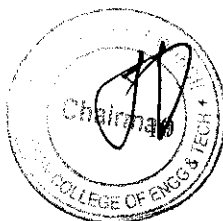
**The student will be able to:**

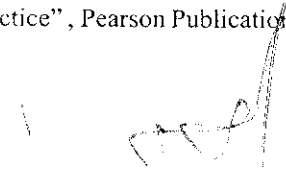
- Course Outcome**
- CO1 Classify the Symmetric Encryption Techniques
  - CO2 Identify the methods used in Symmetric and Asymmetric Ciphers key algorithm.
  - CO3 Evaluate security mechanisms, hash functions and digital signature.
  - CO4 Summarize the intrusion detection and its solutions to overcome the attacks.
  - CO5 Apply Network and Internet security protocols

**TEXT BOOK:**

T1 William Stallings, "Cryptography and Network Security: Principles and Practice", Pearson Publication,

  
Chairman. Board of Studies  
**Chairman - BoS**  
**IT - HICET**



  
Dean-Academics  
**Dean (Academics)**  
**HICET**

(7th Edition), 2017.

T2 Behrouz Forouzan, Debdeep Mukhopadhyay, "Cryptography and Network Security", Tata McGraw Hill Publication, (3rd Edition), 2015.

**REFERENCES:**

R1 Atul Kahate, — "Cryptography and Network Security", Tata McGraw Hill Publication, 2019.


R2 Charles P fleeger, Shari Lawrence P fleeger, Jonathan Margulies, "Security in computing", Pearson Publication, 2018.

R3 Roberta Bragg, Mark Rhodes Ousley, Keith Strassberg, — "Network Security: The Complete Reference", McGraw Hill Publication, 2017.

R4 Kaufman, Perlman and Speciner, "Network Security: Private Communication in a public world", Pearson Publication, 2016.

PO & PSO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	3	3	-	-	-	-	-	-	-	-	1	-	2	2
CO2	3	3	3	-	-	-	-	-	-	-	-	1	-	2	2
CO3	2	3	2	-	-	-	-	-	-	-	-	1	-	1	2
CO4	3	2	3	-	-	-	-	-	-	-	-	1	-	2	2
CO5	2	2	2	-	-	-	-	-	-	-	-	1	-	3	2



  
Chairman, Board of Studies  
**Chairman - BoS**  
**IT - HICET**

  
Dean (Academics)  
**HICET**

Program	Course code	Name of the course	L	T	P	C
B. TECH	21IT6252	DATA SCIENCE (IBM)	3	0	2	4

**The student should be able**

- Course Objective**
- 1 Understand the scientific method for science projects, and the data science team key roles.
  - 2 Acquire technical expertise using popular open-source Such as Apache Hadoop and Apache Spark
  - 3 Big Data Engineering and Spark practices using Scala concepts.
  - 4 Explore Apache Spark industry case studies and Applications.
  - 5 Engage in role-playing challenge-based scenarios to propose real-world solutions.


Unit	Description	Instructional Hours
	<b>INTRODUCTION TO DATA SCIENCE:</b>	
I	Data science Introduction and overview-Data science domains-data science roles-Data science methodology-data analytics lifecycle-Business Analytics-Business Understanding-Data Science Methodology	12
	<b>INTRODUCTION TO SPARK</b>	
II	Big Data-Challenges in Big data- Frameworks-Apache Hadoop-Modules and Components- Installation-Environment Setup-Apache Spark-History-Run Time Architecture-Hadoop vs Spark-Spark Ecosystem -Spark Environment Setup	12
	<b>SPARK FUNDAMENTALS</b>	
III	Spark Libraries-Resilient Distributed Datasets (RDD)-Spark Configuration-Monitoring-Spark Tuning-Spark Web UI-Applications- Apache Spark Core-Unified Stack- Cluster Managers-Big Data Analytics.	12
	<b>INTRODUCTION TO SCALA</b>	
IV	Scala Language-Object Oriented & Function Programming-JVM- Dependencies - Scala Interpreter-IntelliJ IDEA IDE-Variables-Identifiers- Inference & types-Comments -Data Types-Operators-Control Structure-Conditional Statements-Looping	12
	<b>SPARK STREAMING SCALA:</b>	
V	Scala Expressions-Exception Handling-Classes and Methods-Singleton Objects-Functions-Closures-List Literals-List Operations-Sequences-Sets and Maps-Collections- Pattern Matching -Traits-Scala Word Count-Scala Character Count - Analyze Twitter Text-Spark shell-Spark Context	12
<b>Total Instructional Hours</b>		<b>60</b>

S. No


**List of Experiments**

- 1 In-Depth Exploration and Hands-On Examination of the Hadoop Installation Process
- 2 Exploring the Efficient Management of Hadoop Clusters Utilizing Apache Ambari Software
- 3 Investigating File Access and Fundamental Commands in Hadoop Distributed File System (HDFS)
- 4 Analyzing the Efficient Process of Transferring Data into the Hadoop Distributed File System
- 5 Inspecting MapReduce and YARN Jobs: An In-Depth Exploration of Hadoop Job Execution
- 6 Investigating Scala's Efficient Spark RDD Operations for Advanced Data Analysis.
- 7 Delving Hadoop Through the Utilization of Hive for Data Access
- 8 Exploring the Integration of Hive for Enhanced Accessibility to HBase Data
- 9 Development and Implementation of a Basic Pig Script for MapReduce Job Execution

**Total Instruction Hours 60**

  
 Chairman, Board of Studies  
**Chairman - SoS**  
**IT - HICET**



  
 Dean, Academics  
**Dean (Academics)**  
**HICET**

- Course Outcome**
- CO1 Understand the evolution and relevance of Data science in the world today.
  - CO2 Explore Spark use cases using the Big Data lifecycle.
  - CO3 Spark Fundamentals with Data Science.
  - CO4 Gain a Knowledge of Scala Functional Programming language.
  - CO5 Build a Spark Streaming using Scala Function

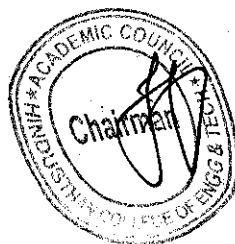
**TEXT BOOK:**

- T1 IBM Data Engine for Hadoop and Spark, by "Dino Quintero, Luis Bolinches, Aditya Gandakusuma Sutandyo"
- T2 "Spark: The Definitive Guide" Author: Bill Chambers, Matei Zaharia

**REFERENCE BOOKS**

- R1 "Scala for the impatient" author: cay s. Horstmann
- R2 "Learning Spark: Lightning-Fast Big Data Analysis" Authors: Holden Karau, Andy Konwinski"
- R3 "Understanding Big Data: Analytics for Enterprise Class Hadoop and Streaming Data" Authors: Dirk deRoos, Chris Eaton, George Lapis, Paul Zikopoulos, Tom Deutsch (IBM)

PO & PSO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	1	3	3	2	0	0	0	3	0	3	0	1	0	0
CO2	3	1	2	2	2	3	0	1	2	0	3	2	1	0	0
CO3	3	2	2	2	2	3	0	1	2	0	2	2	1	0	0
CO4	3	1	2	2	0	3	0	1	0	0	2	2	1	0	0
CO5	3	1	2	1	2	0	0	0	0	0	2	3	1	0	0



*[Signature]*  
 Chairman, Board of Studies  
 Chairman - BoS  
 IT - HICET

*[Signature]*  
 Dean - Academics  
 Dean (Academics)  
 HICET

Programme	Course code	Name of the course	L	T	P	C
B.TECH.	21IT6001	INTERNET OF THINGS LABORATORY	0	0	3	1.5

**The student should be able**

- Course Objective**
- To physically recognize and understand the use cases of different sensors
  - To setup a Raspberry PI board
  - Understand the architecture of IoT solutions
  - Learn about various technologies helping IoT grow
  - Implement an IoT solution practically

**Exp. No Description of the Experiments**

- Case Study
- 1 a) Run some python programs on Pi like:
- 1 b) Read two numbers and print their sum, difference, product and division.
- 1 c) Word and character count of a given string Area of a given shape (rectangle, triangle and circle) reading shape and appropriate values from standard input Print a name 'n' times, where name and n are read from standard input, using for and while loops.
- 1 d) Handle Divided by Zero Exception.
- 1 e) Print current time for 10 times with an interval of 10 seconds.
- 1 f) Read a file line by line and print the word count of eachline.
- 2 Light an LED through Python program
- 3 Read the analog Data through sensors from physical environment (Use MCP3008)
- 4 Access an Image through a Pi webcam
- 5 Control a Light source using webpage
- 6 Machine to Machine Connectivity using MQTT Protocol
- 7 Create a Web Server using RESTFUL API
- 8 Network File Transfer using TCP (Wi-Fi)
- 9 Get the status of a bulb at a remote place (on the LAN) through web.
- 10 Study: Amazon Web Services
- 11 Implement an intruder system that sends an alert to the given mail using Node-Red.

**Total Instructional Hours 45**

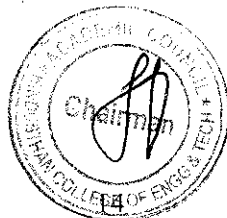
**Course Outcome**


- CO1 Understand constraints and opportunities of wireless and mobile networks for Internet of Things.
- CO2 Analyse real time data stored in a cloud server using data analytics tool.
- CO3 Develop skills to integrate IoT devices
- CO4 Design and implement solutions to IoT based problems.
- CO5 Create an IoT based application

PO & PSO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	1	2	2	-	-	-	-	-	-	1	-	-	-	-	-
CO2	2	2	2	-	-	-	-	-	-	-	-	-	-	-	-
CO3	3	2	3	2	2	2	2	2	3	1	2	-	3	-	1
CO4	3	2	2	2	2	2	-	-	-	-	-	-	-	-	1
CO5	3	3	2	3	2	3	2	2	3	1	2	-	3	3	-

  
Chairman, Board of Studies

**Chairman - 003  
IT - HiCET**



  
Dean-Academics  
**Dean (Academics)  
HiCET**

Programme	Course code	Name of the course	L	T	P	C
B.TECH.	21IT6003	PROJECT BASED LEARNING (Common to IT, CSE, ECE & AIML)	0	0	3	1.5

Course Objective	The student should be able	
	1	To help the students look into the functioning of simple to complex devices and systems
2	To enable the students to design and build simple systems on their own	
3	To help experiment with innovative ideas in design and team work	
4	To create an engaging and challenging environment in the engineering lab	

#### COURSE ASSESSMENT METHODS:

##### DIRECT

1. Project reviews 50%
2. Work book report 10%
3. Demonstration & Viva – voce 40%

##### IN-DIRECT

1. Course-end survey

##### CONTENT:

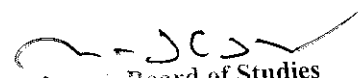
The course will offer the students with an opportunity to gain a basic understanding of computer controlled electronic devices and apply the concepts to design and build simple to complex devices. As a practical project based embedded course, the students will be taught the concepts using a variety of reference material available in the public domain. While the course will start with formal instruction on hardware, programming and applications, the major portion of the course will provide the students with ample opportunity to be innovative in designing and building a range of products from toys to robots and flying machines. In the fifth semester, students will focus primarily on Design and developing a prototype.

##### GUIDELINES:

1. Practical based learning carrying credits.
2. Multi-disciplinary/ Multi-focus group of 5-6 students.
3. Groups can select to work on specific tasks, or projects related to real world problems.
4. Each group has a faculty coordinator/Instructor who will guide/evaluate the overall group as well as individual students.
5. The students have to display their model in the Engineering Clinics Expo at the end of semester.
6. The progress of the course is evaluated based on reviews and final demonstration of prototype.

**Total Instructional Hours                      45**

S.No	Project Title	Technology	Domain
1.	A Gesture-based Tool for Sterile Browsing of Radiology Images	Artificial Intelligence	Health Care
2.	A new hint to transportation - Analysis of the NYC bike share system	Data Analytics	Transport
3.	A Novel Method for Handwritten Digit Recognition System	Artificial Intelligence	Education
4.	AI based discourse for Banking Industry	Artificial Intelligence	Banking & Finance

  
Chairman, Board of Studies  
**Chairman - BoS  
IT - HICET**



  
Dean Academics  
**Dean (Academics)  
HICET**



5.	AI-based localization and classification of skin disease with erythema	Artificial Intelligence	Health Care
6.	AI-powered Nutrition Analyzer for Fitness Enthusiasts	Artificial Intelligence	Health Care
7.	Airlines Data Analytics for Aviation Industry	Data Analytics	Logistic &Transport
8.	Analytics for Hospitals Health-Care Data	Data Analytics	Health Care
9.	Car Resale value Prediction	Applied Data Science	Retails & E-Commerce
10.	Classification of Arrhythmia by Using Deep Learning with 2-D ECG Spectral Image Representation	Artificial Intelligence	Health Care
11.	Containment Zone Alerting Application	Cloud Application Development	Logistic &Transport
12.	Corporate Employee Attrition Analytics	Data Analytics	Banking & Finance
13.	Crude Oil Price Prediction	Artificial Intelligence	Retails & E-Commerce
14.	Customer Care Registry	Cloud Application Development	Retails & E-Commerce
15.	Deep Learning Fundus Image Analysis for Early Detection of Diabetic Retinopathy	Artificial Intelligence	Health Care
16.	Detecting Parkinsons Disease using Machine Learning	Applied Data Science	Health Care
17.	Developing a Flight Delay Prediction Model using Machine Learning	Applied Data Science	Logistic &Transport
18.	Early Detection of Chronic Kidney Disease using Machine Learning	Applied Data Science	Health Care
19.	Efficient Water Quality Analysis and Prediction using Machine Learning	Applied Data Science	Water
20.	Emerging Methods for Early Detection of Forest Fires	Artificial Intelligence	Climate Change
21.	Exploratory Analysis of Rain Fall Data in India for Agriculture	Applied Data Science	Rural & Agriculture Development
22.	Fertilizers Recommendation System For Disease Prediction	Artificial Intelligence	Banking & Finance
23.	Gas Leakage Monitoring And Alerting System	Internet Of Things (IoT)	Safety
24.	Hazardous Area Monitoring For Industrial Plant Powered By IoT	Internet Of Things (IoT)	Safety
25.	Industry-Specific Intelligent Fire Management System	Internet Of Things (IoT)	Safety
26.	Intelligent Vehicle Damage Assessment and Cost Estimator for Insurance Companies	Artificial Intelligence	Banking & Finance
27.	Inventory Management System for Retailers	Cloud Application Development	Retails & E-Commerce
28.	IoT Based Safety Gadget For Child Safety Monitoring And Notification	Internet Of Things (IoT)	Safety
29.	IoT Based Smart Crop Protection System For Agriculture	Internet Of Things (IoT)	Rural & Agriculture Development
30.	Machine Learning based Vehicle Performance Analyzer	Applied Data Science	Logistic &Transport
31.	Natural Disasters Intensity Analysis and Classification using Artificial Intelligence	Artificial Intelligence	Climate Change
32.	News Tracker Application	Cloud Application Development	Education
33.	Nutrition Assistant Application	Cloud Application	Health Care

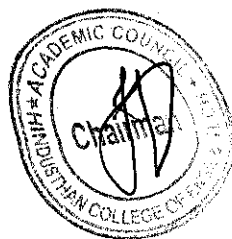
Chairman, Board of Studies  
**Chairman - BoS**  
**IT - HICET**



Dean - Academics  
**Dean (Academics)**  
**HICET**

Sl. No.	Project Name	Technology	Domain
34.	Personal Assistance For Seniors Who Are Self-Reliant	Internet Of Things (IoT)	Accessibility & Assistance
35.	Personal Expense Tracker Application	Cloud Application Development	Banking & Finance
36.	Plasma Donor Application	Cloud Application Development	Education
37.	Real-Time Communication System Powered by AI for Specially Abled	Artificial Intelligence	Health Care
38.	Real-Time River Water Quality Monitoring And Control System	Internet Of Things (IoT)	Water
39.	Retail Store Stock Inventory Analytics	Data Analytics	Logistics
40.	Signs With Smart Connectivity For Better Road Safety	Internet Of Things (IoT)	Safety
41.	Skill and Job Recommender	Cloud Application Development	Education
42.	Smart Fashion Recommender Application	Cloud Application Development	Retails & E-Commerce
43.	Smart Lender - Applicant Credibility Prediction for Loan Approval	Applied Data Science	Banking & Finance
44.	Smart Solutions For Railways	Internet Of Things (IoT)	Logistic & Transport
45.	Smart Waste Management System For Metropolitan Cities	Internet Of Things (IoT)	Climate Change
46.	SmartFarmer - IoT Enabled Smart Farming Application	Internet Of Things (IoT)	Smart Farming
47.	Trip Based Modeling of Fuel Consumption in Modern Fleet Vehicles Using Machine Learning	Applied Data Science	Climate Change
48.	University Admit Eligibility Predictor	Applied Data Science	Education
49.	VirtualEye - Life Guard for Swimming Pools to Detect Active Drowning	Artificial Intelligence	Safety
50.	Visualizing and Predicting Heart Diseases with an Interactive Dash Board	Data Analytics	Health Care
51.	Web Phishing Detection	Applied Data Science	Cyber Security

PO & PSO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	1	3	3	2	1	1	1	3	2	3	1	1	1	1
CO2	3	1	2	2	2	3	1	1	2	2	3	2	1	1	1
CO3	3	2	2	2	2	3	1	1	2	2	2	2	1	1	1
CO4	3	1	2	2	1	3	1	1	1	2	2	2	1	1	1
CO5	3	1	2	1	2	1	1	1	1	2	2	3	1	1	1



17

Chairman, Board of Studies  
**Chairman - BoS**  
**IT - HICET**

Dean - Academics  
**Dean (Academics)**  
**HICET**


Programme	Course Code	Course Title	L	T	P	C
BE/BTECH	21HE6071	SOFT SKILLS - II	0	0	0	1

- Course Objectives:**
1. To make the students aware of the importance, the role and the content of softskills through instruction, knowledge acquisition, demonstration and practice.
  2. To learn everything from equations to probability with a completely different approach.
  3. To make the students learn on an increased ability to explain the problem comprehensively.


Unit	Description	Instructional Hours
I	<b>Group Discussion &amp; Presentation Skills:</b> GD skills – Understanding the objective and skills tested in a GD – General types of GDs – Roles in a GD – Do’s & Don’ts – Mock GD & Feedback.- Presentation Skills – Stages involved in an effective presentation – selection of topic, content, aids – Engaging the audience – Time management – Mock Presentations & Feedback	7
II	<b>Interview Skills and Personality Skills:</b> Interview handling Skills – Self preparation checklist – Grooming tips: do’s & don’ts – mock interview & feedback - Interpersonal skills-creative thinking-problem solving-analytical skills	5
III	<b>Business Etiquette &amp; Ethics:</b> Etiquette – Telephone & E-mail etiquette – Dining etiquette – do’s & Don’ts in a formal setting – how to impress. Ethics – Importance of Ethics and Values – Choices and Dilemmas faced – Discussions from news headlines.	6
IV	<b>Quantitative Aptitude:</b> Permutation, Combination - Probability - Logarithm - Quadratic Equations - Algebra - Progression - Geometry - Mensuration.	6
V	<b>Logical Reasoning:</b> Logical Connectives - Syllogisms - Venn Diagrams – Cubes - Coded inequalities - Conditions and Grouping	6
<b>Course Outcome:</b>	CO1: Students will have learnt to keep going according to plan, coping with the unfamiliar, managing disappointment and dealing with conflict.	
	CO2: Students will Actively participate meetings. Group Discussions / interviews and prepare & deliver presentations	
	CO3: Students will define professional behavior and suggest standards for appearance, actions and attitude in a Business environment	
	CO4: Students will be able to apply quantitative reasoning and mathematical analysis methodologies to understand and solve problems.	
	CO5: Students will excel in complex reasoning.	

#### REFERENCE BOOKS:

- R1: Bridging the Soft Skills Gap: How to Teach the Missing Basics to Today's Young Talent- Bruce Tulgan  
R2: Quantitative Aptitude for Competitive Examinations (5th Edition) - Abhjit Guha  
R3: How to crack test of Reasoning - Jaikishan and Premkishan  
R4: The hand on guide to Analytical Reasoning and Logical Reasoning - Peeyush Bhardwaj

  
Chairman, Board of Studies  
**Chairman - BoS**  
**IT - HiCET**



  
Dean - Academics  
**Dean (Academics)**  
**HiCET**

Programme	Course code	Name of the course	L	T	P	C
B.E.	21HE6072	INTELLECTUAL PROPERTY RIGHTS (IPR)	1	0	0	1

**The student should be able**

**Course Objective**

1. To introduce fundamental aspects of Intellectual property Rights to students who are going to play a major role in development and management of innovative projects in industries.
2. To disseminate knowledge on patents, patent regime in India and abroad and registration aspects.
3. To disseminate knowledge on copyrights and its related rights and registration aspects.
4. To disseminate knowledge on trademarks and registration aspects.
5. To disseminate knowledge on Design, Geographical Indication (GI) and their registration aspects.

Unit	Description	Instructional Hours
	<b>INTRODUCTION TO INTELLECTUAL PROPERTY</b>	
I	Introduction, Types of Intellectual Property, International Organizations, Agencies and Treaties, Importance of Intellectual Property Rights.	3
	<b>PATENTS</b>	
II	Patents -Elements of Patentability: Novelty, Non-Obviousness (Inventive Steps), Industrial Application -Non - Patentable Subject Matter -Registration Procedure, Rights and Duties of Patentee, Assignment and license.	3
	<b>COPYRIGHTS</b>	
III	Purpose And Function Of Trade Marks, Acquisition Of Trade Mark Rights, Protectable Matter, Selecting And Evaluating Trade Mark, Trade Mark Registration Processes.	3
	<b>TRADEMARKS</b>	
IV	Concept of Trademarks -Different kinds of marks (brand names, logos, signatures, symbols, well known marks, certification marks and service marks) -Non-Registrable Trademarks -Registration of Trademarks.	3
	<b>DESIGN AND GEOGRAPHICAL INDICATION</b>	
V	Design: meaning and concept of novel and original -Procedure for registration. Geographical indication: meaning, and difference between GI and trademarks - Procedure for registration.	3
	<b>Total Instructional Hours</b>	<b>45</b>

Upon completion of the course, the students will be able to:

**Course Outcome**

- CO1: Identify different types of Intellectual Properties (IPs), the right of ownership, scope of protection as well as the ways to create and to extract value from IP.
- CO2: Recognize the crucial role of IP in organizations of different industrial sectors for the purposes of product and technology development.
- CO3: Identify, apply and assess ownership rights and marketing protection under intellectual property law as applicable to information, ideas, new products and product marketing.
- CO4: Identify different types of trademarks and procedure for registration
- CO5: Recognize the concept of design, geographical indication and procedure for registration.

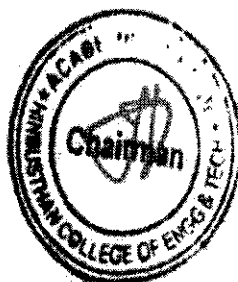
**TEXT BOOK:**

- T1 Neeraj, P., & Khusdeep, D. (2014). Intellectual Property Rights. India, IN: PHI learning Private Limited.
- T2 Scople Vinod, Managing Intellectual Property, Prentice Hall of India pvt. Ltd, 2012.

**REFERENCES:**

- R1 Ahuja, V K. (2017). Law relating to Intellectual Property Rights. India, IN: Lexis Nexis.
- R2 Derek Bosworth and Elizabeth Webster, The Management of Intellectual Property, Edward Elgar Publishing Ltd., 2013.

*H*  
Chairman, Board of Studies  
Chairman - BoS  
MECH - HICET



*[Signature]*  
Dean - Academics  
Dean (Academics)  
HICET

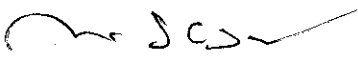
**PROFESSIONAL  
ELECTIVES  
SYLLABUS**

**PROFESSIONAL ELECTIVE II**


Programme	Course code	Name of the course	L	T	P	C
B.TECH.	21IT6301	BUSINESS INTELLIGENCE AND ANALYSIS	3	0	0	3

Course Objective	The student should be able	
	1	To Understand of Decision-Making, Practices of Business Intelligence.
	2	To Design and Build Bi Applications Based on Users Needs
	3	To Demonstrate the Limitations and Possibilities of Bi Technology
	4	To Understand the Concept of Business Intelligent Models.
	5	To Analyze the Business Environment with Related Tools.

Unit	Description	Instructional Hours
I	<b>Business Intelligence an Introduction:</b> Introduction, Definition, History and Evolution, Business Intelligence Segments, Difference between Information and Intelligence, Defining Business Intelligence Value Chain, Factors of Business Intelligence System, Real time Business Intelligence, Business Intelligence Applications, Types of Business Intelligence, Business Intelligence Platform, Dynamic roles in Business Intelligence, Roles of Business Intelligence in Modern Business- Challenges of BI.	9
II	<b>Architecting the Data:</b> Introduction, Enterprise Data and Subject Area Model, Enterprise Conceptual Model, Total Data Quality Management (TDQM). Definition of Data Mining, Data mining parameters, Statistical Perspective on Data Mining, Statistics-need, Similarity Measures, Decision Tree-Illustrations, Neural Network, Neural Network versus Conventional Computers, Data Warehouse, Data Mart, Aspects of Data Mart, Online Analytical Processing, Characteristics of OLAP, OLAP Tools, Data Modeling using Star Schema and Snowflake Schema.	9
III	<b>Types of Business Models:</b> B2B Business Intelligence Model, Electronic Data Interchange & E- Commerce Models, Systems for Improving B2B E-Commerce, B2C Business Intelligence Model, Need of B2C model in Data warehousing, Different types of B2B intelligence Models Knowledge Management: Characteristics of Knowledge Management, Knowledge assets, Generic Knowledge Management Process, Essentials of Knowledge Management Process.	9
IV	<b>Data Extraction:</b> Introduction, Data Extraction, Role of ETL process, Importance of source identification, Various data extraction techniques, Change data capture Business Intelligence Life Cycle: Introduction, Business Intelligence Lifecycle, Enterprise Performance Life Cycle (EPLC) Framework Elements, Life Cycle Phases, Human Factors in BI Implementation, BI Development Stages and Steps, Parallel Development Tracks, BI Framework.	9
V	<b>Business Intelligence User Model:</b> Business Intelligence Opportunity Analysis Overview, Content Management System, End User Segmentation, Basic Reporting and Querying, Online Analytical Processing, OLAP Techniques, Benefits of using OLAP, Dashboard, Advanced/Emerging BI Technologies, Organization Culture, Managing Total Cost of Ownership for Business Intelligence, Total Cost of Ownership and Business Intelligence, Managing the TCO of the Business Intelligence, Factors that Affect Total Cost of Ownership.	9
<b>Total Instructional Hours</b>		<b>45</b>

  
Chairman, Board of Studies



  
Dean-Academics  
**Dean (Academics)**  
**HICET**

<b>Course Outcome</b>	CO1	Demonstrate knowledge about and understanding of organizational and individual decision-making and future trends of BI.
	CO2	Implement the concept of big data and analytics, data visualization techniques.
	CO3	Demonstrate the ability to use BI systems and technology to design and build BI applications based on users' needs
	CO4	Apply relevant theories, concepts and techniques to solve real-world BI problems
	CO5	Critically evaluate the limitations and possibilities of BI technology

**TEXT BOOK:**

- T1 Jena R K, IT & Business Intelligence 1st Edition, Excel Books-2015.  
 T2 Mike Davis, Patrick LeBlanc, Knight's Microsoft Business Intelligence 24-Hour Trainer John Wiley & Sons, 2011.

**REFERENCES:**

- R1 Ramesh Sharda, Dursun Delen, Business Intelligence: A Managerial Perspective on Analytics, 3<sup>rd</sup> Edition, Pearson, 2010

PO & PSO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	3	3	-	-	-	-	3	3	-	2	3	2	2	2
CO2	3	3	3	2	-	-	2	1	2	-	2	3	1	1	1
CO3	3	3	3	1	3	-	2	-	1	-	2	3	3	2	1
CO4	3	3	3	2	3	-	2	1	2	1	2	3	3	2	1
CO5	3	3	3	2	3	-	3	2	1	1	2	3	3	2	2



*[Signature]*  
 Chairman, Board of Studies  
 Chairman - BOS  
 IT - HICET

*[Signature]*  
 Dean - Academics  
 Dean (Academics)  
 HICET

Programme	Course code	Name of the course	L	T	P	C
BE/B.Tech	21IT6302	INFORMATION SECURITY	3	0	0	3

The student should be made to

- |                         |   |                                                                          |
|-------------------------|---|--------------------------------------------------------------------------|
| <b>Course Objective</b> | 1 | Understand the basics of Information Security and its components         |
|                         | 2 | Know the legal, ethical and professional issues in Information Security. |
|                         | 3 | Gain knowledge on access control, IDS and internet security.             |
|                         | 4 | Acquire in-depth knowledge of E-mail and IP Security                     |
|                         | 5 | Explore the requirements of web security, protocols and applications.    |

Unit	Description	Instructional Hours
<b>I INTRODUCTION</b>	History, What is Information Security?, Critical Characteristics of Information, NSTISSC Security Model, Components of an Information System, Securing the Components, Balancing Security and Access, The SDLC, The Security SDLC.	9
<b>II SECURITY INVESTIGATION</b>	Need for Security, Business Needs, Threats, Attacks, Legal, Ethical and Professional Issues - An Overview of Computer Security - Access Control Matrix, Policy-Security policies, Confidentiality policies, Integrity policies and Hybrid policies.	9
<b>III SECURITY TECHNOLOGY</b>	Introduction, Access Control: Identification-Authentication-Authorization-Accountability. Firewalls: Processing Modes-Generation-Architectures. Intrusion Detection and Prevention Systems-Types of IDPS. Honeypots, Honeynets and Padded Cell Systems-Scanning and Analysis Tools-Biometric access controls.	9
<b>IV E-MAIL AND IP SECURITY</b>	E-mail and IP Security: Electronic mail security: Email Architecture -PGP – Operational Descriptions- Key management- Trust Model- S/MIME.IP Security: Overview- Architecture - ESP, AH Protocols IPsec Modes – Security association - Key management.	9
<b>V WEB SECURITY</b>	Web Security: Requirements- Secure Sockets Layer- Objectives-Layers -SSL secure communication-Protocols - Transport Level Security. Secure Electronic Transaction- Entities DS Verification-SET processing.	9
<b>Total Instructional Hours</b>		<b>45</b>

Upon successful completion of this course, students will be able to:

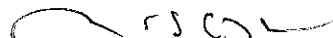
- |                       |     |                                                                           |
|-----------------------|-----|---------------------------------------------------------------------------|
| <b>Course Outcome</b> | CO1 | Outline the basics of data and information security.                      |
|                       | CO2 | Recognize legal, ethical and professional issues in information security. |
|                       | CO3 | Distinguish the various security technologies and its components.         |
|                       | CO4 | Comprehend various security practices and system security standards.      |
|                       | CO5 | Asses the vital web security protocols for E-Commerce applications.       |

**TEXT BOOK:**


- T1 Michael E Whitman and Herbert J Mattord, "Principles of Information Security", Course Technology, 6th Edition, 2017 (Unit-I, II, III).  
T2 Stallings William, "Cryptography and Network Security: Principles and Practice", Pearson Education, 7th Edition, 2017 (Unit-IV, V).

**REFERENCES:**

- R1 Harold F. Tipton, Micki Krause Nozaki, "Information Security Management Handbook", Volume 6, Auerbach Publications, 2016.  
R2 Matt Bishop, "Computer Security Art and Science", Addison Wesley Reprint Edition, 2015.  
R3 Behrouz A Forouzan. Debdeep Mukhopadhyay, "Cryptography And network security", McGraw-Hill Education, 3rd Edition, 2015.  
R4 Stuart McClure, Joel Scrambray, George Kurtz, "Hacking Exposed", McGraw- Hill, 7th Edition, 2012.

  
Chairman, Board of Studies

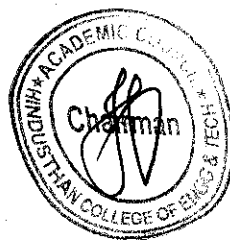


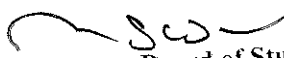
  
Dean-Academics


Dean (Academics)  
NICET



PO & PSO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	2	1	1	1	-	1	2	1	-	-	-	3	3	2
CO2	3	3	2	1	1	1	2	3	1	-	-	-	3	3	2
CO3	3	2	2	1	1	-	2	3	1	-	-	-	3	3	2
CO4	3	2	2	1	1	1	2	3	1	-	-	-	3	3	2
CO5	3	2	1	1	1	-	2	3	1	-	-	-	3	3	2



  
 Chairman, Board of Studies  
**Chairman - BoS**  
**IT - HICET**

  
 Dean-Academics  
**Dean (Academics)**  
**HICET**

Programme	Course code	Name of the course	L	T	P	C
B.TECH.	21IT6303	SOFTWARE DESIGN	3	0	0	3

Course Objective	The student should be able	

- 1 To provide basic understanding on design and its fundamentals
- 2 To understand the software design principles
- 3 To learn various design methodologies
- 4 To understand the various software architectural design
- 5 To develop design using different styles.

Unit	Description	Instructional Hours
	<b>DESIGN FUNDAMENTALS:</b>	
I	The Basic Concepts of Design – Characteristics of Design Activities – Essential Elements of Design – The Factors that Affect the Design -Design Principles: Basic Rules of Software Design – Design Processes.	9
	<b>SOFTWARE DESIGN PRINCIPLES:</b>	
II	The Nature of the Design Process - The Software Design Process -Design in the Software Development Process - Design Qualities.	9
	<b>DESIGN METHODOLOGIES:</b>	
III	Design Practices – Stepwise Refinement – Incremental Design – Structured System Analysis and Design – Jackson Structured Programming – Jackson System Development – Designing with Objects – Component-Based Design.	9
	<b>SOFTWARE ARCHITECTURE DESIGN:</b>	
IV	Notion of Architecture – Notion of Software Architecture - Architectural Styles – Description of Software Architecture –Visual Notation – Examples.	9
	<b>ARCHITECTURAL DESIGN:</b>	
V	Typical Architectural Design – Data Flow – Independent Components – Call and Return – Using Styles in Design – Choices of Style – Combination of Styles – Architectural Design Space – Theory of Design Spaces – Design Space of Architectural Elements – Design Space of Architectural Styles.	9
	<b>Total Instructional Hours</b>	<b>45</b>
Course Outcome	CO1	Design the Software using Designs Fundamentals and Methodologies.
	CO2	To create a Good Software by using the Styles, Architectural Design space.
	CO3	To reconstruct the Software Architecture that can be used for an Application of your choice.
	CO4	Analyse Specifications and Identify appropriate Design Strategies.
	CO5	Develop an appropriate Design for a given set of Requirements.

**TEXT BOOK:**

- T1 David Budgen, "Software Design", Pearson Publication, Second Edition, 2011. (Unit II, UnitIII).  
T2 Hong Zhu, —Software Design Methodology from Principles to Architectural Styles, Elsevier,

**REFERENCES:**

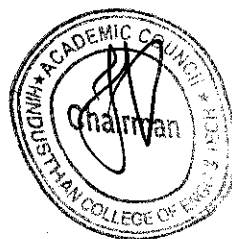
- R1 Eric J. Braude, Software Design: From Programming to Architecture, Wiley, 2017.  
R2 Carlos Otero, "Software Engineering Design: Theory and Practice", CRC Press, 2012.  
R3 Hassan Gomaa, "Software Modeling and Design", Cambridge University Press, 2011.  
R4 John Robinson, Software Design for Engineers and Scientists, Newnes, 2004.





*[Signature]*  
Chairman, Board of Studies  
**Chairman - BOS**  
**IT - HICET**

*[Signature]*  
Dean—Academics  
**Dean (Academics)**  
**HICET**

PO & PSO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	3	3	3	2	2	1	-	2	-	2	2	3	3	2
CO2	3	3	3	3	2	2	1	-	2	-	2	2	3	3	2
CO3	3	3	3	3	2	2	1	-	2	-	2	2	3	3	2
CO4	3	3	3	3	2	2	1	-	2	-	2	2	3	3	2
CO5	3	3	3	3	2	2	1	-	2	-	2	2	3	3	2



  
 Chairman, Board of Studies  
**Chairman - BoS**  
**IT - HICET**

  
 Dean (Academics)  
**HICET**

Programme	Course code	Name of the course	L	T	P	C
B.TECH.	21IT6304	NATURAL LANGUAGE PROCESSING	3	0	0	3

Course Objective	The student should be able					
		1	To understand the basics of NLP.			
	2	To provide knowledge of various levels of analysis involved in NLP				
	3	To study about Semantic Analysis and Discourse Processing.				
	4	To gain knowledge in automated Natural Language Generation and Machine Translation				
	5	To learn the concepts of Retrieving Information and Resources				

Unit	Description	Instructional Hours
	<b>OVERVIEW AND LANGUAGE MODELING</b>	
I	Origins and challenges of NLP-Language and Grammar-Processing Indian Languages-NLP Applications-Information Retrieval- Language Modeling Introduction-Variou Grammar-based Language Models- Statistical Language Model	9
	<b>WORD LEVEL AND SYNTACTIC ANALYSIS</b>	
II	Introduction-Regular Expressions-Finite-State Automata orphological Parsing-Spelling Error Detection and Correction-Words and Word classes Part-of Speech Tagging. Syntactic Analysis Introduction-Context-free Grammar-Constituency-Parsing-Probabilistic Parsing	9
	<b>SEMANTIC ANALYSIS AND DISCOURSE PROCESSING</b>	
III	Introduction- Meaning Representation-Lexical Semantics-Ambiguity- Word Sense Disambiguation- Discourse Processing Introduction – Cohesion – Reference – Resolution - Discourse Coherence and Structure	9
	<b>NATURAL LANGUAGE GENERATION AND MACHINE TRANSLATION</b>	
IV	Introduction-Architecture of NLG Systems-Generation Tasks and Representations-Application of NLG-Machine Translation Introduction-Problems in Machine Translation-Characteristics of Indian Languages-Machine Translation Approaches-Translation involving Indian Languages	9
	<b>INFORMATION RETRIEVAL AND LEXICAL RESOURCES</b>	
V	Introduction-Design features of Information Retrieval Systems-Classical, Non-classical, Alternative Models of Information Retrieval – Evaluation - Lexical Resources Introduction-WordNet-Frame Net- Stemmers-POS Tagger-Research Corpora	9
	<b>Total Instructional Hours</b>	<b>45</b>


Course Outcome	CO1	CO2	CO3	CO4	CO5
	Able to understand the basics of NLP	Analyse the Natural Language Text.	Understand Semantic Analysis and Discourse Processing	Generate the Natural Language and do Machine Translation.	Apply Information Retrieval Techniques
					Apply Information Retrieval Techniques

**TEXT BOOK:**


- T1 Tanveer Siddiqui, U.S. Tiwary, Natural Language Processing and Information Retrieval, Oxford University Press (Third Edition),2008.  
T2 Steven Bird, Ewan Klein and Edward Loper, Natural Language Processing with Python,

**REFERENCES:**

- R1 Daniel Jurafsky and James H Martin, Speech and Language Processing: An introduction to Natural Language Processing, Computational Linguistics and Speech Recognition], Prentice Hall (3rd Edition), 2019.

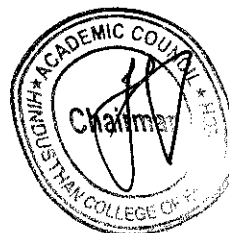
  
Chairman, Board of Studies  
**Chairman - BoS**  
**IT - HiCET**



  
Dean - Academics  
**Dean (Academics)**  
**HiCET**

- R2 Breck Baldwin, Language Processing with Java and LingPipe Cookbook, Atlantic Publisher, 2015.
- R3 Richard M Reese, Natural Language Processing with Javal, OReilly Media, 2015.
- R4 Nitin Indurkha and Fred J. Damerau, Handbook of Natural Language Processing, Chapman and Hall/CRC Press (Second Edition,), 2010.
- R5 James Allen, Benjamin-Cummings, —Natural Language Understanding, Pearson Education( 2nd Edition), 2007

PO & PSO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	-	3	2	2	2	-	-	-	2	-	-	2	2	2	2
CO2	-	3	2	3	2	2	-	-	2	2	-	2	3	3	2
CO3	-	3	3	2	3	2	-	-	2	2	-	2	3	3	2
CO4	-	1	1	2	3	2	2	1	2	2	1	2	3	3	2
CO5	-	1	1	2	3	2	2	2	2	-	3	2	3	2	2



*[Signature]*  
 Chairman, Board of Studies  
**Chairman - BoS**  
**IT - HICET**

*[Signature]*  
 Dean - Academics  
**Dean (Academics)**  
**HICET**

Programme	Course code	Name of the course	L	T	P	C
B.TECH.	21IT6305	SOFT COMPUTING	3	0	0	3

**The student should be able**

**Course Objective**

- 1 Learn the various Soft Computing Frameworks
- 2 Be familiar with design of various Neural Networks
- 3 Be exposed to Fuzzy Logic
- 4 Gain knowledge about Genetic Programming.CO5: Be exposed to Hybrid Systems
- 5 Be exposed to Hybrid Systems

Unit	Description	Instructional Hours
	<b>INTRODUCTION TO SOFT COMPUTING</b>	
I	Introduction-Artificial Intelligence-Artificial Neural Networks-Fuzzy Systems- Genetic Algorithm and Evolutionary Programming-Swarm Intelligent Systems- Classification of ANNs-McCulloch and Pitts Neuron Model-Learning Rules: Hebbian and Delta- Perceptron Network-Adaline Network- Madaline Network.	9
	<b>ARTIFICIAL NEURAL NETWORKS</b>	
II	Back propagation Neural Networks - Kohonen Neural Network - Learning Vector Quantization -Hamming Neural Network – Hopfield Neural Network- Bi-directional Associative Memory - Adaptive Resonance Theory Neural Networks- Support Vector Machines - Spike Neuron Models.	9
	<b>FUZZY SYSTEMS</b>	
III	Introduction to Fuzzy Logic, Classical Sets and Fuzzy Sets - Classical Relations and Fuzzy Relations-Membership Functions -Defuzzification - Fuzzy Arithmetic and Fuzzy Measures -Fuzzy Rule Base and Approximate Reasoning - Introduction to Fuzzy Decision Making.	9
	<b>GENETIC ALGORITHMS</b>	
IV	Basic Concepts- Working Principles -Encoding- Fitness Function - Reproduction – Inheritance Operators - Cross Over - Inversion and Deletion -Mutation Operator - Bit-wise Operators - Convergence of Genetic Algorithm.	9
	<b>HYBRID SYSTEMS</b>	
V	Hybrid Systems -Neural Networks, Fuzzy Logic and Genetic -GA Based Weight Determination - LR-Type Fuzzy Numbers - Fuzzy Neuron - Fuzzy BP Architecture - Learning in Fuzzy BP- Inference by Fuzzy BP - Fuzzy Art Map: A Brief Introduction - Soft Computing Tools	9
	<b>Total Instructional Hours</b>	<b>45</b>

**Course Outcome**

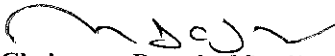
- CO1 Apply various Soft Computing Frameworks.
- CO2 Design of various Neural Networks.
- CO3 Use Fuzzy Logic for Real Time Applications..
- CO4 Discuss Genetic Programming
- CO5 Assess Hybrid Soft Computing techniques

**TEXT BOOK:**

- T1 S.N.Sivanandam and S.N.Deepa, "Principles of Soft Computing", Wiley India Pvt Ltd, Thirdedition 2018.
- T2 S.Rajasekaran, G.A.Vijayalakshmi Pai, "Neural Networks, Fuzzy Logic and Genetic Algorithm,

**REFERENCES:**

- R1 James M. Keller, Derong Liu, David B. Fogel, —Fundamentals of Computational Intelligence:Neural Networks, Fuzzy Systems, and Evolutionary Computationl, Wiley-IEEE Press, 2016.
- R2 J.S.R.Jang, C.T. Sun and E.Mizutani, —Neuro-Fuzzy and Soft Computing, PHI / Pearson

  
Chairman, Board of Studies  
**Chairman - BoS**  
**IT - HICET**

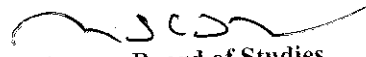


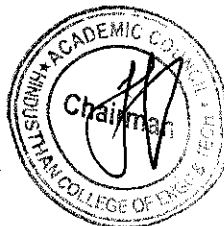
  
Dean - Academics  
**Dean (Academics)**  
**HICET**


Education 2015.

- R3 N.P.Padhy, S.P.Simon, "Soft Computing with MATLAB Programming", Oxford University Press, 2015.  
R4 Melanie Mitchell, —Introduction to Genetic Algorithms PHI Learning, 2002

PO & PSO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	2	2	2	2	-	-	-	-	-	-	1	1	1	1
CO2	2	1	2	1	2	-	-	-	-	-	-	1	1	3	3
CO3	2	1	2	1	2	-	-	-	-	-	-	1	1	2	2
CO4	3	3	3	1	2	-	-	-	-	-	-	1	3	3	3
CO5	3	3	2	3	2	-	-	-	-	-	-	1	2	2	2

  
Chairman, Board of Studies  
**Chairman - BoS**  
**IT - HICET**



  
Dean - Academics  
**Dean (Academics)**  
**HICET**

Programme	Course code	Name of the course	L	T	P	C
B.TECH.	21IT6307	VIRTUAL REALITY AND AUGMENTED REALITY	3	0	0	3

**The student should be able**

- |                         |   |                                                                                                               |
|-------------------------|---|---------------------------------------------------------------------------------------------------------------|
| <b>Course Objective</b> | 1 | To introduce the concept of basic input output devices used in VR technology.                                 |
|                         | 2 | To give an insight on the various modelling techniques used for VR development process.                       |
|                         | 3 | To explore the methodology and terminologies used for content creation in VR.                                 |
|                         | 4 | To understand the possible applications of virtual reality and augmented reality in engineering applications. |
|                         | 5 | To know the basic building blocks of the VR on mobile and web.                                                |

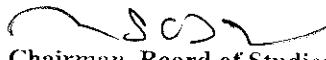
Unit	Description	Instructional Hours
	<b>INPUT/ OUTPUT DEVICES</b>	
I	The three I's of virtual reality-commercial VR technology and the five classic components of a VR system - Input Devices: Three-dimensional position trackers, navigation and manipulation-interfaces and gesture interfaces-Output Devices: Graphics displays-sound displays & haptic feedback.	9
	<b>VR DEVELOPMENT PROCESS</b>	
II	Geometric modeling - kinematics modeling- physical modeling -behavior modeling - model Management.	9
	<b>CONTENT CREATION CONSIDERATIONS FOR VR</b>	
III	Methodology and terminology-user performance studies-VR health and safety issues-Usability of virtual reality system- cyber sickness -sideeffects of exposures to virtual reality environment	9
	<b>VR ON THE WEB &amp; VR ON THE MOBILE</b>	
IV	JS-pros and cons-building blocks (WebVR, WebGL, Three.js, deviceorientation events)- frameworks (A-frame, React VR)-Google VR for Android-Scripts, mobile device configuration, building to android- cameras and interaction-teleporting-spatial audio-Assessing human parameters-device development and drivers-Design Haptics	9
	<b>APPLICATIONS</b>	
V	Medical applications-military applications-robotics applications- Advanced Real time Tracking other applications- games, movies, simulations, therapy	9
	<b>Total Instructional Hours</b>	<b>45</b>
<b>Course Outcome</b>	CO1	Select the appropriate input output device for an application.
	CO2	Apply the suitable modelling for the given problem statement
	CO3	Design appropriate VR content for an application.
	CO4	Construct the building blocks for VR in mobile and web.
	CO5	Analyse & Design VR systems for various applications

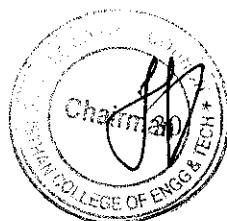
**TEXT BOOK:**

- T1 C. Burdea & Philippe Coiffet, "Virtual Reality Technology", Second Edition, Gregory, JohnWiley & Sons, Inc.,2008.
- T2 Jason Jerald. 2015. The VR Book: Human-Centered Design for Virtual Reality. Association for Computing Machinery and Morgan & Claypool, New York, NY, USA.

**REFERENCES:**

- R1 Augmented Reality: Principles and Practice (Usability) by Dieter Schmalstieg & Tobias Hollerer, Pearson Education (US), Addison-Wesley Educational Publishers Inc. New Jersey, United States, 2016. ISBN: 9780321883575

  
Chairman, Board of Studies  
**Chairman - BoS**  
**IT - HICET**



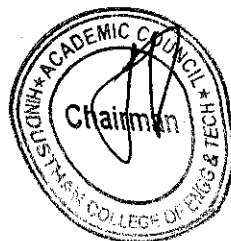
  
Dean-Academics

**Dean (Academics)**  
**HICET**



- R2 Practical Augmented Reality: A Guide to the Technologies, Applications, and Human Factors for AR and VR (Usability), Steve Aukstakalnis, Addison-Wesley Professional; 1 edition, 2016.
- R3 Learning Virtual Reality: Developing Immersive Experiences and Applications for Desktop, Web, and Mobile, Tony Parisi, O'Reilly Media; 1 edition, 2015
- R4 Programming 3D Applications with HTML5 and WebGL: 3D Animation and Visualization for Web Pages, Tony Parisi, O'Reilly Media; 1 edition, 2014.

PO&PSO	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO3
CO1	2	-	-	-	-	-	-	-	-	-	2	-	2	2	2
CO2	3	-	2	-	3	-	-	-	1	-	1	-	2	2	2
CO3	3	3	3	2	3	-	-	-	1	-	2	-	2	2	2
CO4	3	3	3	2	2	-	-	-	1	-	3	-	2	-	2
CO5	3	3	3	2	2	-	-	-	1	-	1	-	2	2	2



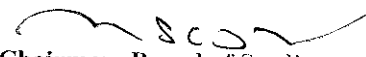
*[Signature]*  
 Chairman, Board of Studies  
**Chairman - BOS**  
**IT - HICET**

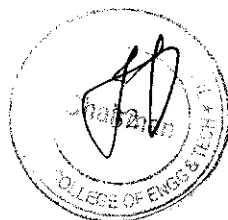
*[Signature]*  
 Dean - Academics  
**Dean (Academics)**  
**HICET**


Programme	Course code	Name of the course	L	T	P	C
B.TECH.	21IT6308	WEB DEVELOPMENT – I	0	0	3	3

- Course Objective**
- The student should be able**
- 1 To build web applications using the Express.js framework
  - 2 Focus on industry-practices like functional programming
  - 3 To get practice with object-oriented design and object-oriented design
  - 4 To Learn about the PostgreSQL with Sequelize models
  - 5 To practice EJS Templating, security, and version control.

- | Unit                                               | Description of the Experiments                                                                                                                                                                                                                                                                                                                                                               |
|----------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>1 Introduction to Node.js</b>                   | In this module students are introduced to Node.js - they learn how to install it and write programs on it and use Node.js REPL. Students also start using GitHub and learn how to collaborate on code with others using the git tool.                                                                                                                                                        |
| <b>2 Working with NPM</b>                          | This module is an introduction to Node.js package manager for students where they start writing custom NPM modules. They also explore and use built-in modules of Node.js                                                                                                                                                                                                                    |
| <b>3 Node.js deep dive</b>                         | In this module students start building their first application and learn how to use closure to emulate private methods.                                                                                                                                                                                                                                                                      |
| <b>4 Testing</b>                                   | In this module students are introduced to testing. They start writing tests for their application, learn how to use Jest to run the tests and pre-commit hooks to run the tests automatically before each commit                                                                                                                                                                             |
| <b>5 Databases and Sequelize</b>                   | In this module students get to learn about databases and set up a PostgreSQL database. They learn how to connect to a database from a Node.js application and then work on the database by creating Sequelize models to manipulate data.                                                                                                                                                     |
| <b>6 Backend Web development with Express.js</b>   | In this module, students develop their first application and connect it to the PostgreSQL database on their machine, and begin learning the basics of the CRUD pattern by building some additional features to the application that they're working on.                                                                                                                                      |
| <b>7 Add User Interface for To-do Application</b>  | This module teaches students how to create interfaces for their application. They also practice converting a given visual design into working HTML and CSS.                                                                                                                                                                                                                                  |
| <b>8 EJS Templating</b>                            | This module teaches touches upon the basics of the MVC pattern, instructing student how to render dynamic data inside their HTML pages using EJS templates. This module also lets the student practice how to deploy their work to a remote server.                                                                                                                                          |
| <b>9 HTML forms to save and accept user inputs</b> | This module teaches students how to accept user input on their application via form element in HTML. Students also explore more of the CRUD pattern, moving onto creation of resources using forms, deletion of existing resources, and learn about Cross Site Request Forgery (CSRF) and how authenticity tokens can be used to prevent such attacks. Students are also introduced to APIs. |
| <b>10 User Authentication and final wrap-up</b>    | In this module students dig deeper into Sequelize association, migration and validation. They build a functional user sign-up page, learn about password storage and play around with browser cookies,                                                                                                                                                                                       |

  
 Chairman, Board of Studies  
**Chairman - BoS**  
**IT - HICET**



  
 Dean - Academics  
**Dean (Academics)**  
**HICET**

sessions, user authentication, and related best practices. They also learn to display one-off flash messages.

**Total Instructional Hours**      **45**

<b>Course Outcome</b>	CO1	Build web applications using Express.js.
	CO2	Manipulate data using both imperative and functional programming techniques
	CO3	Model real-world systems using object-oriented design.
	CO4	Write HTML & CSS to create elegant web pages.
	CO5	Build database applications using Sequelize.

**TEXT BOOK:**

This course does not require students to use physical textbooks. Instead, original course material (videos, text and images) has been prepared for students to go through and is open-sourced under Creative Commons Attribution-ShareAlike 4.0 International License © Freshworks Inc. & Pupilfirst Pvt. Ltd. This course material may include some third-party content with a compatible license, and external links for additional reading on the Internet. Students are also taught how to search for information on their own.

**REFERENCES:**

- R1 Robert. W. Sebesta, "Programming the World Wide Web", Fourth Edition, Pearson Education, 2007
- R2 Mike Cantelon, Marc Hartert, T.J. Holowaychuk, Nathan Rajlich" Node.js in Action",Manning Publications, 2014.
- R3 David Gutman, Fullstack Node.js The Complete Guide to Building Production Apps with Node.js , Fullstack.io 2019.

PO & PSO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	1	3	3	2	0	0	0	3	0	3	0	1	0	0
CO2	3	1	2	2	2	3	0	1	2	0	3	2	1	0	0
CO3	3	2	2	2	2	3	0	1	2	0	2	2	1	0	0
CO4	3	1	2	2	0	3	0	1	0	0	2	2	1	0	0
CO5	3	1	2	1	2	0	0	0	0	0	2	3	1	0	0



*[Signature]*  
 Chairman, Board of Studies  
**Chairman - BOS**  
**IT - HICET**

*[Signature]*  
 Dean - Academics  
**Dean (Academics)**  
**HICET**

**OPEN ELECTIVE  
SYLLABUS**

Programme	Course code	Name of the course	L	T	P	C
B.TECH.	21IT6402	MACHINE LEARNING FOR ENGINEERS	3	0	0	3

**The student should be made to**

- Course Objective**
- 1 Understand the basic concepts of machine learning and probability theory.
  - 2 Appreciate supervised learning and their applications.
  - 3 Understand unsupervised learning like clustering and EM algorithms.
  - 4 Understand the theoretical and practical aspects of probabilistic graphical models.
  - 5 Learn other learning aspects such as reinforcement learning, representation learning, deep learning, neural networks and other technologies.

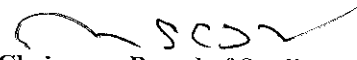
Unit	Description	Instructional Hours
	<b>INTRODUCTION</b>	
I	Machine Learning – Types of Machine Learning – Supervised Learning – Unsupervised Learning – Basic Concepts in Machine Learning – Machine Learning Process – Weight Space – Testing Machine Learning Algorithms – A Brief Review of Probability Theory – Turning Data into Probabilities – The Bias-Variance Tradeoff.	9
	<b>SUPERVISED LEARNING</b>	
II	Learning a Class from Examples, Linear, Non-linear, Multi-class and Multi-label classification - Decision Trees: ID3, Classification and Regression Trees, Regression: Linear Regression, Logistic Regression-K-Nearest Neighbors.	9
	<b>UNSUPERVISED LEARNING</b>	
III	Introduction to clustering -Mixture Models and EM – K-Means Clustering – Spectral Clustering – Hierarchical Clustering – The Curse of Dimensionality – Dimensionality Reduction – Principal Component Analysis (PCA)	9
	<b>GRAPHICAL MODELS</b>	
IV	Bayesian Networks – Conditional Independence – Markov Random Fields – Learning – Naive Bayes Classifiers - Markov Model – Hidden Markov Model.	9
	<b>ADVANCED LEARNING</b>	
V	Reinforcement Learning – Representation Learning – Neural Networks – Active Learning – Ensemble Learning – Bootstrap Aggregation – Boosting – Gradient Boosting Machines – Deep Learning	9
<b>Total Instructional Hours</b>		<b>45</b>

Upon completion of this course, the students will be able to:

- Course Outcome**
- CO1 Choose and implement classification or regression algorithms for an application using an open source tool.
  - CO2 Implement Supervised Learning algorithms for an application and analyze the results.
  - CO3 Implement typical clustering algorithms for different types of applications.
  - CO4 Design and implement an HMM for a sequence model type of application.
  - CO5 Identify applications suitable for different types of machine learning with suitable justification.

**TEXT BOOK:**

- T1 Oliver Theobald , 'Machine Learning for Absolute Beginners', Independently Published, Third Edition, 2021
- T2 Jeremy Watt, Reza Borhani, Aggelos K. Katsaggelos 'Machine Learning Refined: Foundations,

  
Chairman, Board of Studies  
Chairman - BOS  
IT - HICET



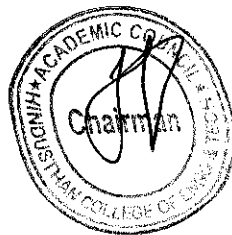
  
Dean - Academics  
Dean (Academics)  
HiCET

T3 Algorithms, and Applications' cambridge University Presss, Second Edition, 2016  
 Sebastian Raschka, Vahid Mirjalili, 'Python Machine Learning and deep learning, Ingram short title, 2nd  
 edition, kindle book, 2018

**REFERENCES:**

- R1 Carol Quadros 'Machine Learning with python, scikit-learn and Tensorflow', Packet Publishing, 2018.
- R2 Gavin Hackeling, 'Machine Learning with scikit-learn', Packet publishing, O'Reily, 2018.
- R3 Giuseppe Bonaccorso, 'Machine Learning Algorithms', Packet Publishing, 2017
- R4 Ian Goodfellow, Yoshua Bengio, Aaron Courville, 'Deep Learning', MIT Press, 2016
- R5 Ethem Alpaydin, 'Introduction to Machine Learning', MIT Press, Prentice Hall of India, Third Edition 2014

PO & PSO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	3	3	3	3	2	1	-	2	3	2	2	1	3	2
CO2	3	3	3	3	3	2	1	-	2	3	2	2	2	3	2
CO3	3	3	3	3	3	2	1	-	2	3	2	2	2	3	2
CO4	3	3	3	3	3	2	1	-	2	3	2	2	1	1	2
CO5	3	3	3	3	3	2	1	-	2	3	2	2	1	2	2



*[Signature]*  
 Chairman, Board of Studies  
**Chairman - BoS**  
**IT - HICET**

*[Signature]*  
 Dean - Academics  
**Dean (Academics)**  
**HICET**

# **HONOUR DEGREE COURSE SYLLABUS**

Programme	Course code	Name of the course	L	T	P	C
B.TECH.	21IT6203	KNOWLEDGE ENGINEERING	2	0	2	3

**The student should be made to:**

- |                         |                                                                                                                                                                                                                                                                                                                                   |
|-------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Course Objective</b> | <ol style="list-style-type: none"> <li>1 Understand the basics of Knowledge Engineering.</li> <li>2 Discuss methodologies and modeling for Agent Design and Development</li> <li>3 Design and develop ontologies</li> <li>4 Apply reasoning with ontologies and rules</li> <li>5 Understand learning and rule learning</li> </ol> |
|-------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|


Unit	Description	Instructional Hours
	<b>REASONING UNDER UNCERTAINTY</b>	
I	Introduction – Abductive reasoning – Probabilistic reasoning: Enumerative Probabilities – Subjective Bayesian view – Belief Functions – Baconian Probability – Fuzzy Probability – Uncertainty methods - Evidence-based reasoning – Intelligent Agent – Mixed-Initiative Reasoning – Knowledge Engineering	6 + 6
	<b>METHODOLOGY AND MODELING</b>	
II	Conventional Design and Development – Development tools and Reusable Ontologies – Agent Design and Development using Learning Technology – Problem Solving through Analysis and Synthesis – Inquiry-driven Analysis and Synthesis – Evidence-based Assessment – Believability Assessment – Drill-Down Analysis, Assumption-based Reasoning, and What-If Scenarios.	6 + 6
	<b>ONTOLOGIES – DESIGN AND DEVELOPMENT</b>	
III	Concepts and Instances – Generalization Hierarchies – Object Features – Defining Features – Representation – Transitivity – Inheritance – Concepts as Feature Values – Ontology Matching. Design and Development Methodologies – Steps in Ontology Development – Domain Understanding and Concept Elicitation – Modelling-based Ontology Specification.	6 + 6
	<b>REASONING WITH ONTOLOGIES AND RULES</b>	
IV	Production System Architecture – Complex Ontology-based Concepts – Reduction and Synthesis rules and the Inference Engine – Evidence-based hypothesis analysis – Rule and Ontology Matching – Partially Learned Knowledge – Reasoning with Partially Learned Knowledge.	6 + 6
	<b>LEARNING AND RULE LEARNING</b>	
V	Machine Learning – Concepts – Generalization and Specialization Rules – Types – Formal definition of Generalization. Modelling, Learning and Problem Solving – Rule learning and Refinement – Overview – Rule Generation and Analysis – Hypothesis Learning.	6 + 6
<b>Total Hours</b>		<b>60</b>

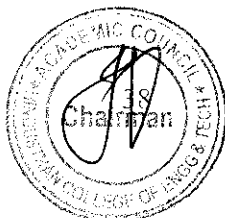
<b>S. No</b>	<b>List of Experiments</b>
--------------	----------------------------


- 1 Perform operations with Evidence Based Reasoning.
- 2 Perform Evidence based Analysis.
- 3 Perform operations on Probability Based Reasoning.
- 4 Perform Believability Analysis
- 5 Implement Rule Learning and refinement.
- 6 Perform analysis based on learned patterns
- 7 Construction of Ontology for a given domain.

Upon completion of this course, the students will be able to:

- |                       |                                                                                                                                                                                                                 |
|-----------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Course Outcome</b> | <p>CO1 Outline the fundamentals of knowledge engineering using probability concepts</p> <p>CO2 Apply methodologies and modeling for Agent Design and Development.</p> <p>CO3 Design and develop ontologies.</p> |
|-----------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|

  
Chairman, Board of Studies  
**Chairman - BoS**  
**IT - HiCET**



  
Dean - Academics  
**Dean (Academics)**  
**HiCET**



- CO4 Apply reasoning with ontologies and rules.  
 CO5 Apply rule learning for problem solving

**TEXT BOOK:**

Gheorghe Tecuci, Dorin Marcu, Mihai Boicu, David A. Schum, ' Knowledge Engineering Building Cognitive Assistants for Evidence-based Reasoning', Cambridge University Press, First Edition, 2016. (Unit 1 – Chapter 1 / Unit 2 – Chapter 3,4 / Unit 3 – Chapter 5, 6 / Unit 4 - 7 , Unit 5 – Chapter 8, 9 )

**REFERENCES:**

- R1 Ronald J. Brachman, Hector J. Levesque, 'Knowledge Representation and Reasoning', Morgan Kaufmann, 2004  
 R2 Ela Kumar, 'Knowledge Engineering', I K International Publisher House, 2018  
 R3 John F. Sowa, 'Knowledge Representation: Logical, Philosophical, and Computational Foundations', Brooks Cole Thomson Learning, 2000.  
 R4 King , 'Knowledge Management and Organizational Learning', Springer, 2009.

PO & PSO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	1	1	1	1	-	-	-	1	2	1	2	3	2	1
CO2	3	2	3	2	2	-	-	-	2	1	2	1	3	2	1
CO3	2	2	3	2	2	-	-	-	3	2	2	2	3	2	1
CO4	2	2	3	1	1	-	-	-	2	2	2	2	3	2	1
CO5	2	2	2	1	1	-	-	-	2	1	1	1	3	2	1



*[Signature]*  
 Chairman, Board of Studies  
**Chairman - BoS**  
**IT - HICET**

*[Signature]*  
 Dean-Academics  
**Dean (Academics)**  
**HICET**

Programme	Course code	Name of the course	L	T	P	C
BE/B.Tech	21IT6204	DEEP LEARNING	3	0	0	3

**The student should be made to:**

Course Objective	Description
1	Understand the basic concept of neuron and neural architectures
2	Be aware of various gradient descent techniques
3	Be aware of various regularization techniques
4	Learn the architecture of a CNN for Image processing applications
5	Learn the architecture of a RNN for sequence learning applications


Unit	Description	Instructional Hours
I	<b>Introduction to Neural Networks</b> History of Deep Learning - Deep Learning success stories – McCulloch Pitts Neuron - Thresholding Logic – Perceptrons - Perceptron Learning Algorithm - Multilayer Perceptrons (MLPs) - Representation power of MLPs - Sigmoid Neurons - Gradient Descent - Feedforward Neural Networks - Representation power of Feedforward Neural Networks	9
	<b>Neural Networks and Backpropagation</b> Feedforward Neural Networks - Learning Parameters - Output Functions and Loss Functions – Backpropagation - Computing Gradients - Gradient Descent (GD) - Momentum based GD - Nesterov accelerated GD - Stochastic and minibatch GD – Adarard – RMSProp - Bias correction in Adam	
II	<b>Regularaization</b> Bias Variance tradeoffs – L2 Regularaization – Early Stopping – Dataset Augmentation – Parameter sharing and tying – Injecting noise at input – Ensemble methods – Dropout – Greedy Layerwise Pretraining – Better Activation functions – Better Weight initialization methods – Batch normalization	9
III	<b>Convolutional Neural Networks</b> Convolution operation - Relation between input size, output size and filter size -- GoogleNet – RESNet – Visualizing CNN – Guided Backpropagation – Deep dream – Deep art – Fooling CNN – Transfer Learning	9
IV	<b>Recurrent Neural Networks</b> Sequence Learning Problems - Recurrent Neural Networks (RNN) – Backpropagation Through Time (BPTT) – Vanishing and Exploding Gradients – Truncated BPTT – GRU – LSTMs	9
V		
<b>Total Instructional Hours</b>		<b>45</b>
Course Outcome	CO1	Outline the concepts of neurons and activation functions.
	CO2	Identify and apply suitable gradient descent technique for variou. applications
	CO3	Compare and contrast various regularization techniques
	CO4	Apply a pretrained CNN architecture for suitable applications
	CO5	Identify and apply a RNN architecture for suitable applications

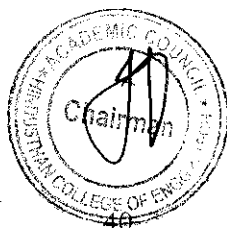
**Text Books:**


- T1 Ian Goodfellow, Yoshua Bengio, Aaron Courville, “Deep Learning”, MIT Press, 2016. (<http://www.deeplearningbook.org>)  
T2 Francois Chollet, “Deep Learning with Python”, Second Edition, Manning Publications, 2021.

**Web References:**

- W1 Swayam NPTEL online course, Deep Learning - IIT Ropar

  
Chairman, Board of Studies  
Chairman - BoS  
IT - HICET

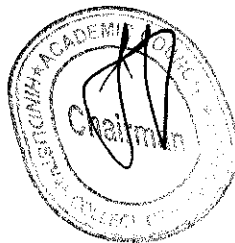


  
Dean - Academics  
Dean (Academics)  
HICET

PO & PSO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	1	1	1	1	1	-	-	1	2	1	2	3	2	1
CO2	3	2	3	2	2	-	-	-	2	1	2	1	3	2	1
CO3	2	2	3	2	2	-	-	-	3	2	2	2	3	2	1
CO4	2	2	3	1	1	-	-	-	2	2	2	2	3	2	1
CO5	2	2	2	1	1	-	-	-	2	1	1	1	3	2	1

  
Chairman, Board of Studies

**Chairman - BoS**  
**IT - HICET**



41

  
Dean Academics  
**Dean (Academics)**  
**HICET**

Programme	Course code	Name of the course	L	T	P	C
B.TECH.	21IT6205	DIGITAL AND MOBILE FORENSICS	3	0	0	3

**The student should be made to**

- Course Objective**
- 1 To understand basic digital forensics and techniques.
  - 2 To understand digital crime and investigation.
  - 3 To understand how to be prepared for digital forensic readiness
  - 4 To understand and use forensics tools for iOS devices.
  - 5 To understand and use forensics tools for Android devices.

Unit	Description	Instructional Hours
	<b>INTRODUCTION TO DIGITAL FORENSICS</b>	
I	Forensic Science – Digital Forensics – Digital Evidence – The Digital Forensics Process – Introduction – The Identification Phase – The Collection Phase – The Examination Phase – The Analysis Phase – The Presentation Phase	9
	<b>DIGITAL CRIME AND INVESTIGATION</b>	
II	Digital Crime – Substantive Criminal Law – General Conditions – Offenses – Investigation Methods for Collecting Digital Evidence – International Cooperation to Collect Digital Evidence	9
	<b>DIGITAL FORENSIC READINESS</b>	
III	Introduction – Law Enforcement versus Enterprise Digital Forensic Readiness – Rationale for Digital Forensic Readiness – Frameworks, Standards and Methodologies – Enterprise Digital Forensic Readiness – Challenges in Digital Forensics	9
	<b>iOS FORENSICS</b>	
IV	Mobile Hardware and Operating Systems - iOS Fundamentals – Jailbreaking – File System – Hardware – iPhone Security – iOS Forensics – Procedures and Processes – Tools – Oxygen Forensics – MobilEdit – iCloud	9
	<b>ANDROID FORENSICS</b>	
V	Android basics – Key Codes – ADB – Rooting Android – Boot Process – File Systems – Security – Tools – Android Forensics – Forensic Procedures – ADB – Android Only Tools – Dual Use Tools – Oxygen Forensics – MobilEdit – Android App Decompiling	9
<b>Total Instructional Hours</b>		<b>45</b>

Upon completion of this course, the students will be able to:

- Course Outcome**
- CO1 Have knowledge on digital forensics.
  - CO2 Know about digital crime and investigations.
  - CO3 Be forensic ready.
  - CO4 Investigate, identify and extract digital evidence from iOS devices.
  - CO5 Investigate, identify and extract digital evidence from Android devices.

**TEXT BOOK:**

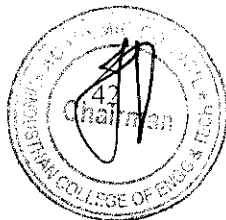
- T1 Andre Arnes, “Digital Forensics”, Wiley, 2018.  
T2 Chuck Easttom, “An In-depth Guide to Mobile Device Forensics”, First Edition. CRC Press, 2022.

**REFERENCE BOOK:**

- R1 Vacca, J, Computer Forensics, Computer Crime Scene Investigation, 2nd Ed, Charles River Media, 2005, ISBN: 1-58450-389.

  
Chairman, Board of Studies

**Chairman - BoS  
IT - HICET**

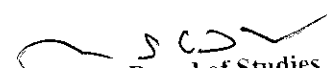


  
Dean - Academics

**Dean (Academics)  
HICET**

PO & PSO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	1	3	2	1	-	-	-	1	1	3	3	1	3	2
CO2	3	3	3	3	3	-	-	-	2	2	1	2	1	3	2
CO3	3	3	2	3	1	-	-	-	3	2	1	1	3	2	2
CO4	3	1	2	2	3	-	-	-	1	3	3	3	1	3	2
CO5	1	3	2	3	2	-	-	-	2	3	2	1	1	2	2



  
 Chairman, Board of Studies  
**Chairman - BoS**  
**IT - HICET**

  
 Dean - Academics  
**Dean (Academics)**  
**HICET**

Programme	Course code	Name of the course	L	T	P	C
B.TECH.	21IT6207	SOCIAL NETWORK SECURITY	3	0	0	3


The student should be made to

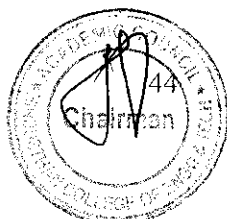
- Course Objective**
- 1 To develop semantic web related simple applications
  - 2 To explain Privacy and Security issues in Social Networking
  - 3 To explain the data extraction of social networks
  - 4 To explain the mining of social networks
  - 5 To describe the Access Control, Privacy and Security management of social networks


Unit	Description	Instructional Hours
	<b>FUNDAMENTALS OF SOCIAL NETWORKING</b>	
I	Introduction to Semantic Web, Limitations of current Web, Development of Semantic Web, Emergence of the Social Web, Social Network analysis, Development of Social Network Analysis, Key concepts and measures in network analysis, Historical overview of privacy and security, Major paradigms, for understanding privacy and security	9
	<b>SECURITY ISSUES IN SOCIAL NETWORKS</b>	
II	The evolution of privacy and security concerns with networked technologies, Contextual influences on privacy attitudes and behaviors, Anonymity in a networked world	9
	<b>EXTRACTION AND MINING IN SOCIAL NETWORKING DATA</b>	
III	Extracting evolution of Web Community from a Series of Web Archive, Detecting communities in social networks, Definition of community, Evaluating communities, Methods for community detection and mining, Applications of community mining algorithms, Tools for detecting communities social network infrastructures and communities, Big data and Privacy	9
	<b>PREDICTING HUMAN BEHAVIOR AND PRIVACY ISSUES</b>	
IV	Understanding and predicting human behavior for social communities, User data Management, Inference and Distribution, Enabling new human experiences, Reality mining, Context, Awareness, Privacy in online social networks, Trust in online environment, What is Neo4j, Nodes, Relationships, Properties	9
	<b>ACCESS CONTROL, PRIVACY AND IDENTITY MANAGEMENT</b>	
V	Understand the access control requirements for Social Network, Enforcing Access Control Strategies, Authentication and Authorization, Roles-based Access Control, Host, storage and network access control options, Firewalls, Authentication, and Authorization in Social Network, Identity & Access Management, Single Sign-on, Identity Federation, Identity providers and service consumers, The role of Identity provisioning	9
<b>Total Instructional Hours</b>		<b>45</b>

Upon completion of this course, the students will be able to:

- Course Outcome**
- CO1 Develop semantic web related simple applications
  - CO2 Address Privacy and Security issues in Social Networking
  - CO3 Explain the data extraction and mining of social networks
  - CO4 Discuss the prediction of human behavior in social communities
  - CO5 Describe the applications of social networks

  
Chairman, Board of Studies  
Chairman - BoS  
IT - HICET



  
Dean - Academics  
Dean (Academics)  
HICET

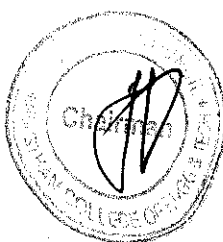
**TEXT BOOK:**

- T1 Peter Mika, "Social Networks and the Semantic Web, First Edition, Springer 2007.
- T2 Borko Furht, "Handbook of Social Network Technologies and Application, First Edition, Springer, 2010.
- T3 Learning Neo4j 3.x "Second Edition By Jérôme Baton, Rik Van Bruggen, Packt publishing

**REFERENCES:**

- R1 Easley D. Kleinberg J., "Networks, Crowds, and Markets – Reasoning about a Highly Connected World", Cambridge University Press, 2010.
- R2 Jackson, Matthew O., "Social and Economic Networks", Princeton University Press, 2008.
- R3 Guandong Xu, Yanchun Zhang and Lin Li, "Web Mining and Social Networking – Techniques and applications", First Edition, Springer, 2011.
- R4 Dion Goh and Schubert Foo, "Social information Retrieval Systems: Emerging Technologies and Applications for Searching the Web Effectively", IGI Global Snippet, 2008.
- R5 Max Chevalier, Christine Julien and Chantal Soulé-Dupuy, "Collaborative and Social Information Retrieval and Access: Techniques for Improved user Modeling", IGI Global Snippet, 2009.
- R6 John G. Breslin, Alexander Passant and Stefan Decker, "The Social Semantic Web", Springer, 2009

PO & PSO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	1	2	3	2	-	-	-	3	2	1	2	1	3	2
CO2	2	2	2	3	3	-	-	-	1	2	2	3	2	3	2
CO3	2	1	1	3	2	-	-	-	1	2	1	1	2	3	2
CO4	3	3	3	3	2	-	-	-	1	1	1	1	1	1	2
CO5	1	3	2	2	2	-	-	-	1	1	3	1	1	2	2



*SCS*  
 Chairman, Board of Studies  
**Chairman - BoS**  
**IT - HICET**

*[Signature]*  
 Dean-Academics  
**Dean (Academics)**  
**HICET**

Programme	Course code	Name of the course	L	T	P	C
B.TECH.	21IT6208	BLOCKCHAIN ARCHITECTURE AND DESIGN	3	0	0	3

The student should be made to

Course Objective	Description
1	Learn the basic understanding of Blockchain architecture along with its primitive
2	Explain the requirements for basic protocol along with scalability aspects
3	Design and deploy the consensus process using frontend and backend
4	Apply Blockchain techniques for different use cases like Finance, Trade/Supply and Government activities.
5	Explore the Blockchain cryptography and security

Unit	Description	Instructional Hours
<b>INTRODUCTION</b>		
I	Digital Money to Distributed Ledgers , Design Primitives: Protocols, Security, Consensus, Permissions, Privacy. Blockchain Architecture and Design: Basic crypto primitives: Hash, Signature, Hashchain to Blockchain, Basic consensus mechanisms	9
<b>CONSENSUS</b>		
II	Requirements for the consensus protocols, Proof of Work (PoW), Scalability aspects of Blockchain consensus protocols Permissioned Blockchains: Design goals, Consensus protocols for Permissioned Blockchains	9
III	<b>Hyperledger Fabric (A):</b> Decomposing the consensus process , Hyperledger fabric components, Chain code Design and Implementation	9
IV	<b>Hyperledger Fabric (B):</b> Beyond Chain code: fabric SDK and Front End (b) Hyperledger composer tool <b>Use case 1 :</b> Blockchain in Financial Software and Systems (FSS): (i) Settlements, (ii) KYC, (iii) Capital markets, (iv) Insurance	9
V	<b>Use case 2:</b> Blockchain in trade/supply chain: (i) Provenance of goods, visibility, trade / supply chain finance, invoice management discounting, etc <b>Use case 3:</b> Blockchain for Government: (i) Digital identity, land records and other kinds of record keeping between government entities, (ii) public distribution system social welfare systems Blockchain Cryptography, Privacy and Security on Blockchain	9
<b>Total Instructional Hours</b>		<b>45</b>

Upon completion of this course, the students will be able to:

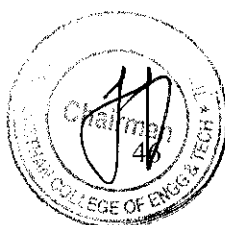
Course Outcome	Description
CO1	Explain the basic understanding of Blockchain architecture along with its primitive
CO2	Explain the requirements for basic protocol along with scalability aspects
CO3	Design the consensus process using frontend and backend
CO4	Discuss the Blockchain techniques for different use cases like Finance, Trade/Supply and Government activities.
CO5	Describe the applied Blockchain cryptography and security

**TEXT BOOK:**

T1 Mastering Bitcoin: Unlocking Digital Cryptocurrencies, by Andreas Antonopoulos

  
Chairman, Board of Studies

**Chairman - BoS  
IT - HICET**



  
Dean - Academics

**Dean (Academics)  
HiCET**



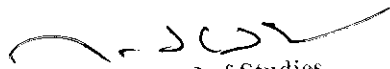
T2 Blockchain by Melanie Swa, O'Reilly

T3 Hyperledger Fabric - <https://www.hyperledger.org/projects/fabric>

T4 Zero to Blockchain - An IBM Redbooks course, by Bob Dill, David Smits -  
<https://www.redbooks.ibm.com/Redbooks.nsf/RedbookAbstracts/crse0401.html>

PO & PSO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	3	3	3	3	2	1	-	2	3	2	2	1	3	2
CO2	3	3	3	3	3	2	1	-	2	3	2	2	2	3	2
CO3	3	3	3	3	3	2	1	-	2	3	2	2	2	3	2
CO4	3	3	3	3	3	2	1	-	2	3	2	2	1	1	2
CO5	3	3	3	3	3	2	1	-	2	3	2	2	1	2	2



  
Chairman, Board of Studies  
**Chairman - BoS**  
**IT - HICET**

  
Dean - Academics  
**Dean (Academics)**  
**HICET**

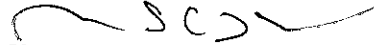
Programme	Course code	Name of the course	L	T	P	C
B.TECH.	21IT6209	BUILDING PRIVATE BLOCKCHAIN	3	0	0	3

The student should be made to


- Course Objective**
- 1 Learn the basics of Blockchain and multichain
  - 2 Understand the importance of consensus
  - 3 Deploy Private Blockchain and smart contracts on Ethereum.
  - 4 Implement Blockchain for various use cases.
  - 5 Apply use case model for blockchain digital identity

Unit	Description	Instructional Hours
	<b>INTRODUCTION TO BLOCKCHAIN</b> What is Block chain? Basic ideas behind Blockchain, how it is changing the landscape of digitalization, Uses of Blockchain. Abstract Models for BLOCKCHAIN - GARAY model - RLA Model,	
I	what is Multichain? Objective of Multichain, Features of Multichain, Uses of Multichain, Process of mining in Multichain technology, Analyse Multichain platform, why it is better than other open platforms Blockchain Architecture and Design: Basic crypto primitives: Hash, Signature,) Hash chain to Blockchain, Basic consensus mechanisms	9
	<b>CONSENSUS &amp; DAPPS</b> Requirements for the consensus protocols, Proof of Work (PoW), Scalability aspects of Blockchain consensus protocols Permissioned Blockchains: Design goals, Consensus protocols for Permissioned Blockchains (DAPPS) - Characteristics of	
II	Decentralized application, Setting up a Private Blockchain, Multiple configurable Blockchains using Multichain Deployment scenarios of Multichain, Centralized currency settlement, Bond issuance and peer-to-peer trading Consumerfacing rewards scheme in Decentralized Applications	9
	<b>HYPERLEDGER FABRIC</b> Hyperledger Fabric (A): Decomposing the consensus process , Hyperledger fabric components, Chain code Design and Implementation Hyperledger Fabric (B): Beyond Chain code: fabric SDK and Front End (b) Hyperledger composer tool	
III		9
	<b>USECASE MODEL – PRIVACY BLOCKCHAIN</b> Use case 1: Blockchain in Financial Software and Systems (FSS): (i) Settlements, (ii) KYC, (iii) Capital markets, (iv) Insurance	
IV	Use case 2: Blockchain in trade/supply chain: (i) Provenance of goods, visibility, trade/supply chain finance, invoice management discounting, etc	9
	<b>USECASE MODEL – BLOCKCHAIN DIGITAL IDENTITY</b> Use case 3: Blockchain for Government: (i) Digital identity, land records and other kinds of record keeping between government entities, (ii) public distribution system social welfare systems Blockchain Cryptography, Privacy and Security on Blockchain	
V		9
<b>Total Instructional Hours</b>		<b>45</b>

- Course Outcome**
- Upon completion of this course, the students will be able to:
- Recall the structure and mechanism of Bitcoin, Ethereum, Hyperledger and Multichain
- CO1 Blockchain platforms
- CO2 Infer the importance of consensus in transactions and how transactions are stored on Blockchain.

  
Chairman, Board of Studies  
Chairman - BoS  
IT - HICET



  
Dean-Academics  
Dean (Academics)  
HICET

- CO3 Setup your own private Blockchain and deploy smart contracts on Ethereum.
- CO4 Deploy the business network using Hyperledger Composer.
- CO5 Implement Blockchain for various use cases

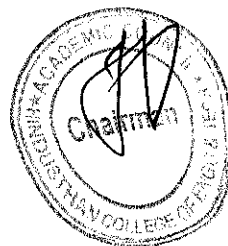
**TEXT BOOK:**

- T1 Andreas M. Antonopoulos , “Mastering Bitcoin: Unlocking Digital Cryptocurrencies”, O’Reilly Media Inc, 2015
- T2 Melanie Swa “Blockchain”, First Edition, O’Reilly Jan 2015

**REFERENCES:**

- R1 Hyperledger Fabric - <https://www.hyperledger.org/projects/fabric>
- R2 Zero to Blockchain - An IBM Redbooks course, by Bob Dill, David Smits - <https://www.redbooks.ibm.com/Redbooks.nsf/RedbookAbstracts/crse0401.html>

PO & PSO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	1	2	3	2	-	-	-	3	2	1	2	1	3	2
CO2	2	2	2	3	3	-	-	-	1	2	2	3	2	3	2
CO3	2	1	1	3	2	-	-	-	1	2	1	1	2	3	2
CO4	3	3	3	3	2	-	-	-	1	1	1	1	1	1	2
CO5	1	3	2	2	2	-	-	-	1	1	3	1	1	2	2



*[Handwritten Signature]*  
 Chairman, Board of Studies  
**Chairman - BoS**  
**IT - HICET**

*[Handwritten Signature]*  
 Dean - Academics  
**Dean (Academics)**  
**HICET**

**MINOR DEGREE  
COURSE SYLLABUS**

Programme	Course code	Name of the course	L	T	P	C
BE/B.Tech	22IT6601	FOUNDATIONS OF DATA SCIENCE	3	0	0	3

**The student should be able to:**

**Course Objective**

- 1 Understand the data science fundamentals and process.
- 2 Learn to describe the data for the data science process.
- 3 Learn to describe the relationship between data.
- 4 Utilize the Python libraries for Data Wrangling.
- 5 Present and interpret data using visualization libraries in Python

Unit	Description	Instructional Hours
	<b>INTRODUCTION</b>	
I	Data Science: Benefits and uses – facets of data - Data Science Process: Overview – Defining research goals – Retrieving data – Data preparation - Exploratory Data analysis – build the model–presenting findings and building applications - Data Mining - Data Warehousing – Basic Statistical descriptions of Data.	9
	<b>DESCRIBING DATA</b>	
II	Types of Data - Types of Variables -Describing Data with Tables and Graphs – Describing Data with Averages - Describing Variability - Normal Distributions and Standard (z) Scores	9
	<b>DESCRIBING RELATIONSHIPS</b>	
III	Correlation –Scatter plots –correlation coefficient for quantitative data – computational formula for correlation coefficient – Regression –regression line – least squares regression line – Standard error of estimate – interpretation of r2 – multiple regression equations –regression towards the mean.	9
	<b>PYTHON LIBRARIES FOR DATA WRANGLING</b>	
IV	Basics of Numpy arrays –aggregations –computations on arrays –comparisons, masks, Boolean logic – fancy indexing – structured arrays – Data manipulation with Pandas – data indexing and selection – operating on data – missing data – Hierarchical indexing – combining datasets – aggregation and grouping – pivot tables	9
	<b>DATA VISUALIZATION</b>	
V	Importing Matplotlib – Line plots – Scatter plots – visualizing errors – density and contour plots – Histograms – legends – colors – subplots – text and annotation – customization – three dimensional plotting - Geographic Data with Basemap - Visualization with Seaborn.	9
	<b>Total Instructional Hours</b>	<b>45</b>

Course Outcome	CO1	CO2	CO3	CO4	CO5
	Outline the data science process	Outline different types of data description for data science process	Acquire information about the connections and interactions among changing data.	Apply the Python Libraries for Data Wrangling	Apply visualization Libraries in Python to interpret and explore data

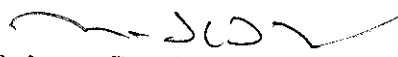
**REFERENCES:**

**TEXT BOOK**

- T1 David Cielen, Arno D. B. Meysman, and Mohamed Ali, “Introducing Data Science”, Manning Publications, 2016. (Unit I)
- T2 Robert S. Witte and John S. Witte, “Statistics”, Eleventh Edition, Wiley Publications, 2017. (Units II and III)
- T3 Jake VanderPias, “Python Data Science Handbook”, O’Reilly, 2016. (Units IV and V)

**REFERENCE BOOK:**

- R1 Allen B. Downey, “Think Stats: Exploratory Data Analysis in Python”, Green Tea Press.2014
- R2 Runkler TA,|Data Analytics: Models and algorithms for intelligent data analysis|, Springer, 2012.

  
Chairman, Board of Studies

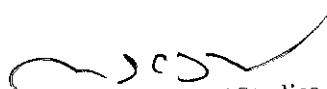
**Chairman - BoS  
IT - HICET**

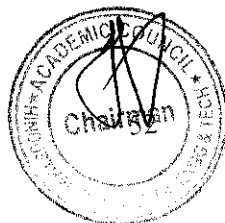



  
Dean - Academics

**Dean (Academics)  
HICET**

PO & PSO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	2	2	1	2	2	-	-	-	1	1	1	2	2	2	2
CO2	2	1	-	1	1	-	-	-	2	1	1	2	2	3	1
CO3	2	2	1	2	2	1	1	-	1	2	1	3	2	2	3
CO4	3	2	2	1	2	-	-	-	1	1	2	2	3	3	2
CO5	2	2	1	2	2	-	-	-	1	1	1	2	2	2	2

  
 Chairman, Board of Studies  
**Chairman**  
**IT - HICET**



  
 Dean - Academics  
**Dean (Academics)**  
**HICET**

Programme	Course code	Name of the course	L	T	P	C
BE/B.Tech	22IT6602	ARTIFICIAL INTELLIGENCE AND EXPERT SYSTEMS	3	0	0	3

The student should be made to:

Course Objective	1	2	3	4	5
	Have an overview of various AI applications	Learn about various heuristic and game search algorithms	Obtain a thorough knowledge of various knowledge representation schemes	Know about various Expert System tools and applications	Understand about basic concepts of NLP.

Unit	Description	Instructional Hours
I	<b>Introduction to AI:</b> Definitions of AI - Problem solving by searching- Uninformed Search Strategies: Breadth First search, Depth first search, Depth limited search – Informed Search strategies: A * search. Greedy Best First Search - Local Search Optimization: Simulated Annealing- Genetic Algorithm.	9
II	<b>Adversarial search:</b> Games - Optimal decisions in games - Minimax algorithm - Alpha-beta pruning - Constraint Satisfaction problems -Map coloring and Crypt Arithmetic problem.	9
III	<b>Knowledge Representation:</b> Knowledge base agent - knowledge representation techniques - Probabilistic reasoning - Bayes theorem in AI.	9
IV	<b>Expert System:</b> Characteristics of Expert System- Components of an Expert System-Expert System Development- Knowledge Engineering-Applications of Expert System-Case Studies: Simple Medical Expert System-Successful Expert Systems.	9
V	<b>Natural Language Processing</b> – Language Models-Text classification – Information Retrieval - Information Extraction.	9
<b>Total Instructional Hours</b>		<b>45</b>

Upon completion of this course, the Students will be able to

Course Outcome	CO1	CO2	CO3	CO4	CO5
	Identify problems that are amenable to solution by AI methods.	Identify appropriate AI methods to solve gaming Problems.	Apply the concept of Knowledge Representation for solving problems.	Design Expert systems.	Outline the fundamentals of NLP.

**TEXT BOOK:**

- T1 Stuart Russell, Peter Norvig, 'Artificial Intelligence: A Modern Approach', Pearson, 2nd Edition, 2016 (Unit 1, 2, 3 and 5)
- T2 Vinod Chandra S.S and Anand Hareendran S, 'Artificial Intelligence :Principles and Applications', PHI Learning Private Limited, 2014. (Unit 4).

**Reference Book:**

- R1 Elaine Rich, Kevin Knight, Shivashankar B Nair, 'Artificial Intelligence and Machine Learning', Tata Mc Graw-Hill, Third edition, 2013
- R2 W. Patterson, 'Introduction to Artificial Intelligence and Expert Systems', Prentice Hall of India, 2003.

**Web Resources:**

- W1 <https://www.javatpoint.com/probabilistic-reasoning-in-artificial-intelligence> (Unit 3).
- W2 <https://www.edureka.co/blog/knowledge-representation-in-ai/> (Unit 3)

PO & PSO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	3	3	3	3	2	1	-	2	3	2	2	1	1	3
CO2	3	3	3	3	3	2	1	-	2	3	2	2	1	2	2
CO3	3	2	2	3	3	2	1	-	2	3	1	1	1	2	3
CO4	3	3	3	3	3	2	1	-	2	3	2	2	2	1	2
CO5	3	3	3	3	3	2	1	-	2	3	2	2	2	1	2

Chairman, Board of Studies

Chairman - BoS  
IT - HICET



Dean-Academics

Dean (Academics)  
HiCET

Programme	Course Code	Name of the Course	L	T	P	C
B.E.	21CE6603	SUSTAINABLE AGRICULTURE AND ENVIRONMENTAL MANAGEMENT	3	0	0	3

- Course Objective**
1. To introduce the concepts of agroecology, agroecosystem and sustainable agriculture.
  2. To educate about the issues related to soil health, nutrient and pest management.
  3. To outline the significance of sustainable water management and irrigation.
  4. To explore the concepts and plans for energy and waste management.
  5. To learn about the methods and approaches for evaluating sustainability in agroecosystems.

Unit	Description	Instructional Hours
<b>AGROECOLOGY, AGROECOSYSTEM AND SUSTAINABLE AGRICULTURE CONCEPTS</b>		
I	Ecosystem definition - Biotic Vs. abiotic factors in an ecosystem - Ecosystem processes - Ecological services and agriculture - Problems associated with industrial agriculture/food systems - Defining sustainability - Characteristics of sustainable agriculture - Difference between regenerative and sustainable agriculture systems	9
<b>SOIL HEALTH, NUTRIENT AND PEST MANAGEMENT</b>		
II	Soil health definition - Factors to consider (physical, chemical and biological) - Composition of healthy soils - Soil erosion and possible control measures - Techniques to build healthy soil - Management practices for improving soil nutrient - Ecologically sustainable strategies for pest and disease control	9
<b>WATER MANAGEMENT</b>		
III	Soil water storage and availability - Plant yield response to water - Reducing evaporation in agriculture - Earthworks and tanks for rainwater harvesting - Options for improving the productivity of water - Localized irrigation - Irrigation scheduling - Fertigation - Advanced irrigation systems and agricultural practices for sustainable water use	9
<b>ENERGY AND WASTE MANAGEMENT</b>		
IV	Types and sources of agricultural wastes - Composition of agricultural wastes – Sustainable technologies for the management of agricultural wastes - Useful and high value materials produced using different processes from agricultural wastes - Renewable energy for sustainable agriculture	9
<b>EVALUATING SUSTAINABILITY IN AGROECOSYSTEMS</b>		
V	Indicators of sustainability in agriculture - On-farm evaluation of agroecosystem sustainability - Alternative agriculture approaches/ farming techniques for sustainable food production - Goals and components of a community food system - Case studies	9
<b>Total Instructional Hours</b>		<b>45</b>

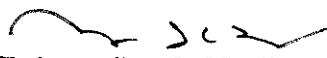
- Course Outcome**
- On completion of the course, the student is expected to be able to:
- CO1 Have an in-depth knowledge about the concepts, principles and advantages of sustainable agriculture
  - CO2 Discuss the sustainable ways in managing soil health, nutrients, pests and diseases
  - CO3 Suggest the ways to optimize the use of water in agriculture to promote an ecological use of resources
  - CO4 Develop energy and waste management plans for promoting sustainable agriculture in non-sustainable farming areas
  - CO5 Assess an ecosystem for its level of sustainability and prescribe ways of converting to a sustainable system through the redesign of a conventional agroecosystem

**TEXT BOOKS:**

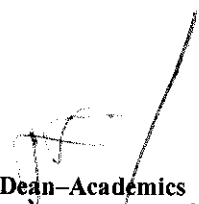
- T1. Approaches to Sustainable Agriculture – Exploring the Pathways Towards the Future of Farming, Oberc, B.P. & Arroyo Schnell, A., IUCN, Belgium, 2020
- T2. Natural bioactive products in sustainable agriculture, Singh, J. & Yadav, A.N., Springer, 2020
- T3. Organic Farming for Sustainable Agriculture, Nandwani, D., Springer, 2016

**REFERENCE BOOKS:**

- R1. Principles of Agronomy for Sustainable Agriculture, Villalobos, F.J. & Fereres, E., Springer, 2016
- R2. Sustainable Agriculture for Food Security: A Global Perspective, Balkrishna, A., CRC Press, 2021
- R3. Sustainable Energy Solutions in Agriculture, Bundschuh, J. & Chen, G., CRC Press, 2014

  
**Chairman, Board of Studies**  
**Chairman - BOS**  
**IT - HICET**



  
**Dean - Academics**  
**Dean (Academics)**  
**HICET**

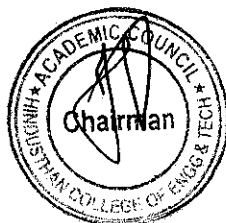


Programme	Course Code	Name of the Course	L	T	P	C
B.E.	21CE6604	SUSTAINABLE BIOMATERIALS	3	0	0	3
Course Objective	1. To Impart knowledge of biomaterials and their properties					
	2. To learn about Fundamentals aspects of Biopolymers and their applications					
	3. To learn about bioceramics and biopolymers					
	4. To introduce the students about metals as biomaterials and their usage as implants					
	5. To make the students understand the significance of bionanomaterials and its applications.					

Unit	Description	Instructional Hours
<b>INTRODUCTION TO BIOMATERIALS</b>		
I	Introduction: Definition of biomaterials, requirements & classification of biomaterials - Types of Biomaterials - Degradable and resorbable biomaterials - engineered natural materials - Biocompatibility - Hydrogels - pyrolytic carbon for long term medical implants-textured and porous materials-Bonding types - crystal structure-imperfection in crystalline structure-surface properties and adhesion of materials - strength of biological tissues - performance of implants-tissue response to implants - Impact and Future of Biomaterials	9
<b>BIO POLYMERS</b>		
II	Molecular structure of polymers - Molecular weight - Types of polymerization techniques - Types of polymerization reactions - Physical states of polymers - Common polymeric biomaterials - Polyethylene -Polymethylmethacrylate (PMMA) - Polylactic acid (PLA) and polyglycolic acid (PGA) - Polycaprolactone (PCL) - Other biodegradable polymers - Polyurethan- reactions polymers for medical purposes - Collagens- Elastin - Cellulose and derivatives-Synthetic polymeric membranes and their biological applications	9
<b>BIO CERAMICS AND BIOCOMPOSITES</b>		
III	General properties - Bio ceramics -Silicate glass - Alumina (Al <sub>2</sub> O <sub>3</sub> ) - Zirconia (ZrO <sub>2</sub> ) - Carbon - Calcium phosphates (CaP) - Resorbable Ceramics - surface reactive ceramics - Biomedical Composites- Polymer Matrix Composite (PMC) - Ceramic Matrix Composite (CMC) - Metal Matrix Composite (MMC) - glass ceramics - Orthopedic implants - Tissue engineering scaffolds	9
<b>METALS AS BIOMATERIALS</b>		
IV	Biomedical metals - types and properties - stainless steel - Cobalt chromium alloys - Titanium alloys - Tantalum - Nickel titanium alloy (Nitinol) - magnesium based biodegradable alloys - surface properties of metal implants for osteointegration - medical application - corrosion of metallic implants - biological tolerance of implant metals	9
<b>NANOBIOMATERIALS</b>		
V	Meatllc nano biomaterials - Nanopolymers - Nanoceramics - Nanocomposites - Carbon based nanobiomaterials - transport of nanoparticles - release rate - positive and negative effect of nanosize -nanofibres - Nano and micro features and their importance in implant performance - Nanosurface and coats -Applications nanoantibiotics - Nanomedicines - Biochips - Biomimetics - BioNEMs -	9

  
Chairman, Board of Studies

Chairman - BoS  
IT - HICET



  
Dean-Academics

Dean (Academics)  
HICET


	CO1 Students will gain familiarity with Biomaterials and understand their importance.
	CO2 Students will get an overview of different biopolymers and their properties
<b>Course Outcome</b>	CO3 Students gain knowledge on the important Bioceramics and Biocomposite materials
	CO4 Students gain knowledge on metals as biomaterials
	CO5 Students gain knowledge on the importance of nanobiomaterials in engineering applications.

**TEXT BOOKS:**

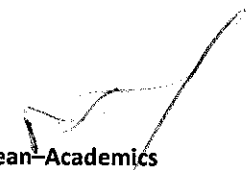
- T1. C. Mauli Agrawal, Joo L. Ong, Mark R. Appleford, Gopinath Mani "Introduction to Biomaterials Basic Theory with Engineering Applications" Cambridge University Press, 2014.
- T2. Donglu shi "Introduction to Biomaterials" Tsinghua University press, 2006.
- T3. Joon Park, R.S.Lakes "Biomaterials An Introduction" third edition, Springer 2007.
- T4. M.Jaffe, W.Hammond, P.Tolias and T.Arinzeh "Characterization of Biomaterials" Wood head publishing, 2013.

**REFERENCE BOOKS:**

- R1. VasifHasirci, NesrinHasirci "Fundamentals of Biomaterials" Springer, 2018
- R2. Leopoldo Javier Rios Gonzalez. "Handbook of Research on Bioenergy and Biomaterials: Consolidated and green process" Apple academic press, 2021.
- R3. Devarajan Thangadurai, Jeyabalan Sangeetha, Ram Prasad "Functional Bionanomaterials" springer, 2020.
- R4. Sujata.V.Bhat Biomaterials; Narosa Publishing house, 2002.

  
Chairman, Board of Studies  
Chairman - BOS  
IT - HICET



  
Dean-Academics  
Dean  
HICET

Programme	Course Code	Name of the Course	L	T	P	C
B.E	21CS6603	FUNDAMENTALS OF INVESTMENT	3	0	0	3

- Course Objective**
1. Describe the investment environment in which investment decisions are taken.
  2. Explain how to Value bonds and equities
  3. Explain the various approaches to value securities
  4. Describe how to create efficient portfolios through diversification
  5. Discuss the mechanism of investor protection in India.

Unit	Description	Instructional Hours
	<b>THE INVESTMENT ENVIRONMENT</b>	
I	The investment decision process, Types of Investments – Commodities, Real Estate and Financial Assets, the Indian securities market, the market participants and trading of securities, security market indices, sources of financial information, Concept of return and risk, Impact of Taxes and Inflation on return.	9
	<b>FIXED INCOME SECURITIES</b>	
II	Bond features, types of bonds, estimating bond yields, Bond Valuation types of bond risks, default risk And credit rating.	9
	<b>APPROACHES TO EQUITY ANALYSIS</b>	
III	Introduction to Fundamental Analysis, Technical Analysis and Efficient Market Hypothesis, dividend capitalisation models, and price-earnings multiple approach to equity valuation.	9
	<b>PORTFOLIO ANALYSIS AND FINANCIAL DERIVATIVES</b>	
IV	Portfolio and Diversification, Portfolio Risk and Return; Mutual Funds; Introduction to Financial Derivatives; Financial Derivatives Markets in India	9
	<b>INVESTOR PROTECTION</b>	
V	Role of SEBI and stock exchanges in investor protection; Investor grievances and their redressal system, insider trading, investors' awareness and activism	9
<b>Total Instructional Hours</b>		<b>45</b>

- Course Outcome**
- CO1: Associate and classify the the investment environment in which investment decisions are taken.
- CO2: Elaborate the how to Value bonds and equities
- CO3: Interpret the the various approaches to value securities
- CO4: Acquire how to create efficient portfolios through diversification
- CO5: Illustrate how to create efficient portfolios through diversification

#### TEXT BOOKS:

- T1: Charles P. Jones, Gerald R. Jensen. Investments: analysis and management. Wiley, 14<sup>TH</sup> Edition, 2019
- T2: Chandra, Prasanna. Investment analysis and portfolio management. McGraw-hill education, 5th, Edition, 2017.

#### REFERENCE BOOKS:

- R1: Rustagi, R. P. Investment Management Theory and Practice. Sultan Chand & Sons, 2021.
- R2: ZviBodie, Alex Kane, Alan J Marcus, Pitabus Mohanty, Investments, McGraw Hill Education(India), 11 Edition(SIE), 2019


  
Chairman, Board of Studies

**Chairman - BoS**  
**IT - HICET**




  
Dean - Academics  
**Dean (Academics)**  
**HICET**

PO & PSO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	2	2	1	2	2	-	-	-	1	1	1	2	2	2
CO2	2	1	-	1	1	-	-	-	2	1	1	2	2	3
CO3	2	2	1	2	2	1	1	-	1	2	1	3	2	2
CO4	3	2	2	1	2	-	-	-	1	1	2	2	3	3
CO5	2	2	1	2	2	-	-	-	1	1	1	2	2	2

  
 Chairman, Board of Studies  
**Chairman - BoS**  
**IT - HICET**



  
 Dean - Academics  
**Dean (Academics)**  
**HICET**

Programme	Course Code	Name of the Course	L	T	P	C
B.E	21CS6604	BANKING, FINANCIAL SERVICES AND INSURANCE	3	0	0	3

- Course Objective**
1. To Understand the Banking system in India
  2. To Grasp how banks raise their sources and how they deploy it
  3. To Understand the development in banking technology
  4. To Understand the financial services in India
  5. To Understand the insurance Industry in India


Unit	Description	Instructional Hours
I	<b>INTRODUCTION TO INDIAN BANKING SYSTEM</b> Overview of Banking system – Structure – Functions –Banking system in India - Key Regulations in Indian Banking sector –RBI. Relationship between Banker and Customer - Retail & Wholesale Banking – types of Accounts - Opening and operation of Accounts.	9
II	<b>MANAGING BANK FUNDS/ PRODUCTS</b> Liquid Assets - Investment in securities - Advances - Loans.Negotiable Instruments – Cheques, Bills of Exchange & Promissory Notes.Designing deposit schemes– Asset and Liability Management –NPA’s – Current issues on NPA’s – M&A’s of banks into securities market.	9
III	<b>DEVELOPMENT IN BANKING TECHNOLOGY</b> Payment system in India – paper based – e payment –electronic banking –plastic money – e-money–forecasting of cash demand at ATM’s –The Information Technology Act, 2000 in India – RBI’s Financial Sector Technology vision document – security threats in e-banking & RBI’s Initiative.	9
IV	<b>FINANCIAL SERVICES</b> Introduction – Need for Financial Services – Financial Services Market in India – NBFC – Leasing and Hire Purchase – mutual funds. Venture Capital Financing –Bill discounting – factoring –Merchant Banking	9
V	<b>INSURANCE</b> Insurance –Concept - Need - History of Insurance industry in India. Insurance Act, 1938 – IRDA –Regulations –Life Insurance - Annuities and Unit Linked Policies - Lapse of the Policy – revival –settlement of claim	9
<b>Total Instructional Hours</b>		<b>45</b>

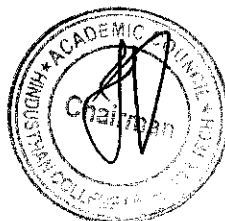
- Course Outcome**
- CO1: Understand the Banking system in India  
CO2: Grasp how banks raise their sources and how they deploy it  
CO3: Understand the development in banking technology  
CO4: Understand the financial services in India  
CO5: Understand the insurance Industry in India

**TEXT BOOKS:**

T1: 1. Padmalatha Suresh and Justin Paul, “Management of Banking and Financial Services, Pearson, Delhi, 2017.

T2: Meera Sharma, “Management of Financial Institutions – with emphasis on Bank and Risk Management”, PHI Learning Pvt. Ltd., New Delhi 2010

  
Chairman, Board of Studies  
**Chairman - BoS**  
**IT - HICET**

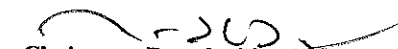


  
Dean (Academics)  
**HICET**


**REFERENCE BOOKS:**

R1: Peter S. Rose and Sylvia C. and Hudgins, "Bank Management and Financial Services", Tata McGraw Hill, New Delhi, 2017

PO & PSO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	2	2	1	2	2	1	2	2	1	1	1	2	2	2
CO2	2	1	-	1	1	1	1	1	2	1	1	2	2	3
CO3	2	2	1	2	2	1	2	2	1	2	1	3	2	2
CO4	3	2	2	2	2	2	2	2	1	1	2	2	3	3
CO5	2	2	1	2	2	1	2	2	1	1	1	2	2	2

  
Chairman, Board of Studies  
Chairman - BOS  
IT - HICET



  
Dean-Academics  
Dean (Academics)  
HICET

Programme	Course Code	Name of the Course	L	T	P	C
BE/B.TECH (MINOR DEGREE)	21BA6601	INTRODUCTION TO NEW BUSINESS VENTURE	3	0	0	3


- Course Objective
1. To create awareness toward development of business idea
  2. To develop value proposing and market segmentation
  3. To demonstrate the benefits of marketing mix
  4. To explore operations management in business
  5. To demonstrate financial forecast for small business units

Unit	Description	Instructional Hours
I	<b>Business Idea</b> New venture typologies-Creating and identifying opportunities-Techniques for exploring change-Techniques for exploring product inadequacies. Defining the market / industry-concentration and geographic spread-Estimating market size-SWOT analysis-selecting appropriate option	9
II	<b>Value proposition and market segmentation</b> New venture creation framework-Generic business models and competitive advantage-Niche business model-Internet business model-Characteristics of good business model-Low cost market testing. Identifying target customers-value proposition-Differentiation through branding-Sustainable entrepreneurship-Mission statement	9
III	<b>Developing marketing mix</b> Product features and benefits-Channels of distribution-Cost, price and volume; pricing decisions-Sales force planning and allocation. Communicating the value proposition-Communications media-Social networks-Guerilla marketing-Publicity, PR and advertising-CRM.	
IV	<b>Managing operations</b> Marketing activities-Retail activities-Internet business activities-Internet business activities. Managing and leading people-Attracting the right people-Using professional advisors-Team building-Organizational structure, design and control-Leadership and management	9
V	<b>Preparing and using financial forecasts</b> Forecast sales turnover, income statement and costs-Forecast breakeven point-SMART Performance metrics-Valuing the business. Business Plan-Difference between business model and business plan-Purpose of a business plan-Structure and components of a business plan-Using the business plan to seek finance-Harvesting the business-	9
<b>Total Instructional Hours</b>		<b>45</b>

- Course Outcome
- CO1: Awareness on business idea generation  
CO2: Develop value proposition and market segmentation for business  
CO3: Marketing mix for various business ventures  
CO4: Able to manage business operations  
CO5: Able to make financial forecast for new business

**Text and References**

1. Paul Burns, New Venture Creation: A Framework for Entrepreneurial Start-ups, MacMillan, 2023
2. A Sahay, V Sharma, Entrepreneurship and new Venture Creation, Excel, 2023
3. Inge Hill, Start-Up: A Practice Based Guide For New Venture Creation, MacMillan, 2023
4. Arya Kumar, Entrepreneurship: Creating and Leading an Entrepreneurial Organization, Pearson, 2023
5. Kathleen R. Allen, Launching New Ventures: An Entrepreneurial Approach, Cengage, 2023
6. Kuratko, New Venture Management: The Entrepreneur's Roadmap, Pearson, 2023

  
**Chairman - BoS  
IT - HICET**



  
**Dean (Academics)  
HICET**

COs	PO1	PO2	PO3	PO4	PO5	PO6	PSO1	PSO2
CO1	3	3	3	3	3	3	3	3
CO2	3	3	3	3	3	3	3	3
CO3	3	3	1	1	1	1	2	2
CO4	3	3	3	3	2	2	2	2
CO5	3	3	3	3	3	3	3	3

*[Handwritten Signature]*  
**Chairman - BoS**  
**IT - HICET**



*[Handwritten Signature]*  
**Dean (Academics)**  
**HICET**



PROGRAMME	COURSE CODE	NAME OF THE COURSE	L	T	P	C
BE/B.TECH (MINOR DEGREE)	21BA6602	TEAM BUILDING & LEADERSHIP MANAGEMENT FOR BUSINESS	3	0	0	3

- Course Objective
1. To provide a framework for the students to understand the importance of Leadership and team effectiveness in organizations.
  2. To develop an understanding of the interpersonal processes and group dynamics.
  3. To provide a theoretical understanding of leadership practices in organizations.
  4. To provide an understanding of factors influencing teamwork and team leadership.
  5. To evaluate the role of leadership in the development of an institution.

Unit	Description	Instructional Hours
I	<b>Introduction to Leadership &amp; Team Management;</b> Leadership Myths; Interactional Framework for analysing leadership; Leadership Development Leader Development- The Action-Observation-Reflection Model ,LMX Theory and Normative Decision Model; Situational Leadership Model; Contingency Model and Path Goal Theory; Emotional Approach Charismatic and Transformational Leadership; Leadership for Tomorrow	9
II	Leadership Attributes; Personality Traits and Leadership; Personality Types and Leadership; Intelligence and Leadership; Emotional Intelligence and Leadership, Power and Leadership; The art of influence in leadership; Leadership and “Doing the Right Things; Character-Based Approach to Leadership; Role of Ethics and Values in Organisational Leadership	9
III	Leadership Behaviour; Leadership Pipeline; Assessing Leadership Behaviours: Multi-rater Feedback Instruments; The Dark Side of; Leadership- Destructive Leadership; Managerial Incompetence and Derailment Conflict Management	9
IV	Negotiation and Leadership; Leadership under a crisis situation; The Situation and the Environment; Culture and Leadership; Global Leadership	9
V	<b>Team Management:</b> Meaning, Types of team, Understand the stages of Team Development skills required for team development, Delegation and Empowerment; Leading teams: Enhancing teamwork within a group; The leader’s role in team-based organizations; Leader actions that foster Teamwork Effectiveness; Offsite training and team development	9
	<b>Understanding Team processes and Team coaching;</b> Team decision making and conflict management; Virtual teams; Managing Multicultural teams; Building great teams; Development Planning: GAP Analysis; Coaching and Mentoring; Building Effective Relationship with subordinates and peers; Fostering Followers satisfaction; The Art of Communication; Setting Goals and Providing Constructive Feedback; Enhancing Creativity problem solving skills Building High-Performance Teams	9
<b>Total Instructional Hours</b>		<b>45</b>

- Course Outcome
- CO1: To understand the concept and the importance of Leadership and team
  - CO2: To understanding of the interpersonal processes and group dynamics
  - CO3: To learn the leadership practices in organizations
  - CO4: To gain knowledge about factors influencing teamwork and team leadership
  - CO5: To gain knowledge on leadership in the development of an institution

**Books & Reference**

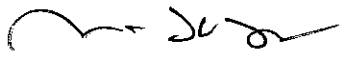
1. Leadership: Enhancing the lessons of experience by Hughes, R.L., Ginnett, R.C., & Curphy, G.J. (2019), 9th Edition, McGraw Hill Education, Chennai, India.
2. Team Building: The Ultimate Guide to Build & Manage Winning Teams (Team Building Activities, Business Management, Leadership Books, Managing) Kindle Edition By Sylvia Reyes (Author)
3. The five dysfunctions of a team- Patrick Lencioni 228 pages, Paperback First published April 11, 2002
4. Icon Team. (2014). Constructive communication in international teams an experience based guide. Münster, DE: Waxmann




Chairman -  
IT - HICET

Dean (Academics)  
HICET

COs	PO1	PO2	PO3	PO4	PO5	PO6	PSO1	PSO2
CO1	3	3	1	1	1	2	3	2
CO2	3	3	2	1	3	3	3	3
CO3	3	3	3	3	3	3	3	3
CO4	3	3	3	3	3	3	3	3
CO5	3	3	1	1	3	3	3	3

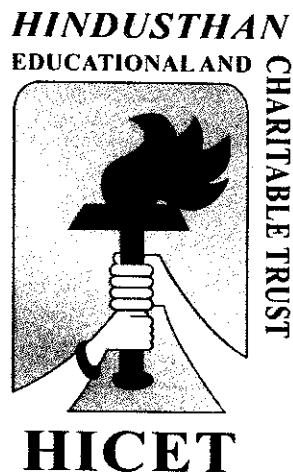
  
**Chairman - BoS**  
**IT - HiCET**



  
**Dean (Academics)**  
**HiCET**

***HINDUSTHAN COLLEGE OF ENGINEERING AND TECHNOLOGY***  
**(An Autonomous Institution Affiliated to Anna University, Chennai)**  
**(Approved by AICTE, New Delhi, Accredited by NAAC with 'A' Grade)**  
**Coimbatore - 641 032.**

**B.TECH. INFORMATION TECHNOLOGY**



**CHOICE BASED CREDIT SYSTEM**

**Revised Curriculum and Syllabus for the Even semester**  
**Academic year 2023-24**

# **CURRICULUM R2022**

**DETAILS OF CHANGES CARRIED OUT IN CURRICULUM & SYLLABUS**

**CBCS PATTERN**

**UNDERGRADUATE PROGRAMMES**

**B.TECH. INFORMATION TECHNOLOGY (UG)**

**REGULATION-2022**

**For the students admitted during the academic year 2022-2023 and onwards**

**SEMESTER I**

S. No	Course Code	Course Title	Category	L	T	P	C	TCP	CIA	ESE	Total
<b>THEORY</b>											
1.	22MA1101	Matrices and Calculus	BSC	3	1	0	4	4	40	60	100
<b>THEORY WITH LAB COMPONENT</b>											
2.	22HE1151	English for Engineers	HSC	2	0	2	3	4	50	50	100
3.	22CY1151	Chemistry for Circuit Engineers	BSC	2	0	2	3	4	50	50	100
4.	22CS1151/ 22CS1152	Problem solving using C programming / Object Oriented Programming using Python	ESC/ICC	2	0	2	3	4	50	50	100
5.	22IT1152	Introduction to Web Application Development	ESC	2	0	2	3	4	50	50	100
<b>EEC COURSES (SE/AE)</b>											
6.	22HE1071	UHV	AEC	2	0	0	2	3	40	60	100
7.	22HE1072	Entrepreneurship & Innovation	AEC	1	0	0	1	1	100	0	100
<b>MANDATORY COURSE</b>											
8.	22MC1091/ 22MC1092	தமிழரும் தொழில் நுட்பமும் / Indian Constitution	MC	2	0	0	0	2	0	0	0
<b>TOTAL</b>				<b>16</b>	<b>1</b>	<b>8</b>	<b>19</b>	<b>26</b>	<b>480</b>	<b>320</b>	<b>800</b>

**SEMESTER II**

S. No	Course Code	Course Title	Category	L	T	P	C	TCP	CIA	ESE	Total
<b>THEORY</b>											
1.	22MA2103	Differential Equations And Linear Algebra	BSC	3	1	0	4	4	40	60	100
2.	22PH2101	Basics of Material Science	BSC	2	0	0	2	3	40	60	100
<b>THEORY WITH LAB COMPONENT</b>											
3.	22HE2151	Effective Technical Communication	HSC	2	0	2	3	4	50	50	100
4.	22PH2151	Physics for Circuit Engineering	BSC	2	0	2	3	4	50	50	100

5.	22IT2251/ 22IT2252	Python programming and Practices/ Relational Database Management System	PCC/ICC	2	0	2	3	4	50	50	100
6.	22IT2253	Dynamic Web Design	PCC	2	0	2	2	4	50	50	100
<b>PRACTICAL</b>											
7.	22ME2001	Engineering Practices	ESC	0	0	4	2	2	60	40	100
<b>EEC COURSES (SE/AE)</b>											
8.	22HE2071	Design Thinking	AEC	2	0	0	2	2	100	0	100
9.	22HE2072	Soft Skills and Aptitude 1	AEC	1	0	0	1	1	100	0	100
<b>MANDATORY COURSE</b>											
10.	22MC2091/ 22MC2092	தமிழர் மரபு / Heritage of Tamils	MC	2	0	0	0	1	0	0	0
11.	22MC2093	NCC */NSS / YRC / Sports / Clubs / Society Service - Enrollment (Common)	MC	All students shall enroll, on admission, in anyone of the personality and character development programmes and undergo training for about 80 hours							
<b>TOTAL</b>				<b>17</b>	<b>1</b>	<b>14</b>	<b>22</b>	<b>32</b>	<b>640</b>	<b>360</b>	<b>1000</b>

### SEMESTER III

S. No	Course Code	Course Title	Category	L	T	P	C	TCP	CIA	ESE	Total
<b>THEORY</b>											
1.	22MA3101	Applied Statistics and Queuing Theory	BSC	3	1	0	4	4	40	60	100
2.	22IT3201	Data Structures	PCC	3	0	0	3	4	40	60	100
3.	22IT3202	Operating System	PCC	3	1	0	4	4	40	60	100
4.	22IT3203	Digital Principles and Computer Organization	ESC	3	0	0	3	3	40	60	100
<b>THEORY WITH LAB COMPONENT</b>											
5.	22IT3251/ 22IT3252	Java Programming/ Data Visualization	PCC/ICC	3	0	2	4	4	50	50	100
<b>PRACTICAL</b>											
6.	22IT3001	Operating System Laboratory	PCC	0	0	4	2	4	60	40	100
7.	22IT3002	Digital Principles and Computer Organization Laboratory	ESC	0	0	4	2	4	60	40	100
<b>EEC COURSES (SE/AE)</b>											
8.	22HE3071	Soft Skills and Aptitude-II (Common)	SEC	0	0	0	1	1	100	0	100
9.	22IT3003	Data Structures Laboratory	AEC	0	0	4	2	4	60	40	100
<b>MANDATORY COURSE</b>											
10.	22MC3191	Essence of Indian Traditional Knowledge	MC	2	0	0	0	2	40	60	100
<b>TOTAL</b>				<b>17</b>	<b>2</b>	<b>14</b>	<b>25</b>	<b>34</b>	<b>530</b>	<b>470</b>	<b>1000</b>

**SEMESTER IV**

S. No	Course Code	Course Title	Category	L	T	P	C	TC P	CIA	ESE	Total
<b>THEORY</b>											
1.	22HE4101	IPR and Start-ups	HSC	2	0	0	2	2	40	60	100
2.	22IT4201	Design and Analysis of Algorithms	PCC	3	0	0	3	4	40	60	100
3.	22IT4202	Computer Networks	PCC	3	0	0	3	3	40	60	100
4.	22IT4203 / 22IT4204	Object Oriented Software Engineering / Design Thinking	PCC	3	0	0	3	3	40	60	100
<b>THEORY WITH LAB COMPONENT</b>											
5.	22IT4251	Web Framework	PCC	2	0	2	4	4	50	50	100
6.	22IT4252	Database Management System	PCC	2	0	2	4	4	50	50	100
<b>PRACTICAL</b>											
7.	22IT4001 / 22IT4003	Case Tools Laboratory / Design Thinking Laboratory	PCC	0	0	4	1.5	4	60	40	100
8.	22IT4002	Network Laboratory	PCC	0	0	4	1.5	4	60	40	100
<b>EEC COURSES (SE/AE)</b>											
9.	22HE4071	Soft Skills AND APTITUDE III	SEC	1	0	0	1	1	100	0	100
<b>TOTAL</b>				<b>16</b>	<b>0</b>	<b>12</b>	<b>23</b>	<b>29</b>	<b>480</b>	<b>420</b>	<b>900</b>
<p>* Two weeks internship carries 1 credit and it will be done during Semester III summer vacation and same will be evaluated in Semester IV.                      If students unable to undergo in semester III, then the Internship I offered in the semester IV can be clubbed with Internship II (Total: 4 weeks-2 credits)</p>											

**SEMESTER V**

S. No	Course Code	Course Title	Category	L	T	P	C	TC P	CIA	ESE	Total
<b>THEORY</b>											
1.	22IT5201	IOT and it Applications	PCC	3	1	0	4	4	40	60	100
2.	22IT5202	Compiler Design	PCC	3	0	0	3	3	40	60	100
3.	22IT53XX	Professional Elective-1	PEC	3	0	0	3	3	40	60	100
4.	22IT53XX	Professional Elective-2	PEC	3	0	0	3	3	40	60	100
5.	22IT53XX	Professional Elective-3	PEC	3	0	0	3	3	40	60	100
<b>THEORY WITH LAB COMPONENT</b>											
6.	22IT5251/ 22IT5252	Artificial Intelligence & Machine Learning / Business Intelligence	PCC/ICC	2	0	2	3	4	50	50	100
<b>PRACTICAL</b>											
7.	22IT5001	Compiler Design Laboratory	PCC	0	0	4	2	4	60	40	100
<b>EEC COURSES (SE/AE)</b>											
8.	22HE5071	Soft Skills -4/ Foreign languages	SEC	1	0	0	1	1	100	0	100
<b>TOTAL</b>				<b>18</b>	<b>1</b>	<b>6</b>	<b>22</b>	<b>25</b>	<b>410</b>	<b>390</b>	<b>800</b>

**SEMESTER VI**

S. No	Course Code	Course Title	Category	L	T	P	C	TCP	CIA	ESE	Total
<b>THEORY</b>											
1.	22IT6201/ 22IT6202	Foundation of Data Science / Data Science	PCC	3	0	0	3	3	40	60	100
2.	22HE6101	Professional Ethics	HSC	3	0	0	3	3	40	60	100
3.	22IT63XX/ 22IT6313	Professional Elective - 4/ Predictive Modeling	PEC/ ICC	3	0	0	3	3	40	60	100
4.	22IT63XX	Professional Elective-5	PEC/ ICC	3	0	0	3	3	40	60	100
5.	22XX64XX	Open Elective – 1*	OEC	3	0	0	3	3	40	60	100
6.	22XX64XX	Open Elective – 2*	OEC	3	0	0	3	3	40	60	100
7.	22CY6101	Environmental Science	ESC	2	0	0	2	3	40	60	100
<b>PRACTICAL</b>											
8.	22IT6001	Data Science Laboratory	PCC	0	0	4	2	4	60	40	100
<b>EEC COURSES (SE/AE)</b>											
9.	22HE6071	Soft Skills – 5	SEC	2	0	0	2	2	100	0	100
<b>TOTAL</b>				<b>22</b>	<b>0</b>	<b>4</b>	<b>24</b>	<b>27</b>	<b>440</b>	<b>460</b>	<b>900</b>

**SEMESTER VII**

S. No	Course Code	Course Title	Category	L	T	P	C	TCP	CIA	ESE	Total
<b>THEORY</b>											
1.	22IT7201	Cryptography and Network Security	PCC	3	0	0	3	3	40	60	100
2.	22IT7202	Data Warehousing and Data Mining	PCC	3	1	0	4	4	40	60	100
3.	22IT73XX/ 22IT7307	Professional Elective-6 / Big Data with Security	PEC	3	0	0	3	3	40	60	100
4.	22XX74XX	Open Elective – 3*	OEC	3	0	0	3	3	40	60	100
5.	22XX74XX	Open Elective – 4*	OEC	3	0	0	3	3	40	60	100
<b>PRACTICAL</b>											
6.	22IT7001	Cryptography and Network Security Laboratory	PCC	0	0	4	2	4	60	40	100
<b>EEC COURSES (SE/AE)</b>											
7.	22IT7701	Internship - II*	SEC	0	0	0	2	2	100	0	100
<b>TOTAL</b>				<b>15</b>	<b>1</b>	<b>4</b>	<b>20</b>	<b>22</b>	<b>360</b>	<b>340</b>	<b>700</b>
* - Two weeks internship carries 1 credit and it will be done during Semester VI summer vacation/placement training and same will be evaluated in Semester VII.											

**SEMESTER VIII**

S. No	Course Code	Course Title	Category	L	T	P	C	TCP	CIA	ESE	Total
<b>EEC COURSES (SE/AE)</b>											
1.	22IT8901	Project Work/Granted Patent	SEC	0	0	20	10	20	100	100	200
<b>TOTAL</b>				<b>0</b>	<b>0</b>	<b>20</b>	<b>10</b>	<b>20</b>	<b>100</b>	<b>100</b>	<b>200</b>



**Note:**

1. \*As per the AICTE guideline, in Semesters I, II, III & IV NCC one credit subject is added as Value Added Course with Extra Credit. Further, the students who enrolled his/her name in HICET NCC and Air Wing are eligible to undergo this subject. The earned extra credits printed in the Consolidated Mark sheet as per the regulation.
2. NCC course level 1 & Level 2 will be added in the list of open elective subjects in the appropriate semester. Further, the students' who have opted NCC subjects in Semester I, II, III & IV are eligible to undergo NCC Open Elective Subjects.
3. The above-mentioned NCC Courses will be offered to the students who are going to be admitted in the Academic Year 2021 – 22.

**OPEN ELECTIVE I AND II (EMERGING TECHNOLOGIES)**

To be offered for the students other than CSE, IT, AI&ML, ECE & BIOMEDICAL

S. NO.	COURSE CODE	COURSE TITLE	CATE GORY	PERIODS PER WEEK			TOTAL CONTACT PERIODS	CREDITS
				L	T	P		
1	22AI6451	Artificial Intelligence and Machine Learning Fundamentals	OEC	2	0	2	4	3
2	22CS6451	BlockChain Technology	OEC	2	0	2	4	3
3	22EC6451	Cyber security	OEC	2	0	2	4	3
4	22EC6452	IoT Concepts and Applications	OEC	2	0	2	4	3
5	22IT6451	Data Science and Analytics	OEC	2	0	2	4	3
6	22BM6451	Augmented and Virtual Reality	OEC	2	0	2	4	3

**OPEN ELECTIVE I AND II**

To be offered for the students other than AUTO, AERO, AGRI, MECH, MCTS, CIVIL, EEE, CHEMICAL, FOOD TECH, E&I

S. NO.	COURSE CODE	COURSE TITLE	CATE GORY	PERIODS PER WEEK			TOTAL CONTACT PERIODS	CREDITS
				L	T	P		
1	22AE6401	Space Science	OEC	3	0	0	3	3
2	22MT6401	Introduction to Industrial Engineering	OEC	3	0	0	3	3
3	22MT6402	Industrial Safety and Environment	OEC	3	0	0	3	3
4	22CE6401	Climate Change and its Impact	OEC	3	0	0	3	3
5	22CE6402	Environment and Social Impact Assessment	OEC	3	0	0	3	3
6	22ME6401	Renewable Energy System	OEC	3	0	0	3	3
7	22ME6402	Additive Manufacturing systems	OEC	3	0	0	3	3
8	22EI6401	Introduction to Industrial	OEC	3	0	0	3	3

		Instrumentation and Control						
9	22E16402	Graphical Programming using Virtual Instrumentation	OEC	3	0	0	3	3
10	22AU6401	Fundamentals of Automobile Engineering	OEC	3	0	0	3	3
11	22AU6402	Automotive Vehicle Safety	OEC	3	0	0	3	3
12	22EE6401	Digital Marketing	OEC	3	0	0	3	3
13	22EE6402	Research Methodology	OEC	3	0	0	3	3
14	22FT6401	Traditional Foods	OEC	3	0	0	3	3
15	22AG6401	Urban Agriculture and Organic Farming	OEC	3	0	0	3	3
16	22CH6401	Biomass and Biorefinery	OEC	3	0	0	3	3

**Note:** Non-Circuit Departments can add one Open Elective course in the above list to offer for the circuit branches

### OPEN ELECTIVE III

Students shall choose any one of the open elective courses such that the course content or title not belong to their own programme.

(Note: Each programme in our institution is expected to provide one course only)

S. NO.	COURSE CODE	COURSE TITLE	CATE GORY	PERIODS PER WEEK			TOTAL CONTACT PERIODS	CREDITS
				L	T	P		
1	22IT7401	Disaster Management	OEC	3	0	0	3	3

### OPEN ELECTIVE IV

S. NO.	COURSE CODE	COURSE TITLE	CATE GORY	PERIODS PER WEEK			TOTAL CONTACT PERIODS	CREDITS
				L	T	P		
1	22LS7401	General studies for competitive examinations	OEC	3	0	0	3	3
2	22LS7402	Human Rights, Women Rights and Gender equity	OEC	3	0	0	3	3
3	22LS7403	Indian ethos and Human values	OEC	3	0	0	3	3
4	22LS7404	Financial independence and management	OEC	3	0	0	3	3
5	22LS7405	Yoga for Human Excellence	OEC	3	0	0	3	3
6	22LS7406	Democracy and Good Governance	OEC	3	0	0	3	3
7	22LS7407	NCC Level - II	OEC	3	0	0	3	3

**PROFESSIONAL ELECTIVE COURSES: VERTICALS**

<b>Vertical I Data Science</b>	<b>Vertical II Full Stack Development for IT</b>	<b>Vertical III Cloud Computing and Data Centre Technologies</b>	<b>Vertical IV Internet of things</b>	<b>Vertical V Creative Media</b>	<b>Vertical VI Emerging Technologies</b>
<b>22IT5301</b> Exploratory Data Analysis	<b>22IT5304</b> Cloud Computing	<b>22IT5307</b> Security and Privacy in Cloud	<b>22IT5310</b> Fundamentals of IoT & Cloud	<b>22IT5313</b> Multimedia Data Compression and Storage	<b>22IT5316</b> Augmented Reality
<b>22IT5302</b> Recommender Systems	<b>22 IT5305</b> App Development	<b>22IT5308</b> Virtualization	<b>22IT5311</b> IoT Architectures and Protocols	<b>22IT5314</b> Multimedia and Animation	<b>22IT5317</b> Robotic Process Automation
<b>22IT5303</b> Computer Vision	<b>22IT5306</b> Cloud Services Management	<b>22IT5309</b> Stream Processing	<b>22IT5312</b> Architecting Smart IoT Devices	<b>22IT5315</b> Video Creation and Editing	<b>22IT5318</b> Neural Networks and Deep Learning
<b>22IT6301</b> Text and Speech Analysis	<b>22IT6303</b> Dev-ops	<b>22IT6305</b> Data Warehousing	<b>22IT6307</b> Fog Computing & Energy Management In Iot Devices	<b>22IT6309</b> UI and UXDesign	<b>22IT6311</b> Cyber security
<b>22IT6302</b> Big Data Analytics	<b>22IT6304</b> Software Testingand Automation	<b>22IT6306</b> Storage Technologies	<b>22IT6308</b> IoT cloud and data analytics	<b>22IT6310</b> Digital marketing	<b>22IT6312</b> Quantum Computing
<b>22IT7301</b> Image and video analytics	<b>22IT7302</b> Web Application Security	<b>22IT7303</b> Software Defined Networks	<b>22IT7304</b> IOT Security	<b>22IT7305</b> Visual Effects	<b>22IT7306</b> Cryptocurrency and Block chain Technologies

Students are permitted to choose all Professional Electives from a particular vertical or from different verticals.

**PROFESSIONAL ELECTIVE COURSES: VERTICALS**

**Details of Vertical I: Data Science**

<b>S. NO.</b>	<b>COURSE CODE</b>	<b>COURSE TITLE</b>	<b>CATE GORY</b>	<b>PERIODS PER WEEK</b>			<b>TOTAL CONTACT PERIODS</b>	<b>CREDITS</b>
				<b>L</b>	<b>T</b>	<b>P</b>		
<b>1.</b>	<b>22IT5301</b>	Exploratory Data Analysis	PEC	3	0	0	3	3
<b>2.</b>	<b>22IT5302</b>	Recommender Systems	PEC	3	0	0	3	3
<b>3.</b>	<b>22IT5303</b>	Computer Vision	PEC	3	0	0	3	3
<b>4.</b>	<b>22IT6301</b>	Text and Speech Analysis	PEC	3	0	0	3	3
<b>5.</b>	<b>22IT6302</b>	Big Data Analytics	PEC	3	0	0	3	3
<b>6.</b>	<b>22IT7301</b>	Image and video analytics	PEC	3	0	0	3	3

### Details of Vertical II: Full Stack Development for IT

S. NO.	COURSE CODE	COURSE TITLE	CATE GORY	PERIODS PER WEEK			TOTAL CONTACT PERIODS	CREDITS
				L	T	P		
1.	22IT5304	Cloud Computing	PEC	3	0	0	3	3
2.	22IT5305	App Development	PEC	3	0	0	3	3
3.	22IT5306	Cloud ServicesManagement	PEC	3	0	0	3	3
4.	22IT6303	Dev-ops	PEC	3	0	0	3	3
5.	22IT6304	Software Testing and Automation	PEC	3	0	0	3	3
6.	22IT7302	Web Application Security	PEC	3	0	0	3	3

### Details of Vertical III: Cloud Computing and Data Centre Technologies

S. NO.	COURSE CODE	COURSE TITLE	CATE GORY	PERIODS PER WEEK			TOTAL CONTACT PERIODS	CREDITS
				L	T	P		
1.	22IT5307	Security and Privacy inCloud	PEC	3	0	0	3	3
2.	22IT5308	Virtualization	PEC	3	0	0	3	3
3.	22IT5309	Stream Processing	PEC	3	0	0	3	3
4.	22IT6305	Data Warehousing	PEC	3	0	0	3	3
5.	22IT6306	Storage Technologies	PEC	3	0	0	3	3
6.	22IT7303	Software DefinedNetworks	PEC	3	0	0	3	3

### Details of Vertical IV: Internet of Things

S. NO.	COURSE CODE	COURSE TITLE	CATE GORY	PERIODS PER WEEK			TOTAL CONTACT PERIODS	CREDITS
				L	T	P		
1.	22IT5310	Fundamentals of IoT & Cloud	PEC	3	0	0	3	3
2.	22IT5311	IoT Architectures and Protocols	PEC	3	0	0	3	3
3.	22IT5312	Architecting Smart IoT Devices	PEC	3	0	0	3	3
4.	22IT6307	Fog Computing & Energy Management In Iot Devices	PEC	3	0	0	3	3
5.	22IT6308	IoT cloud and data analytics	PEC	3	0	0	3	3
6.	22IT7304	IOT Security	PEC	3	0	0	3	3

### Details of Vertical V: Creative Media

S. NO.	COURSE CODE	COURSE TITLE	CATE GORY	PERIODS PER WEEK			TOTAL CONTACT PERIODS	CREDITS
				L	T	P		
1.	22IT5313	Multimedia Data Compression and Storage	PEC	3	0	0	3	3
2.	22IT5314	Multimedia and Animation	PEC	3	0	0	3	3
3.	22IT5315	Video Creation and Editing	PEC	3	0	0	3	3
4.	22IT6309	UI and UX Design	PEC	3	0	0	3	3
5.	22IT6310	Digital marketing	PEC	3	0	0	3	3
6.	22IT7305	Visual Effects	PEC	3	0	0	3	3

### Details of Vertical VI: Emerging Technologies

S. NO.	COURSE CODE	COURSE TITLE	CATE GORY	PERIODS PER WEEK			TOTAL CONTACT PERIODS	CREDITS
				L	T	P		
1.	22IT5316	Augmented Reality	PEC	3	0	0	3	3
2.	22IT5317	Robotic Process Automation	PEC	3	0	0	3	3
3.	22IT5318	Cognitive Science and Deep Learning	PEC	3	0	0	3	3
4.	22IT6311	Cyber security	PEC	3	0	0	3	3
5.	22IT6312	Quantum Computing	PEC	3	0	0	3	3
6.	22IT7306	Cryptocurrency and Blockchain Technologies	PEC	3	0	0	3	3

#### Enrollment for B.E. / B. TECH. (HONOURS) / Minor Degree (optional)

A student can also optionally register for additional courses (18 credits) and become eligible for the award of B.E. / B. Tech. (Honours) or Minor Degree. For B.E. / B. Tech. (Honours), a student shall register for the additional courses (18 credits) from semester V onwards. These courses shall be from the same vertical or a combination of different verticals of the same programme of study only. For minor degree, a student shall register for the additional courses (18 credits) from semester V onwards. All these courses have to be in a particular vertical from any one of the other programmes.

**Clause 4.10** of Regulation 2022 is applicable for the Enrolment of B.E. / B. TECH. (HONOURS) / Minor Degree (Optional).

#### VERTICALS FOR MINOR DEGREE

- Heads are requested to provide one vertical from their program to offer for other program students to register for additional courses (18 Credits) to become eligible for the B.E./B.Tech. Minor Degree.

Note: Each programme should provide verticals for minor degree

S. NO.	COURSE CODE	COURSE TITLE	CATE GORY	PERIODS PER WEEK			TOTAL CONTACT PERIODS	CREDITS
				L	T	P		
1.	22IT5601	Sem 5: Database System	MDC	3	0	0	3	3
2.	22IT6601	Sem 6: Fundamentals of Data Science	MDC	3	0	0	3	3
3.	22IT6602	Sem 6: Artificial Intelligence and Expert Systems	MDC	3	0	0	3	3
4.	22IT7601	Sem 7: Data Exploration and Visualization	MDC	3	0	0	3	3
5.	22IT7602	Sem 7: Business Intelligence	MDC	3	0	0	3	3
6.	22IT8601	Sem 8: Cyber Security	MDC	3	0	0	3	3

\*MDC – Minor Degree Course

In addition to the above the following additional courses for Minor Degree can also be given to the student's common to all the branches.

Vertical I Fintech and Block Chain	Vertical II Entrepreneurship	Vertical III Environment and Sustainability
Financial Management	Foundations of Entrepreneurship	Sustainable infrastructure Development
Fundamentals of Investment	Team Building & Leadership Management for Business	Sustainable Agriculture and Environmental Management
Banking, Financial Services and Insurance	Creativity & Innovation in Entrepreneurship	Sustainable Bio Materials
Introduction to Blockchain and its Applications	Principles of Marketing Management for Business	Materials for Energy Sustainability
Fintech Personal Finance and Payments	Human Resource Management for Entrepreneurs	Green Technology
Introduction to Fintech	Financing New Business Ventures	Environmental Quality Monitoring and Analysis

### B Tech (Hons) Information Technology with Specialization in Artificial Intelligence and Machine Learning

S.No.	Course Code	Course Title	Category	Periods per Week				TCP	CIA	ESE	Total
				L	T	P	C				
1.	22IT5203	Foundations of Machine Learning	PC	3	0	0	3	4	40	60	100
2.	22IT6203	Knowledge Engineering	PC	3	0	0	3	4	40	60	100
3.	22IT6204	Soft Computing	PC	3	0	0	3	4	40	60	100
4.	22IT7203	Optimization Techniques	PC	3	0	0	3	4	40	60	100
5.	22IT7204	Deep Learning	PC	3	0	0	3	4	40	60	100
6.	22IT8201	Game theory	PC	3	0	0	3	4	40	60	100

### B Tech (Hons) Information Technology with Specialization in Cyber Security

S.No.	Course Code	Course Title	Category	Periods per Week				TCP	CIA	ESE	Total
				L	T	P	C				
1.	22IT5204	Ethical Hacking	PC	3	0	0	3	3	40	60	100
2.	22IT6205	Digital and Mobile Forensics	PC	3	0	0	3	3	40	60	100
3.	22IT6206	Social Network Security	PC	3	0	0	3	3	40	60	100
4.	22IT7206	Engineering Secure Software Systems	PC	3	0	0	3	3	40	60	100
5.	22IT7207	Cryptocurrency and Blockchain Technologies	PC	3	0	0	3	3	40	60	100
6.	22IT8202	Network Security	PC	3	0	0	3	3	40	60	100

### B Tech (Hons) Information Technology with Specialization in BlockChain Technology

S.No.	Course Code	Course Title	Category	Periods per Week				TCP	CIA	ESE	Total
				L	T	P	C				
1.	22IT5205	Fundamentals of Blockchain Technology	PC	3	0	0	3	3	40	60	100
2.	22IT6207	Blockchain Architecture and Design	PC	3	0	0	3	3	40	60	100
3.	22IT6208	Building Private Blockchain	PC	3	0	0	3	3	40	60	100
4.	22IT7208	Blockchain Business Models	PC	3	0	0	3	3	40	60	100
5.	22IT7209	Blockchain and IoT	PC	3	0	0	3	3	40	60	100
6.	22IT8203	Blockchain and AI	PC	3	0	0	3	3	40	60	100

Note: Each programme should provide verticals for Honours degree

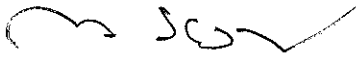
Sem. No	Course	Course Title	L	T	P	C	TCP	CIA	ESE	TOTAL
<b>SKILLED / INTEGRATED COURSES OFFERED THROUGH CHOICE BASED CREDIT SYSTEM</b>										
1	22CS1152	Object Oriented Programming using Python	2	0	2	3	4	50	50	100
2	22IT2252	Relational Database Management System	2	0	2	3	4	50	50	100
3	22IT3252	Data Visualization	3	0	2	4	4	50	50	100
4	22IT4204	Design Thinking	3	0	0	3	3	40	60	100
4	22IT4003	Design Thinking Laboratory	0	0	4	1.5	4	60	40	100
5	22IT5252	Predictive Modeling	2	0	2	3	4	50	50	100
6	22IT6313	Business Intelligence	3	0	0	3	3	40	60	100
6	22IT6314	Big Data and Security	3	0	0	3	3	40	60	100
7	22IT7205	Data Science	3	1	0	4	4	40	60	100
7	22IT7002	Data Science Laboratory	0	0	4	2	4	60	40	100

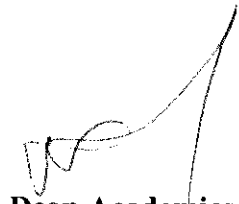
**SEMESTER-WISE CREDIT DISTRIBUTION**


<b>B.E. / B.TECH. PROGRAMMES</b>										
<b>S.No.</b>	<b>Course Area</b>	<b>Credits per Semester</b>								<b>Total Credits</b>
		<b>I</b>	<b>II</b>	<b>III</b>	<b>IV</b>	<b>V</b>	<b>VI</b>	<b>VII</b>	<b>VIII</b>	
1	HSC	3	3	-	2	-	3	-	-	11
2	BSC	7	9	4	-	-	-	-	-	23
3	ESC	6	2	5	-	-	2	-	-	15
4	PCC	-	5	13	20	12	5	9	-	61
5	PEC	-	-	-	-	9	6	3	-	18
6	OEC	-	-	-	-	-	6	6	-	12
7	EEC	3	3	3	1	1	2	2	10	25
8	MCC	✓	✓	-	-	-	-	-	-	-
<b>Total</b>		<b>19</b>	<b>22</b>	<b>25</b>	<b>23</b>	<b>22</b>	<b>24</b>	<b>20</b>	<b>10</b>	<b>165</b>

**CREDIT DISTRIBUTION R2022**

<b>Semester</b>	<b>I</b>	<b>II</b>	<b>III</b>	<b>IV</b>	<b>V</b>	<b>VI</b>	<b>VII</b>	<b>VIII</b>	<b>Total</b>
<b>Credits</b>	19	22	25	23	22	24	20	10	165

  
**Chairman BoS**  
**Chairman - BoS**  
**IT - HICET**

  
**Dean Academics**  
**Dean (Academics)**  
**HICET**

  
**Principal**  
**PRINCIPAL**  
**Hindusthan College Of Engineering & Technology**  
**COIMBATORE - 641 032.**



**SEMESTER - IV**  
**SYLLABUS**

**SEMESTER IV**

Programme	Course code	Name of the course	L	T	P	C
B.TECH.	22IT4201	DESIGN AND ANALYSIS OF ALGORITHMS	3	0	0	3

**The student should be able to**

**Course Objective**

- 1 Analyze the performance of algorithms
- 2 Understand the various designing techniques and methods for algorithms
- 3 Understand and design algorithms using greedy strategy, divide and conquer approach and dynamic programming
- 4 Solve problems using greedy approach
- 5 Understand the Backtracking and Branch and Bound problems

Unit	Description	Instructional Hours
	<b>ALGORITHM ANALYSIS TECHNIQUES</b>	
I	Notion of an Algorithm - Fundamentals of Algorithmic Problem Solving – Important Problem Types – Fundamentals of the Analysis of Algorithmic Efficiency – Asymptotic Notations and their properties. Analysis Framework - Mathematical analysis for Recursive and Non-recursive algorithms.	9
	<b>BRUTE FORCE and DIVIDE-AND-CONQUER</b>	
II	Brute Force - Selection sort- Exhaustive Search - Travelling Salesman Problem - Knapsack Problem - Assignment problem. Divide-And Conquer-Binary Search - Merge sort - Quick sort - Finding maximum and minimum in an array	9
	<b>DYNAMIC PROGRAMMING</b>	
III	Principle of optimality- Computing a Binomial Coefficient – Warshall’s algorithm- Floyd’s algorithm – Optimal Binary Search Trees – Knapsack Problem and Memory functions.	9
	<b>GREEDY APPROACH</b>	
IV	Container loading problem-Prim’s algorithm and Kruskal’s Algorithm - Dijkstra’s Algorithm- 0/1 Knapsack problem, Optimal Merge pattern – Huffman Trees.	9
	<b>BACKTRACKING AND BRANCH AND BOUND</b>	
V	Backtracking – n-Queen problem – Hamiltonian Circuit Problem – Subset Sum Problem- Graph coloring-Branch and Bound – LIFO Search and FIFO search - Assignment problem – Knapsack Problem – Travelling Salesman Problem.	9
	<b>Total Instructional Hours</b>	<b>45</b>

**Upon completion of the course, the students will be able to**

- |                       |     |                                                                                           |
|-----------------------|-----|-------------------------------------------------------------------------------------------|
| <b>Course Outcome</b> | CO1 | Analyze the time and space complexity of algorithms                                       |
|                       | CO2 | Derive and solve recurrences describing the performance of divide-and-conquer algorithms. |

*[Signature]*  
 Chairman, Board of Studies  
**Chairman - BoS**  
**IT - HICET**



*[Signature]*  
 Dean Academics  
**Dean (Academics)**  
**HICET**

- CO3 Analyze the different algorithm design techniques for a given problem
- CO4 EApply graphs to model engineering problems
- CO5 Solve complex problems using backtracking .branch and bound techniques.

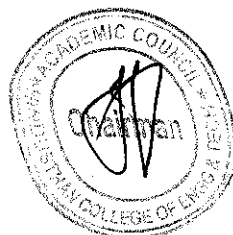
**TEXT BOOK:**

T1 AnanyLevitin, "Introduction to the Design and Analysis of Algorithms", Third Edition, Pearson Education, 2012

**REFERENCES:**

- R1 Ellis Horowitz, SartajSahni and SanguthevarRajasekaran, "Computer Algorithms/ C++", Second Edition, Universities Press, 2008.
- R2 Thomas H.Cormen, Charles E.Leiserson, Ronald L. Rivest and Clifford Stein, "Introduction to Algorithms", Third Edition, PHI Learning Private Limited, 2012.
- R3 Sara Baase and Allen Van Gelder, "Computer Algorithms: Introduction to Design and Analysis", Pearson Publications, 3rd Edition, 2008.

PO & PSO	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO3
CO1	2	3	3	2	-	-	-	-	-	-	-	-	2	2	2
CO2	3	2	2	2	-	-	-	-	1	-	1	-	2	2	2
CO3	3	3	3	2	-	-	-	-	1	-	2	-	2	2	2
CO4	3	3	3	2	1	-	-	-	1	-	3	-	2	-	2
CO5	3	3	3	2	1	-	-	-	1	-	1	-	2	2	2



Chairman, Board of Studies  
**Chairman - BoS**  
**IT - HICET**

Dean - Academics  
**Dean (Academics)**  
**HICET**

<b>Programme</b>	<b>Course code</b>	<b>Name of the course</b>	<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
B.TECH.	21IT4202	COMPUTER NETWORKS	3	0	0	3

The student should be able

- |                         |   |                                                                                       |
|-------------------------|---|---------------------------------------------------------------------------------------|
| <b>Course Objective</b> | 1 | To study the Protocol Layering and Physical Level Communication.                      |
|                         | 2 | To understand the Data Communication System and the purpose of Layered Architecture.  |
|                         | 3 | To analyze the concepts of Routing Methods and Sub-netting.                           |
|                         | 4 | To learn the functions of Network Layer and the various Routing Protocols.            |
|                         | 5 | To familiarize the functions and Protocols of the Transport Layer & Application Layer |

<b>Unit</b>	<b>Description</b>	<b>Instructional Hours</b>
<b>OVERVIEW &amp; PHYSICAL LAYER</b>		
<b>I</b>	Introduction - Network Types - TCP/IP Protocol suits - OSI Reference Model - Network Topologies - Physical Layer: Transmission Media: Guided Media, Unguided Media - Switching-Circuit Switched Networks-Packet Switching	9
<b>DATA LINK LAYER</b>		
<b>II</b>	Introduction - Link-Layer Addressing - DLC Services: Error detection and correction - Data-Link Layer Protocols - HDLC- PPP - Media Access Control - Wired LANs: Ethernet - Wireless LANs - Introduction -IEEE 802.11, Bluetooth - Connecting Devices.	9
<b>NETWORK AND ROUTING</b>		
<b>III</b>	Network Layer Services - Packet switching - Performance - IPV4 Addresses - Forwarding of IP Packets - Network Layer Protocols: IP, ICMP v4 - Unicast Routing Algorithms- IPV6 Addressing - IPV6 Protocol.	9
<b>TRANSPORT LAYER</b>		
<b>IV</b>	Introduction - Transport Layer Protocols - Services - Port Numbers - User Datagram Protocol - Transmission Control Protocol - SCTP.	9
<b>APPLICATION LAYER</b>		
<b>V</b>	WWW and HTTP - FTP - Email -Telnet -SSH - DNS - SNMP.	9
<b>Total Instructional Hours</b>		<b>45</b>
<b>Course Outcome</b>	CO1	Learn about the Protocol Layering and Physical Level Communication
	CO2	Understand the Data Communication System and the purpose of Layered Architecture.
	CO3	Analyze the concepts of Routing Methods and Subnetting.
	CO4	Describe the protocols for various functions in the Network.
	CO5	Analyze the working of various Transport and application layer protocols

**TEXT BOOK:**

- T1 Larry Peterson, Bruce Davie, Computer Networks: A Systems Approach, Elsevier, Online Edition, 2019
- T2 Behrouz A. Forouzan, Data Communications and Networking with TCP/IP Protocol Suite, Sixth Edition TMH, 2022

**REFERENCES:**

- R1 Larry L. Peterson, Bruce S. Davie, Computer Networks: A Systems Approach, Fifth Edition, Morgan Kaufmann Publishers Inc., 2012.
- R2 William Stallings, Data and Computer Communications, Tenth Edition, Pearson Education, 2013.
- R3 Nader F. Mir, Computer and Communication Networks, Second Edition, Prentice Hall, 2014.
- R4 Ying-Dar Lin, Ren-Hung Hwang, Fred Baker, "Computer Networks: An Open Source Approach", McGraw Hill, 2012..




*[Signature]*  
 Chairman, Board of Studies  
**Chairman - BoS**  
**IT - HICET**

*[Signature]*  
 Dean-Academics  
**Dean (Academics)**  
**HICET**

PO & PSO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	2	2	2	2	-	-	-	-	-	-	1	1	1	1
CO2	2	1	2	1	2	-	-	-	-	-	-	1	1	3	3
CO3	2	1	2	1	2	-	-	-	-	-	-	1	1	2	2
CO4	3	3	3	1	2	-	-	-	-	-	-	1	3	3	3
CO5	3	3	2	3	2	-	-	-	-	-	-	1	2	2	2



  
 Chairman, Board of Studies  
 Chairman - 603  
 IT - HiCET

  
 Dean - Academics  
 Dean (Academics)  
 HiCET

Programme	Course code	Name of the course	L	T	P	C
BE/B.Tech	22IT4203	OBJECT ORIENTED SOFTWARE ENGINEERING	3	0	0	3

**The student should be made to:**

- Course Objective**
- 1 Learn various Software Development Life Cycle Models.
  - 2 Understand how to gather and analyze the customer requirements.
  - 3 Learn design concepts and different architectural styles for designing software.
  - 4 Understand various testing methods to verify and validate the software.
  - 5 Study the metrics and how to manage the artifacts of the software project.

Unit	Description	Instructional Hours
	<b>SOFTWARE PROCESS AND AGILE DEVELOPMENT</b>	
I	Defining software- software engineering- software process, generic process model perspective process models: waterfall models -increment process models – evolutionary process models-concurrent models introduction to agility-agile process-extreme programming(XP) case study	9
	<b>REQUIREMENTS ANALYSIS AND SPECIFICATION</b>	
II	Requirements engineering - Eliciting requirements -Developing use cases -Building the requirements model -Elements of the requirements- Validating requirements - Software Requirement Specification- UML diagrams– use case model – class diagrams.	9
	<b>SOFTWARE DESIGN</b>	
III	Design process- Design concepts- Modularity-Information hiding -Functional independence-Design classes- Design model elements – Architectural styles- Data Flow Diagram -Architectural mapping using data flow-UML diagrams: Interaction diagrams–Activity diagrams – State chart diagrams	9
	<b>SOFTWARE TESTING AND DEBUGGING</b>	
IV	White-Box Testing: basis path testing- Loop testing; Black-Box Testing: equivalence partitioning- boundary value analysis; Verification and Validation- software testing strategy- criteria for completion of testing - Unit testing-Integration testing- Regression testing- Smoke testing - Alpha and Beta testing- System testing-debugging process.	9
	<b>PROJECT MANAGEMENT AND METRICS</b>	
V	Project management concepts: People - Product - Process -Project - the W5HH principle- Software Configuration Management- Metrics: Process metrics- Project metrics; Software measurement: Direct measures- Indirect measures- Size-oriented metrics- Function-oriented metrics- Object-oriented metrics- Webapp project metrics.	9
<b>Total Instructional Hours</b>		<b>45</b>

**Upon completion of this course, the students will be able to:**

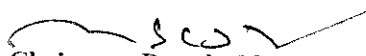
- Course Outcome**
- CO1 Apply the appropriate SDLC Model for software project.
  - CO2 Gather the correct requirements and analyse requirements using UML diagrams.
  - CO3 Design Document by applying architecture styles and GUI using UML diagrams.
  - CO4 Test the developed software using various testing methods.
  - CO5 Manage the developers, customers, Project and measure the software metrics.

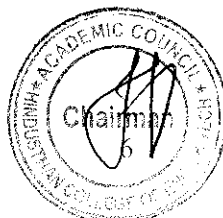
**TEXT BOOKS:**

- T1 Roger S. Pressman, 'Software Engineering: A Practitioner's Approach', Seventh Edition, Mc Graw-Hill International Edition, 2010.
- T2 Bernd Bruegge and Allen H. Dutoit, 'Object-Oriented Software Engineering: Using UML, Patterns and Java', Third Edition, Pearson Education, 2009..

**REFERENCES:**

- R1 Carlo Ghezzi, Mehdi Jazayeri, Dino Mandrioli, 'Fundamentals of Software Engineering'. 2nd edition, PHI Learning Pvt. Ltd., 2010.
- R2 Rajib Mall, 'Fundamentals of Software Engineering', 3rd edition, PHI Learning Pvt. Ltd., 2009.
- R3 Stephen Schach, 'Object-Oriented and Classical Software Engineering', 8th edition, McGraw-Hill, 2010.

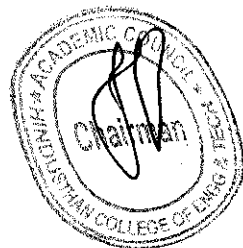
  
 Chairman, Board of Studies  
**Chairman - BoS**  
**IT - HICET**

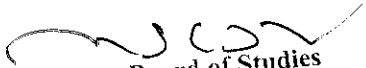


  
 Dean - Academics

**Dean (Academics)**  
**HICET**

PO & PSO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	-	3	2	2	2	-	-	-	2	-	-	2	2	2	2
CO2	-	3	2	3	2	2	-	-	2	2	-	2	3	3	2
CO3	-	3	3	2	3	2	-	-	2	2	-	2	3	3	2
CO4	-	1	1	2	3	2	2	1	2	2	1	2	3	3	2
CO5	-	1	1	2	3	2	2	2	2	-	3	2	3	2	2



  
 Chairman, Board of Studies  
 Chairman - BoS  
 IT - HICET

  
 Dean Academics  
 Dean (Academics)  
 HICET

Program	Course code	Name of the course	L	T	P	C
B. Tech	22IT4204	Design Thinking (IBM)	3	0	0	3

Course Objective	The student should be able					
	1	Expose students to the design process as a tool for innovation.				
	2	Develop students' professional skills in client management and communication.				
	3	Students develop a portfolio of work to set them apart in the job market.				
	4	Provide an authentic opportunity for students to develop teamwork and leadership skills.				
	5	Demonstrate the value of developing a local network and assist students in making lasting connections with the business community				

Unit	Description	Instructional Hours
	<b>DESIGN THINKING HISTORY AND OVERVIEW</b>	
I	Understand what came before Design Thinking - Identify who did what to bring it about-Learn how it built upon previous approaches-How design thinking is introduced in an organization- Understand the transformation required-What outcomes are possible-Understand the whole approach to design thinking-Determine what is most important. <i>Illustrative program: Listening and HMW</i>	9
	<b>KEY HABITS</b>	
II	Introduction to key habits-types-avoid common anti-patterns-Optimize for success with these habits-Introduction to loop-Importance of iteration-How to observe, Reflect & Make-Drill down. <i>Illustrative program: USER RESEARCH and PRACTICE MAPPING INSIGHTS FROM USER RESEARCH</i>	9
	<b>USER RESEARCH AND MAKE</b>	
III	Importance of user research-Appreciate empathy through listening-Key methods of user research-How make fits into the loop-Leverage observe information-Ideation, story boarding, & Prototyping. <i>Illustrative program: PRACTICE IDEATION AND PRIORITIZATION, COLLABORATIVELY CONSOLIDATE STORYBOARDS</i>	9
	<b>USER FEEDBACK AND TEACHING</b>	
IV	User feedback and the loop-Different types of user feedback-How to carryout getting feedback-Understand the challenges of teaching EDT-Valuable hints and tips-Ready to teach the course. <i>Illustrative program: DEVELOP A SUMMARY HILL STATEMENT AND BUILD YOUR STORY BOARD AND HILL INTO A PROTOTYPE</i>	9
	<b>LOGISTICS AND APPLICATIONS</b>	
V	Understand what type of room you need-Learn what materials and supplies you need-Learn how to setup the room-Domains that are applicable-Digital versus physical-Explore some technology specialization. <i>Illustrative program: PRACTICE TEACHING SELECTED SECTION AND USER FEEDBACK</i>	9

**Total Instructional Hours 45**

Course Outcome	Description
CO1	Students develop a strong understanding of the Design Process and how it can be applied in a variety of business settings
CO2	Students learn to build empathy for target audiences from different "cultures"
CO3	Students learn to research and understand the unique needs of a company around specific challenges
CO4	Students learn to develop and test innovative ideas through a rapid iteration cycle
	Students learn how to map insights from user research.
CO5	Students develop a strong understanding of the Design Process and how it can be applied in a variety of business settings

Chairman, Board of Studies

**Chairman - BoS  
IT - HICET**



Dean-Academics

**Dean (Academics)  
HiCET**



**REFERENCES:**

- R1 IBM Courseware: IBM CEP Portal
- R2 The Design Thinking Playbook: Mindful Digital Transformation of Teams, Products, Services, Businesses and Ecosystems by Michael Lewrick, Patrick Link, and Larry Leifer.
- R3 Design Thinking with Mural: A Practical Guide to Collaborative Innovation by Mike Rothery and Sarah Gibbons:
- R4 IBM Design Thinking: A Practical Guide to Creating Customer-Centric Solutions by Scott Christianson and Michael Osterman:
- R5 The Design of Business: Why Design Thinking is the Next Competitive Advantage by Roger Martin

PO & PSO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	1	3	3	2	0	0	0	3	0	3	0	1	0	0
CO2	3	1	2	2	2	3	0	1	2	0	3	2	1	0	0
CO3	3	2	2	2	2	3	0	1	2	0	2	2	1	0	0
CO4	3	1	2	2	0	3	0	1	0	0	2	2	1	0	0
CO5	3	1	2	1	2	0	0	0	0	0	2	3	1	0	0
Avg	3	1	2	2	2	2	0	1	1	0	2	2	1	0	0



*[Signature]*  
 Chairman, Board of Studies  
 Chairman - BOS  
 IT - HICET

*[Signature]*  
 Dean - Academics  
 Dean (Academics)  
 HICET

Programme	Course code	Name of the course	L	T	P	C
B.TECH.	22IT4251	WEB FRAMEWORK	2	0	2	4

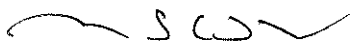
**The student should be made to**

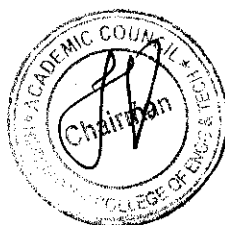
Course Objective	1	2	3	4	5
	Understand the fundamentals of web framework	Know the concept of Javascript web framework	Be exposed to the concepts of AngularJS	Learn the technologies of AngularJS	Be familiar with high level python Web framework


Unit	Description	Instructional Hours
	<b>FUNDAMENTALS OF WEB FRAMEWORK</b>	
I	Web framework-History-Types of framework architectures-Model-view-controller (MVC)-Three-tier organization-Introduction to frameworks-Framework applications - General-purpose website frameworks -Server-side-Client-side-Features.	(9+3)
	<b>INTRODUCTION TO AngularJS</b>	
II	Introducing AngularJS 2,What Is MVC (Model-View-Controller),AngularJS Benefits,The AngularJS Philosophy, Starting Out with AngularJS ,What Backend Do I Need? ,Does My Entire Application Need to Be an AngularJS App?, A Basic AngularJS Application , AngularJS Hello World	(9+3)
	<b>BASIC AngularJS DIRECTIVES AND CONTROLLERS</b>	
III	AngularJS Modules ,Creating Our First Controller ,Working with and Displaying Arrays ,More Directives ,Working with ng-repeat ,ng-repeat Over an Object ,Helper Variables in ng-repeat ,Track by ID ,ng-repeat Across Multiple HTML Elements .	(9+3)
	<b>AngularJS - FORMS, INPUTS, AND SERVICES</b>	
IV	Working with Forms . Leverage Data-Binding and Models . Form Validation and States , Error Handling with Forms , Displaying Error Messages , Styling Forms and States , Nested Forms with ng-form ,Other Form Controls , Textareas , Checkboxes , Radio Buttons , Combo Boxes/Drop-Downs.	(9+3)
	<b>HIGH LEVEL PYTHON WEB FRAMEWORK - FLASK</b>	
V	Flask – Overview, Environment, Application, Routing. Variable Rules, URL Binding, HTTP Methods, Templates, Static Files, Request Objects, Sending Form Data to Template, Cookies, Sessions.	(9+3)

**LAB EXERCISES,**

- Ex 1 Create a simple web page that displays "Hello".
- Ex 2 Use the MVC pattern to organize your code. Define a model.
- Ex 3 Create a Basic AngularJS Hello World App.
- Ex 4 Create a simple AngularJS application that demonstrates the Model-View-Controller (MVC) architecture.
- Ex 5 Build a basic to-do list application using AngularJS.
- Ex 6 Create a basic weather application using AngularJS to fetch data from a weather API.
- Ex 7 Develop a program for Form Validation in AngularJS.
- Ex 8 Implement Web 2.0 features using traditional Python web frameworks.

  
Chairman, Board of Studies  
**Chairman - BoS**  
**IT - HICET**



  
Dean-Academics  
**Dean (Academics)**  
**HICET**

- Ex 9 Create a Flask web application Routing and Request Handling.  
 Ex 10 Create a Flask web application, with Form Handling and Sessions.

**Total Instructional Hours      60 Hrs**

Upon completion of this course the students will be able to:

- Course Outcome**
- CO1 Analyze the fundamentals of web framework.
  - CO2 Implement the concepts in AngularJS.
  - CO3 Use the concept of BASIC AngularJS Directives and Controllers.
  - CO4 Apply the concept AngularJS - FORMS, INPUTS, AND SERVICES.
  - CO5 Analyze the High Level Web framework - Flask.

**TEXT BOOK:**

- T1 AngularJS : Up and Running: ENHANCED PRODUCTIVITY WITH STRUCTURED WEB APPS By Brad Green and Shyam Seshadri, 'AngularJS', O'Reilly, 1st Edition, 2014.
- T2 Dana Moore, Raymond Budd, William Wright, 'Professional Python Frameworks Web 2.0', John Wiley & Sons, 2008.
- T3 Flask Web Development, 2nd Edition by Miguel Grinberg, O'Reilly Media, Inc.

**REFERENCES:**

- R1 The Ultimate Flask Course, by Anthony Herbert, September 2019, Packt Publishing
- R2 [https://www.tutorialspoint.com/flask/flask\\_environment.htm](https://www.tutorialspoint.com/flask/flask_environment.htm)

PO & PSO	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3
CO1	2	3	1	-	2	-	-	-	-	-	-	2	2	2	2
CO2	1	3	3	-	2	-	-	-	2	-	-	2	2	2	2
CO3	2	3	3	-	3	-	-	-	2	-	-	2	2	2	2
CO4	2	3	3	-	3	-	-	-	2	-	-	2	2	2	2
CO5	2	3	3	-	3	-	-	-	2	-	-	2	2	2	1



*[Signature]*  
 Chairman, Board of Studies  
 Chairman - BUS  
 IT - HICET

*[Signature]*  
 Dean - Academics  
 Dean (Academics)  
 HICET


Programme	Course code	Name of the course	L	T	P	C
B.TECH.	22IT4252	DATABASE MANAGEMENT SYSTEMS	2	0	2	4

Course Objective	The student should be made to:	


- 1 To Learn the fundamentals of data models.
- 2 To Acquire knowledge about ER diagrams and Normalization.
- 3 To study various SQL Query and optimization techniques.
- 4 To understand internal storage structure and indexing techniques for Database Design.
- 5 Familiarize with the concepts of transactions and concurrency control.

Unit	Description	Instructional Hours
	<b>RELATIONAL DATABASES</b>	
I	Purpose of Database System- Database characteristics-Views of Data-Data Models- Database Architecture – Key issues and challenges in Database Systems - Introduction to relational databases – Relational Model – Relational Algebra	9
	<b>DATABASE DESIGN</b>	
II	Entity Relationship model - Extended ER –ER to Relational mapping Functional Dependencies, Non - loss Decomposition, Anomaly - 1NF to 5NF	9
	<b>SQL &amp; QUERY OPTIMIZATION</b>	
III	SQL fundamentals - SQL Standards- Data types - DDL – DML – DCL – TCL – Keys - Integrity – Views – Trigger – Cursors - Embedded SQL - Dynamic SQL - Query Processing and Optimization	9
	<b>INDEXING AND HASHING</b>	
IV	Basic concepts, Ordered Indices: Dense and Sparse Indices – Multi Level Indices – Index Update. B+ - Tree Index Files: Structure of a B+-Tree – Queries in B+ Trees – Static Hashing, Dynamic Hashing.	9
	<b>TRANSACTION PROCESSING AND CONCURRENCY CONTROL</b>	
V	Transaction Concepts - ACID Properties - Serializability - Concurrency – Need for Concurrency- Concurrency Control - Transaction Recovery – Locking Protocols – Two Phase Locking – SQL Facilities for Concurrency and recovery –Two Phase Commit Protocol	9
<b>Total Instructional Hours</b>		<b>45</b>

S.No	List of Experiments
1	Create a database table, add constraints (primary key, unique, check, Not null), insert rows, update and delete rows using SQL DDL and DML commands.
2	Query the database tables, explore sub queries, and nested queries operations.
3	Query the database tables and explore simple, natural and outer joins.
4	Create View and index for database tables with a large number of records.
5	Write user defined functions and stored procedures in SQL.
6	Write SQL Triggers for insert, delete, and update operations in a database table.
	Case Study using any of the real life database applications
7	<ul style="list-style-type: none"> <li>• Build Entity Model diagram. The diagram should align with the business and functional goals stated in the application.</li> <li>• Apply Normalization rules in designing the tables in scope.</li> <li>• Prepare applicable views, triggers, and functions for enabling enterprise grade features.</li> <li>• Build PL SQL / Stored Procedures for Complex Functionalities</li> </ul>

  
 Chairman, Board of Studies  
**Chairman - BoS**  
**IT - HICET**



  
 Dean, Academics  
**Dean (Academics)**  
**HICET**

- Ability to showcase ACID Properties with sample queries with appropriate settings

Upon completion of this course, the students will be able to:

<b>Course</b>	CO1	Design a Data Model.
<b>Outcome</b>	CO2	Apply ER Diagrams and Normalization concepts for real time applications.
	CO3	Construct simple and complex SQL queries using DML and DCL commands.
	CO4	Compare and contrast various Indexing strategies.
	CO5	Apply Transactions and Concurrency mechanisms for real time applications.

**TEXT BOOK:**

- T1 Ramez Elmasri and Shamkant B. Navathe, 'Fundamentals of Database Systems', Seventh Edition, Pearson Education, 2016.
- T2 Abraham Silberschatz, Henry F. Korth and S. Sudharshan, 'Database System Concepts', Seventh Edition, Tata McGraw Hill, 2019.

**REFERENCES:**

- R1 C.J.Date, A.Kannan and S.Swamynathan, 'An Introduction to Database Systems', Eighth Edition, Pearson Education, 2012.
- R2 Raghu Ramakrishnan, — 'Database Management Systems', Fourth Edition, Tata McGraw Hill, 2014.

PO&PSO	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO3
CO1	2	-	-	-	-	-	-	-	-	-	2	-	2	2	2
CO2	3	-	2	-	3	-	-	-	1	-	1	-	2	2	2
CO3	3	3	3	2	3	-	-	-	1	-	2	-	2	2	2
CO4	3	3	3	2	2	-	-	-	1	-	3	-	2	-	2
CO5	3	3	3	2	2	-	-	-	1	-	1	-	2	2	2



Chairman, Board of Studies  
Chairman - B.S  
IT - HICET

Dean - Academics  
Dean (Academics)  
HICET

Programme	Course code	Name of the course	L	T	P	C
B.TECH.	22IT4001	CASE TOOLS LABORATORY	0	0	4	1.5

**The student should be able to:**

- |                         |   |                                                                        |
|-------------------------|---|------------------------------------------------------------------------|
| <b>Course Objective</b> | 1 | Capture the requirements specification for an intended software system |
|                         | 2 | Draw the UML diagrams for the given specification                      |
|                         | 3 | Map the design properly to code                                        |
|                         | 4 | Test the software system thoroughly for all scenarios                  |
|                         | 5 | Improve the design by applying appropriate design patterns             |

**List of Experiments**

- |                |                                                                                                                                       |
|----------------|---------------------------------------------------------------------------------------------------------------------------------------|
| <b>Exp. No</b> |                                                                                                                                       |
| 1              | Identify a software system that needs to be developed.                                                                                |
| 2              | Document the Software Requirements Specification (SRS) for the identified system.                                                     |
| 3              | Identify use cases and develop the Use Case model.                                                                                    |
| 4              | Identify the conceptual classes and develop a Domain Model and also derive a Class Diagram from that.                                 |
| 5              | Using the identified scenarios, find the interaction between objects and represent them using UML Sequence and Collaboration Diagrams |
| 6              | Draw relevant State Chart and Activity Diagrams for the same system.                                                                  |
| 7              | Implement the system as per the detailed design                                                                                       |
| 8              | Test the software system for all the scenarios identified as per the usecase diagram                                                  |
| 9              | Improve the reusability and maintainability of the software system by applying appropriate design patterns.                           |
| 10             | Implement the modified system and test it for various scenarios.                                                                      |

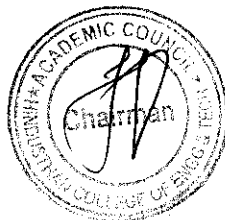
**SUGGESTED DOMAINS FOR MINI-PROJECT:**

- 1 Passport automation system.
- 2 Book bank
- 3 Exam registration
- 4 Stock maintenance system.
- 5 Online course reservation system
- 6 Airline/Railway reservation system
- 7 Software personnel management system
- 8 Credit card processing
- 9 e-book management system
- 10 Recruitment system
- 11 Foreign trading system
- 12 Conference management system
- 13 BPO management system
- 14 Library management system
- 15 Student information system

**Total Instructional Hours 45**

**Upon completion of this course, the students will be able to:**

- |                       |     |                                                                                                                                                                             |
|-----------------------|-----|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Course Outcome</b> | CO1 | Perform Object Oriented analysis and design for a given problem specification.                                                                                              |
|                       | CO2 | Differentiate advance Object Oriented Approach from the traditional approach for design and development system                                                              |
|                       | CO3 | Construct various UML Models using the appropriate notations                                                                                                                |
|                       | CO4 | Identify and map basic software requirements in UML                                                                                                                         |
|                       | CO5 | Improve the software quality using design patterns and to explain the rationale behind applying specific design patterns. test the compliance of the software with the SRS. |

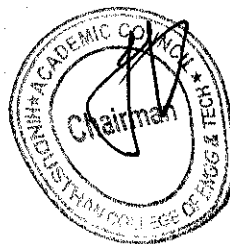


14

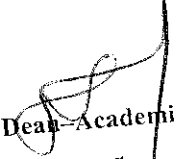
*SCS*  
Chairman, Board of Studies  
**Chairman - BoS**  
**IT - NICET**

*[Signature]*  
Dean - Academics  
**Dean (Academics)**  
**NICET**

PO & PSO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	2	2	3	2	2	1	0	1	2	1	2	0	1	0	1
CO2	2	2	3	2	2	3	0	1	2	1	2	1	1	1	1
CO3	2	2	3	2	2	3	0	1	2	1	2	2	1	1	2
CO4	2	2	3	2	2	3	0	1	1	1	2	2	1	1	2
CO5	2	2	2	2	2	1	0	1	2	1	2	2	1	1	2



  
 Chairman, Board of Studies  
 Chairman - BOS  
 IT - HICET

  
 Dean (Academics)  
 HICET

Program	Course code	Name of the course	L	T	P	C
B. TECH	22IT4003	DESIGN THINKING LABORATORY (IBM)	0	0	4	1.5

**The student should be able**

**Course Objective**

- 1 Expose students to the design process as a tool for innovation.
- 2 Develop students' professional skills in client management and communication.
- 3 Students develop a portfolio of work to set them apart in the job market.
- 4 Provide an authentic opportunity for students to develop teamwork and leadership skills.
- 5 Demonstrate the value of developing a local network and assist students in making lasting connections with the business community

**Exp. No**

**Description of the Experiments**

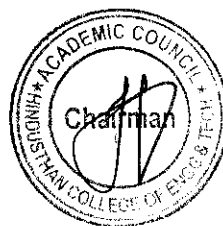
- 1 Essential Skills of Listening
- 2 Collaborate on How Might We statement
- 3 User Research Model
- 4 Preparing the Reflect for the observation
- 5 The Ideation Technique
- 6 Concept of Story Boarding
- 7 Crafting Hills Technique
- 8 Art of Prototyping
- 9 Importance of User Feedback
- 10 Carrying out Playback Sessions
- 11 Process of Teaching

**Total Instructional Hours 45**

**Course Outcome**

- CO1 Students develop a strong understanding of the Design Process and how it can be applied in a variety of business settings
- CO2 Students learn to build empathy for target audiences from different "cultures"
- CO3 Students learn to research and understand the unique needs of a company around specific challenges

PO & PSO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	1	3	3	2	0	0	0	3	0	3	0	1	0	0
CO2	3	1	2	2	2	3	0	1	2	0	3	2	1	0	0
CO3	3	2	2	2	2	3	0	1	2	0	2	2	1	0	0
CO4	3	1	2	2	0	3	0	1	0	0	2	2	1	0	0
CO5	3	1	2	1	2	0	0	0	0	0	2	3	1	0	0



*[Signature]*  
Chairman, Board of Studies  
**Chairman - BOS**  
**IT - HICET**

*[Signature]*  
Dean - Academics  
**Dean (Academics)**  
**HICET**





Programme	Course Code	Course Title	L	T	P	C
BE/BTECH	22HE4071	SOFTSKILLS AND APTITUDE III	0	0	0	1

- Course Objectives:**
1. Solve Logical Reasoning questions of easy to intermediate level
  2. Solve Quantitative Aptitude questions of easy to intermediate level
  3. Solve Verbal Ability questions of easy to intermediate level
  4. Display good writing skills while dealing with essays

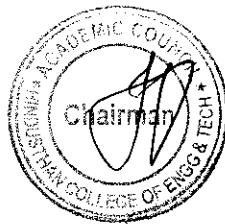
Unit	Description	Instructional Hours
------	-------------	---------------------

I	<p><b>Logical Reasoning</b> Clocks - Calendars - Direction Sense - Cubes - Data Interpretation: Tables, Pie Chart, Bar Graph - Data Sufficiency - Syllogism</p>	10
II	<p><b>Quantitative Aptitude</b> Time and work: Work with different efficiencies, Pipes and cisterns, Work equivalence, Division of wages - Time, Speed and Distance: Basics of time, speed and distance, Relative speed, Problems based on trains, Problems based on boats and streams, Problems based on races - Profit and loss, Partnerships and averages: Basic terminologies in profit and loss - Partnership - Averages - Weighted average Permutation, Combination: Fundamental Counting Principle, Permutation and Combination, Computation of Permutation, Circular Permutations, Computation of Combination - Probability</p>	12
III	<p><b>Verbal Ability</b> Sentence Correction: Subject-Verb Agreement, Modifiers, Parallelism, Pronoun-Antecedent Agreement, Verb Time Sequences, Comparisons, - Sentence Completion and Para-jumbles- Critical Reasoning: Argument - Identifying the Different Parts (Premise, assumption, conclusion), Strengthening statement, Weakening statement, Mimic the pattern</p>	6
IV	<p><b>Recruitment Essentials</b> Cracking interviews - demonstration through a few mocks - Sample mock interviews to demonstrate how to crack the: HR interview, MR interview, Technical interview - Cracking other kinds of interviews: Skype/ Telephonic interviews, Panel interviews, Stress interviews - Resume building – workshop: A workshop to make students write an accurate resume- Essay Writing</p>	2
<b>Total Instructional Hours</b>		30

- Course Outcome:**
- CO1: Students will avoid the various fallacies that can arise through the misuse of logic.
- CO2: Students would opt for alternate methods to solve the problems rather than conventional methods.
- CO3: Students will heighten their awareness of correct usage of English grammar in writing and speaking
- CO4: Students will be concise and clear, using professional language for placements.

**REFERENCE BOOKS:**

- R1: A New Approach To Reasoning Verbal & Non-Verbal By B.S. Sijwali
- R2: How to prepare for data interpretation for CAT by Arun Sharma.
- R3: How to Crack TEST OF REASONING in all competitive examinations by Jaikishan and Premkishan.
- R4: Quantitative Aptitude for Competitive Examinations - Dr. R.S. Aggarwal, S. Chand
- R5: Word Power Made Easy by Norman Lewis
- R6: Six weeks to words of power by Wilfred Funk



Chairman, Board of Studies  
Chairman - BOS  
IT - HICET

Dean-Academics  
Dean (Academics)  
HICET

Programme	Course code	Name of the course	L	T	P	C
B.E.	22HE4101	IPR AND START-UPS	2	0	0	2


The student should be able

- Course Objective**
1. The main objective of the IPR is to make the students aware of their rights for the protection of their invention done in their project work.
  2. To get registration in our country and foreign countries of their invention, designs and thesis or theory written by the students during their project work and for this they must have knowledge of patents, copy right,
  3. To learn about the trademarks and geographical indications (GI) in our country and foreign countries of their invention.
  4. To gain the knowledge about designs and layout design Act-2000.
  5. To learn about the technology transfer to product and Start-up knowledge.

Unit	Description	Instructional Hours
I	<b>INTRODUCTION TO IPR</b> Meaning of property, Origin, Nature, Meaning of Intellectual Property Rights Introduction to Trade-Related of Intellectual Property Rights (TRIPS) and World Trade Organization (WTO). - Kinds of Intellectual property rights—Copy Right, Patent, Trade Mark, Trade Secret and trade dress, Design, Layout Design, Geographical Indication, Plant Varieties and Traditional Knowledge.	6
	<b>PATENT RIGHTS AND COPY RIGHTS</b> Origin, Meaning of Patent, Types, Procedure to follow the methods of IP agents, Inventions, which are not patentable, Registration Procedure, Rights and Duties of Patentee, Assignment and licence, Restoration of lapsed Patents, Surrender and Revocation of Patents, Infringement, Remedies & Penalties, IT Act- introduction.	6
III	COPY RIGHT- Origin, Definition &Types of Copy Right, Patent Ethics, Registration procedure, Assignment & licence, Terms of Copy Right, Piracy, Infringement, Remedies,	
	<b>TRADE MARKS AND GEOGRAPHICAL INDICATION</b> Origin, Meaning & Nature of Trade Marks, Types, Registration of Trade Marks, Infringement & Remedies, Offences relating to Trade Marks, Passing off, Penalties.	6
IV	GEOGRAPHICAL INDICATION – International Protection, plant varieties, Infringement of GI, licencing, legal issues.	
	<b>DESIGN</b> Meaning, Definition, Object, Registration of Design, Cancellation of Registration, International convention on design, functions of Design. Semiconductor Integrated circuits and layout design Act-2000.	6
V	<b>START-UPS</b> Process of Innovation, Monetizing Ideas, Technology transfer to product, Funding Options for Start-up, Start-up Models, Preparation of Project Report, Start up to MNC, Start-up Audit.	6

Total Instructional Hours

30

  
Chairman, Board of Studies  
Chairman - BoS  
IT - HICET



  
Dean - Academics  
Dean (Academics)  
HICET

Upon completion of the course, the students will be able to:

CO1: Understand IPR and aware the invention rights.

**Course Outcome** CO2: Get awareness of acquiring the patent for their project ideas

CO3: Learn obtaining copyright for their innovative works

CO4: Understand the designs and layout design Act-2000.

CO5: Understand the concept of start-ups, identify the required strategic resources.

**TEXT BOOK:**

T1. Intellectual Property Rights (IPR) by M.K Bhandari 2021


T2. Law relating to Intellectual Property Rights, by V.K Ahuja 2017

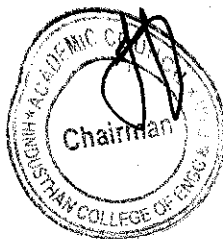
T3. Intellectual Property Rights (IPR) for Start-ups by Vinay Vaish 2016


T4. Intellectual Property - Patents, Copyright, Trade Marks and Allied Rights (South Asian Edition) by W Cornish and D Llewelyn and T Pain 8th South Asian Edition, 2016.

T5 Peter Thiel & Blake Masters, Zero to One: Notes on Start Ups, or How to Build the Future, Random House, 2014.

PO & PSO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	-	3	-	-	3	-	-	-	-	-	3	2	2
CO2	3	-	3	-	-	3	-	-	-	-	-	3	2	2
CO3	3	-	3	-	-	3	-	-	-	-	-	3	2	2
CO4	3	-	3	-	-	3	-	-	-	-	-	3	2	2
CO5	3	-	3	-	-	3	-	-	-	-	-	3	2	2
Avg.	3	-	3	-	-	3	-	-	-	-	-	3	2	2

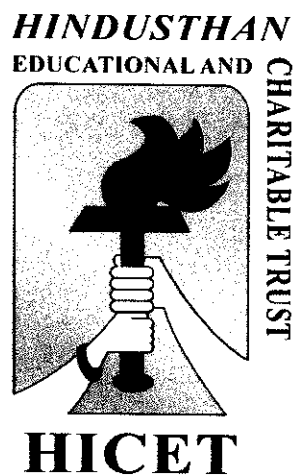
  
 Chairman, Board of Studies  
 Chairman - BOS  
 IT - HICET



  
 Dean Academics  
 Dean (Academics)  
 HICET

***HINDUSTHAN COLLEGE OF ENGINEERING AND TECHNOLOGY***  
**(An Autonomous Institution Affiliated to Anna University, Chennai)**  
**(Approved by AICTE, New Delhi, Accredited by NAAC with 'A' Grade)**  
**Coimbatore - 641 032.**

**B.TECH. INFORMATION TECHNOLOGY**



**CHOICE BASED CREDIT SYSTEM**

**Revised Curriculum and Syllabus for the Even semester**  
**Academic year 2023-24**

# **CURRICULUM**

## **R2022**

**DETAILS OF CHANGES CARRIED OUT IN CURRICULUM & SYLLABUS**

**CBCS PATTERN**

**UNDERGRADUATE PROGRAMMES**

**B.TECH. INFORMATION TECHNOLOGY (UG)**

**REGULATION-2022**

**For the students admitted during the academic year 2023-2024 and onwards**

**SEMESTER I**

S. No	Course Code	Course Title	Category	L	T	P	C	TC	CP	CIA	ESE	Total
<b>THEORY</b>												
1.	22MA1101	Matrices and Calculus	BSC	3	1	0	4	4	40	60	100	
<b>THEORY WITH LAB COMPONENT</b>												
2.	22HE1151	English for Engineers	HSC	2	0	2	3	4	50	50	100	
3.	22CY1151	Chemistry for Circuit Engineers	BSC	2	0	2	3	4	50	50	100	
4.	22CS1151	Problem solving using C programming	ESC	2	0	2	3	4	50	50	100	
5.	22IT1152	Introduction to Web Application Development	ESC	2	0	2	3	4	50	50	100	
<b>EEC COURSES (SE/AE)</b>												
6.	22HE1072	Entrepreneurship & Innovation	AEC	1	0	0	1	1	100	0	100	
7.	22HE1073	Introduction to Soft Skills	SEC	1	0	0	0	1	100	0	100	
<b>MANDATORY COURSE</b>												
8.	22MC1093/ 22MC1094	தமிழர்மரபு / Heritage Of Tamil	MC	2	0	0	1	2	100	0	100	
9.	22MC1095	Universal Human Values (Common To All Branches)	AEC	2	0	0	0	2	40	60	100	
<b>TOTAL</b>				<b>17</b>	<b>1</b>	<b>8</b>	<b>18</b>	<b>26</b>	<b>580</b>	<b>320</b>	<b>900</b>	

**SEMESTER II**

S. No	Course Code	Course Title	Category	L	T	P	C	TC	CP	CIA	ESE	Total
<b>THEORY</b>												
1.	22MA2103	Differential Equations And Linear Algebra	BSC	3	1	0	4	4	40	60	100	
2.	22PH2101	Basics of Material Science	BSC	2	0	0	2	3	40	60	100	
<b>THEORY WITH LAB COMPONENT</b>												
3.	22HE2151	Effective Technical Communication	HSC	2	0	2	3	4	50	50	100	

4.	22PH2151	Physics for Circuit Engineering	BSC	2	0	2	3	4	50	50	100
5.	22IT2251	Python programming and Practices	PCC/ICC	2	0	2	3	4	50	50	100
6.	22IT2253	Dynamic Web Design	PCC	2	0	2	2	4	50	50	100
<b>PRACTICAL</b>											
7.	22ME2001	Engineering Practices	ESC	0	0	4	2	2	60	40	100
<b>EEC COURSES (SE/AE)</b>											
8.	22HE2071	Design Thinking	AEC	2	0	0	2	2	100	0	100
9.	22HE2072	Soft Skills and Aptitude I	SEC	1	0	0	1	1	100	0	100
<b>MANDATORY COURSE</b>											
10.	22MC2094/ 22MC2095	தமிழரும் தொழில்நுட்பமும் / Tamils And Technology	MC	2	0	0	1	2	100	0	100
11.	22MC2093	NCC */NSS / YRC / Sports / Clubs / Society Service - Enrollment (Common)	MC	All students shall enroll, on admission, in anyone of the personality and character development programmes and undergo training for about 80 hours							
<b>TOTAL</b>				<b>17</b>	<b>1</b>	<b>14</b>	<b>23</b>	<b>32</b>	<b>640</b>	<b>360</b>	<b>1000</b>

### SEMESTER III

S. No	Course Code	Course Title	Category	L	T	P	C	TCP	CIA	ESE	Total
<b>THEORY</b>											
1.	22MA3101	Applied Statistics and Queuing Theory	BSC	3	1	0	4	4	40	60	100
2.	22IT3201	Data Structures	PCC	3	0	0	3	4	40	60	100
3.	22IT3202	Operating System	PCC	3	0	0	4	4	40	60	100
4.	22IT3203	Digital Principles and Computer Organization	ESC	3	0	0	3	3	40	60	100
<b>THEORY WITH LAB COMPONENT</b>											
5.	22IT3251	Java Programming	PCC	2	0	2	4	4	50	50	100
<b>PRACTICAL</b>											
6.	22IT3001	Operating System Laboratory	PCC	0	0	4	2	4	60	40	100
7.	22IT3002	Digital Principles and Computer Organization Laboratory	ESC	0	0	4	2	4	60	40	100
<b>EEC COURSES (SE/AE)</b>											
8.	22HE3071	Soft Skills -2 (Common)	SEC	1	0	0	1	1	100	0	100
9.	22IT3003	Data Structures Laboratory	AEC	0	0	4	2	4	60	40	100
<b>MANDATORY COURSE</b>											
10.	22MC3191	Essence of Indian Traditional Knowledge	MC	2	0	0	0	2	40	60	100
<b>TOTAL</b>				<b>15</b>	<b>3</b>	<b>14</b>	<b>25</b>	<b>32</b>	<b>490</b>	<b>410</b>	<b>900</b>



**SEMESTER IV**

S. No	Course Code	Course Title	Category	L	T	P	C	TC	PC	CIA	ESE	Total
<b>THEORY</b>												
1.	22HE4101	IPR and Start-ups	HSC	2	0	0	2	2	40	60	100	
2.	22IT4201	Design and Analysis of Algorithms	PCC	3	0	0	3	3	40	60	100	
3.	22IT4202	Computer Networks	PCC	3	0	0	3	3	40	60	100	
4.	22IT4203	Object Oriented Software Engineering	PCC	3	0	0	4	4	40	60	100	
<b>THEORY WITH LAB COMPONENT</b>												
5.	22IT4251	Web Framework	PCC	2	0	2	3	4	50	50	100	
6.	22IT4252	Database Management System	PCC	2	0	2	3	4	50	50	100	
<b>PRACTICAL</b>												
7.	22IT4001	Case Tools Laboratory	PCC	0	0	4	2	4	60	40	100	
8.	22IT4002	Network Laboratory	PCC	0	0	4	2	4	60	40	100	
<b>EEC COURSES (SE/AE)</b>												
9.	22HE4071	Soft Skills -III	SEC	1	0	0	1	1	100	0	100	
<b>MANDATORY COURSE</b>												
10.		Indian Constitution	MC	2	0	0	0	2	40	60	100	
				<b>TOTAL</b>								
				<b>16</b>	<b>0</b>	<b>12</b>	<b>23</b>	<b>29</b>	<b>480</b>	<b>420</b>	<b>900</b>	
<p>* Two weeks internship carries 1 credit and it will be done during Semester III summer vacation and same will be evaluated in Semester IV.                      If students unable to undergo in semester III, then the Internship I offered in the semester IV can be clubbed with Internship II (Total: 4 weeks-2 credits)</p>												

**SEMESTER V**

S. No	Course Code	Course Title	Category	L	T	P	C	TC	PC	CIA	ESE	Total
<b>THEORY</b>												
1.	22IT5201	IOT and it Applications	PCC	3	1	0	4	4	40	60	100	
2.	22IT5202	Compiler Design	PCC	3	0	0	3	3	40	60	100	
3.	22IT53XX	Professional Elective-1	PEC	3	0	0	3	3	40	60	100	
4.	22IT53XX	Professional Elective-2	PEC	3	0	0	3	3	40	60	100	
5.	22IT53XX	Professional Elective-3	PEC	3	0	0	3	3	40	60	100	
<b>THEORY WITH LAB COMPONENT</b>												
6.	22IT5251	Artificial Intelligence & Machine Learning	PCC/ICC	2	0	2	3	4	50	50	100	
<b>PRACTICAL</b>												
7.	22IT5001	Compiler Design Laboratory	PCC	0	0	4	2	4	60	40	100	

EEC COURSES (SE/AE)											
8.	22HE5071	Soft Skills -4/ Foreign languages	SEC	1	0	0	1	1	100	0	100
<b>TOTAL</b>				<b>18</b>	<b>1</b>	<b>6</b>	<b>22</b>	<b>25</b>	<b>410</b>	<b>390</b>	<b>800</b>

#### SEMESTER VI

S. No	Course Code	Course Title	Category	L	T	P	C	TC	CP	CIA	ESE	Total
<b>THEORY</b>												
1.	22IT6201	Foundation of Data Science	PCC	3	0	0	3	3	40	60	100	
2.	22HE6101	Professional Ethics	HSC	3	0	0	3	3	40	60	100	
3.	22IT63XX	Professional Elective - 4	PEC/ ICC	3	0	0	3	3	40	60	100	
4.	22IT63XX	Professional Elective-5	PEC/ ICC	3	0	0	3	3	40	60	100	
5.	22XX64XX	Open Elective – 1*	OEC	3	0	0	3	3	40	60	100	
6.	22XX64XX	Open Elective – 2*	OEC	3	0	0	3	3	40	60	100	
7.	22CY6101	Environmental Science	ESC	2	0	0	2	3	40	60	100	
<b>PRACTICAL</b>												
8.	22IT6001	Data Science Laboratory	PCC	0	0	4	2	4	60	40	100	
<b>EEC COURSES (SE/AE)</b>												
9.	22HE6071	Soft Skills – 5	SEC	2	0	0	2	2	100	0	100	
<b>TOTAL</b>				<b>22</b>	<b>0</b>	<b>4</b>	<b>24</b>	<b>27</b>	<b>440</b>	<b>460</b>	<b>900</b>	

#### SEMESTER VII

S. No	Course Code	Course Title	Category	L	T	P	C	TC	CP	CIA	ESE	Total
<b>THEORY</b>												
1.	22IT7201	Cryptography and Network Security	PCC	3	0	0	3	3	40	60	100	
2.	22IT7202	Data Warehousing and Data Mining	PCC	3	1	0	4	4	40	60	100	
3.	22IT73XX	Professional Elective-6	PEC	3	0	0	3	3	40	60	100	
4.	22XX74XX	Open Elective – 3*	OEC	3	0	0	3	3	40	60	100	
5.	22XX74XX	Open Elective – 4*	OEC	3	0	0	3	3	40	60	100	
<b>PRACTICAL</b>												
6.	22IT7001	Cryptography and Network Security Laboratory	PCC	0	0	4	2	4	60	40	100	
<b>EEC COURSES (SE/AE)</b>												
7.	22IT7701	Internship - II*	SEC	0	0	0	2	2	100	0	100	
<b>TOTAL</b>				<b>15</b>	<b>1</b>	<b>4</b>	<b>20</b>	<b>22</b>	<b>360</b>	<b>340</b>	<b>700</b>	
* - Two weeks internship carries 1 credit and it will be done during Semester VI summer vacation/placement training and same will be evaluated in Semester VII.												

**SEMESTER VIII**

S. No	Course Code	Course Title	Category	L	T	P	C	TCP	CIA	ESE	Total
<b>EEC COURSES (SE/AE)</b>											
1.	22IT8901	Project Work/Granted Patent	SEC	0	0	20	10	20	100	100	200
<b>TOTAL</b>				<b>0</b>	<b>0</b>	<b>20</b>	<b>10</b>	<b>20</b>	<b>100</b>	<b>100</b>	<b>200</b>

**Note:**

- \*As per the AICTE guideline, in Semesters I, II, III & IV NCC one credit subject is added as Value Added Course with Extra Credit. Further, the students who enrolled his/her name in HICET NCC and Air Wing are eligible to undergo this subject. The earned extra credits printed in the Consolidated Mark sheet as per the regulation.
- NCC course level 1 & Level 2 will be added in the list of open elective subjects in the appropriate semester. Further, the students' who have opted NCC subjects in Semester I, II, III & IV are eligible to undergo NCC Open Elective Subjects.
- The above-mentioned NCC Courses will be offered to the students who are going to be admitted in the Academic Year 2021 – 22.

**OPEN ELECTIVE I AND II (EMERGING TECHNOLOGIES)**

To be offered for the students other than CSE, IT, AI&ML, ECE & BIOMEDICAL

S. NO.	COURSE CODE	COURSE TITLE	CATE GORY	PERIODS PER WEEK			TOTAL CONTACT PERIODS	CREDITS
				L	T	P		
1	22AI6451	Artificial Intelligence and Machine Learning Fundamentals	OEC	2	0	2	4	3
2	22CS6451	Blockchain Technology	OEC	2	0	2	4	3
3	22EC6451	Cyber security	OEC	2	0	2	4	3
4	22EC6452	IoT Concepts and Applications	OEC	2	0	2	4	3
5	22IT6451	Data Science and Analytics	OEC	2	0	2	4	3
6	22BM6451	Augmented and Virtual Reality	OEC	2	0	2	4	3

**OPEN ELECTIVE I AND II**

To be offered for the students other than AUTO, AERO, AGRI, MECH, MCTS, CIVIL, EEE, CHEMICAL, FOOD TECH, E&I

S. NO.	COURSE CODE	COURSE TITLE	CATE GORY	PERIODS PER WEEK			TOTAL CONTACT PERIODS	CREDITS
				L	T	P		
1	22AE6401	Space Science	OEC	3	0	0	3	3
2	22MT6401	Introduction to Industrial Engineering	OEC	3	0	0	3	3
3	22MT6402	Industrial Safety and Environment	OEC	3	0	0	3	3
4	22CE6401	Climate Change and its Impact	OEC	3	0	0	3	3
5	22CE6402	Environment and Social Impact Assessment	OEC	3	0	0	3	3
6	22ME6401	Renewable Energy System	OEC	3	0	0	3	3

7	22ME6402	Additive Manufacturing systems	OEC	3	0	0	3	3
8	22EI6401	Introduction to Industrial Instrumentation and Control	OEC	3	0	0	3	3
9	22EI6402	Graphical Programming using Virtual Instrumentation	OEC	3	0	0	3	3
10	22AU6401	Fundamentals of Automobile Engineering	OEC	3	0	0	3	3
11	22AU6402	Automotive Vehicle Safety	OEC	3	0	0	3	3
12	22EE6401	Digital Marketing	OEC	3	0	0	3	3
13	22EE6402	Research Methodology	OEC	3	0	0	3	3
14	22FT6401	Traditional Foods	OEC	3	0	0	3	3
15	22AG6401	Urban Agriculture and Organic Farming	OEC	3	0	0	3	3
16	22CH6401	Biomass and Biorefinery	OEC	3	0	0	3	3

**Note:** Non-Circuit Departments can add one Open Elective course in the above list to offer for the circuit branches

### OPEN ELECTIVE III

Students shall choose any one of the open elective courses such that the course content or title not belong to their own programme.

(Note: Each programme in our institution is expected to provide one course only)

S. NO.	COURSE CODE	COURSE TITLE	CATE GORY	PERIODS PER WEEK			TOTAL CONTACT PERIODS	CREDITS
				L	T	P		
1	22IT7401	Disaster Management	OEC	3	0	0	3	3

### OPEN ELECTIVE IV

S. NO.	COURSE CODE	COURSE TITLE	CATE GORY	PERIODS PER WEEK			TOTAL CONTACT PERIODS	CREDITS
				L	T	P		
1	22LS7401	General studies for competitive examinations	OEC	3	0	0	3	3
2	22LS7402	Human Rights, Women Rights and Gender equity	OEC	3	0	0	3	3
3	22LS7403	Indian ethos and Human values	OEC	3	0	0	3	3
4	22LS7404	Financial independence and management	OEC	3	0	0	3	3
5	22LS7405	Yoga for Human Excellence	OEC	3	0	0	3	3
6	22LS7406	Democracy and Good Governance	OEC	3	0	0	3	3
7	22LS7407	NCC Level - II	OEC	3	0	0	3	3

**PROFESSIONAL ELECTIVE COURSES: VERTICALS**

Vertical I Data Science	Vertical II Full Stack Development for IT	Vertical III Cloud Computing and Data Centre Technologies	Vertical IV Internet of things	Vertical IV Cyber Security and Data Privacy	Vertical V Creative Media	Vertical VI Emerging Technologies
<b>22IT5301</b> Exploratory Data Analysis	<b>22IT5304</b> Cloud Computing	<b>22IT5307</b> Security and Privacy in Cloud	<b>22IT5310</b> Fundamentals of IoT & Cloud	<b>22IT5310</b> Ethical Hacking	<b>22IT5313</b> Multimedia Data Compression and Storage	<b>22IT5316</b> Augmented Reality
<b>22IT5302</b> Recommender Systems	<b>22 IT5305</b> App Development	<b>22IT5308</b> Virtualization	<b>22IT5311</b> IoT Architectures and Protocols	<b>22IT5311</b> Digital and Mobile Forensics	<b>22IT5314</b> Multimedia and Animation	<b>22IT5317</b> Robotic Process Automation
<b>22IT5303</b> Computer Vision	<b>22IT5306</b> Cloud Services Management	<b>22IT5309</b> Stream Processing	<b>22IT5312</b> Architecting Smart IoT Devices	<b>22IT5312</b> Social Network Security	<b>22IT5315</b> Video Creation and Editing	<b>22IT5318</b> Neural Networks and Deep Learning
<b>22IT6301</b> Text and Speech Analysis	<b>22IT6303</b> Dev-ops	<b>22IT6305</b> Data Warehousing	<b>22IT6307</b> Fog Computing & Energy Management In IoT Devices	<b>22IT6307</b> Modern Cryptography	<b>22IT6309</b> UI and UX Design	<b>22IT6311</b> Cyber security
<b>22IT6302</b> Big Data Analytics	<b>22IT6304</b> Software Testing and Automation	<b>22IT6306</b> Storage Technologies	<b>22IT6308</b> IoT cloud and data analytics	<b>22IT6308</b> Engineering Secure software systems	<b>22IT6310</b> Digital marketing	<b>22IT6312</b> Quantum Computing
<b>22IT7301</b> Image and video analytics	<b>22IT7302</b> Web Application Security	<b>22IT7303</b> Software Defined Networks	<b>22IT7304</b> IOT Security	<b>22IT7304</b> Network and Information Security	<b>22IT7305</b> Visual Effects	<b>22IT7306</b> Cryptocurrency and Block chain Technologies

Students are permitted to choose all Professional Electives from a particular vertical or from different verticals.

**PROFESSIONAL ELECTIVE COURSES: VERTICALS**

**Details of Vertical I: Data Science**

S. NO.	COURSE CODE	COURSE TITLE	CATE GORY	PERIODS PER WEEK			TOTAL CONTACT PERIODS	CREDITS
				L	T	P		
1.	<b>22IT5301</b>	Exploratory Data Analysis	PEC	3	0	0	3	3
2.	<b>22IT5302</b>	Recommender Systems	PEC	3	0	0	3	3
3.	<b>22IT5303</b>	Computer Vision	PEC	3	0	0	3	3
4.	<b>22IT6301</b>	Text and Speech Analysis	PEC	3	0	0	3	3
5.	<b>22IT6302</b>	Big Data Analytics	PEC	3	0	0	3	3
6.	<b>22IT7301</b>	Image and video analytics	PEC	3	0	0	3	3

### Details of Vertical II: Full Stack Development for IT

S. NO.	COURSE CODE	COURSE TITLE	CATE GORY	PERIODS PER WEEK			TOTAL CONTACT PERIODS	CREDITS
				L	T	P		
1.	22IT5304	Cloud Computing	PEC	3	0	0	3	3
2.	22IT5305	App Development	PEC	3	0	0	3	3
3.	22IT5306	Cloud ServicesManagement	PEC	3	0	0	3	3
4.	22IT6303	Dev-ops	PEC	3	0	0	3	3
5.	22IT6304	Software Testing and Automation	PEC	3	0	0	3	3
6.	22IT7302	Web Application Security	PEC	3	0	0	3	3

### Details of Vertical III: Cloud Computing and Data Centre Technologies

S. NO.	COURSE CODE	COURSE TITLE	CATE GORY	PERIODS PER WEEK			TOTAL CONTACT PERIODS	CREDITS
				L	T	P		
1.	22IT5307	Security and Privacy inCloud	PEC	3	0	0	3	3
2.	22IT5308	Virtualization	PEC	3	0	0	3	3
3.	22IT5309	Stream Processing	PEC	3	0	0	3	3
4.	22IT6305	Data Warehousing	PEC	3	0	0	3	3
5.	22IT6306	Storage Technologies	PEC	3	0	0	3	3
6.	22IT7303	Software Defined Networks	PEC	3	0	0	3	3

### Details of Vertical IV: Internet of Things

S. NO.	COURSE CODE	COURSE TITLE	CATE GORY	PERIODS PER WEEK			TOTAL CONTACT PERIODS	CREDITS
				L	T	P		
1.	22IT5310	Fundamentals of IoT & Cloud	PEC	3	0	0	3	3
2.	22IT5311	IoT Architectures and Protocols	PEC	3	0	0	3	3
3.	22IT5312	Architecting Smart IoT Devices	PEC	3	0	0	3	3
4.	22IT6307	Fog Computing & Energy Management In Iot Devices	PEC	3	0	0	3	3
5.	22IT6308	IoT cloud and data analytics	PEC	3	0	0	3	3
6.	22IT7304	IOT Security	PEC	3	0	0	3	3

### Details of Vertical V: Creative Media

S. NO.	COURSE CODE	COURSE TITLE	CATE GORY	PERIODS PER WEEK			TOTAL CONTACT PERIODS	CREDITS
				L	T	P		
1.	22IT5313	Multimedia Data Compression and Storage	PEC	3	0	0	3	3
2.	22IT5314	Multimedia and Animation	PEC	3	0	0	3	3
3.	22IT5315	Video Creation and Editing	PEC	3	0	0	3	3
4.	22IT6309	UI and UX Design	PEC	3	0	0	3	3
5.	22IT6310	Digital marketing	PEC	3	0	0	3	3
6.	22IT7305	Visual Effects	PEC	3	0	0	3	3

### Details of Vertical VI: Emerging Technologies

S. NO.	COURSE CODE	COURSE TITLE	CATE GORY	PERIODS PER WEEK			TOTAL CONTACT PERIODS	CREDITS
				L	T	P		
1.	22IT5316	Augmented Reality	PEC	3	0	0	3	3
2.	22IT5317	Robotic Process Automation	PEC	3	0	0	3	3
3.	22IT5318	Cognitive Science and Deep Learning	PEC	3	0	0	3	3
4.	22IT6311	Cyber security	PEC	3	0	0	3	3
5.	22IT6312	Quantum Computing	PEC	3	0	0	3	3
6.	22IT7306	Cryptocurrency and Blockchain Technologies	PEC	3	0	0	3	3

#### Enrollment for B.E. / B. TECH. (HONOURS) / Minor Degree (optional)

A student can also optionally register for additional courses (18 credits) and become eligible for the award of B.E. / B. Tech. (Honours) or Minor Degree. For B.E. / B. Tech. (Honours), a student shall register for the additional courses (18 credits) from semester V onwards. These courses shall be from the same vertical or a combination of different verticals of the same programme of study only. For minor degree, a student shall register for the additional courses (18 credits) from semester V onwards. All these courses have to be in a particular vertical from any one of the other programmes.

**Clause 4.10** of Regulation 2022 is applicable for the Enrolment of B.E. / B. TECH. (HONOURS) / Minor Degree (Optional).

#### VERTICALS FOR MINOR DEGREE

- Heads are requested to provide one vertical from their program to offer for other program students to register for additional courses (18 Credits) to become eligible for the B.E./B.Tech. Minor Degree.

Note: Each programme should provide verticals for minor degree

S. NO.	COURSE CODE	COURSE TITLE	CATE GORY	PERIODS PER WEEK			TOTAL CONTACT PERIODS	CREDITS
				L	T	P		
1.	22IT5601	Sem 5: Introduction to Database System	MDC	3	0	0	3	3
2.	22IT6601	Sem 6: Fundamentals of Data Science	MDC	3	0	0	3	3
3.	22IT6602	Sem 6: Artificial Intelligence and Expert Systems	MDC	3	0	0	3	3
4.	22IT7601	Sem 7: Data Exploration and Visualization	MDC	3	0	0	3	3
5.	22IT7602	Sem 7: Business Intelligence	MDC	3	0	0	3	3
6.	22IT8601	Sem 8: Cyber Security	MDC	3	0	0	3	3

\*MDC – Minor Degree Course

In addition to the above the following additional courses for Minor Degree can also be given to the student's common to all the branches.

Vertical I Fintech and Block Chain	Vertical II Entrepreneurship	Vertical III Environment and Sustainability
Financial Management	Foundations of Entrepreneurship	Sustainable infrastructure Development
Fundamentals of Investment	Team Building & Leadership Management for Business	Sustainable Agriculture and Environmental Management
Banking, Financial Services and Insurance	Creativity & Innovation in Entrepreneurship	Sustainable Bio Materials
Introduction to Blockchain and its Applications	Principles of Marketing Management for Business	Materials for Energy Sustainability
Fintech Personal Finance and Payments	Human Resource Management for Entrepreneurs	Green Technology
Introduction to Fintech	Financing New Business Ventures	Environmental Quality Monitoring and Analysis

### B Tech (Hons) Information Technology (Artificial Intelligence and Machine Learning)

S.No.	Course Code	Course Title	Category	Periods per Week				TCP	CIA	ESE	Total
				L	T	P	C				
1.	22IT5203	Foundations of	PC	3	0	0	3	4	40	60	100



		Machine Learning									
2.	22IT6203	Knowledge Engineering	PC	3	0	0	3	4	40	60	100
3.	22IT6204	Soft Computing	PC	3	0	0	3	4	40	60	100
4.	22IT7203	Optimization Techniques	PC	3	0	0	3	4	40	60	100
5.	22IT7204	Deep Learning	PC	3	0	0	3	4	40	60	100
6.	22IT8201	Game theory	PC	3	0	0	3	4	40	60	100

### B Tech (Hons) Information Technology (Cyber Security)

S.No.	Course Code	Course Title	Category	Periods per Week				TCP	CIA	ESE	Total
				L	T	P	C				
1.	22IT5204	Ethical Hacking	PC	3	0	0	3	3	40	60	100
2.	22IT6205	Digital and Mobile Forensics	PC	3	0	0	3	3	40	60	100
3.	22IT6206	Social Network Security	PC	3	0	0	3	3	40	60	100
4.	22IT7206	Engineering Secure Software Systems	PC	3	0	0	3	3	40	60	100
5.	22IT7207	Cryptocurrency and Blockchain Technologies	PC	3	0	0	3	3	40	60	100
6.	22IT8202	Network Security	PC	3	0	0	3	3	40	60	100

### B Tech (Hons) Information Technology (Blockchain Technology)

S.No.	Course Code	Course Title	Category	Periods per Week				TCP	CIA	ESE	Total
				L	T	P	C				
1.	22IT5205	Fundamentals of Blockchain Technology	PC	3	0	0	3	3	40	60	100
2.	22IT6207	Blockchain Architecture and Design	PC	3	0	0	3	3	40	60	100
3.	22IT6208	Building Private Blockchain	PC	3	0	0	3	3	40	60	100
4.	22IT7208	Blockchain Business Models	PC	3	0	0	3	3	40	60	100
5.	22IT7209	Blockchain and IoT	PC	3	0	0	3	3	40	60	100
6.	22IT8203	Blockchain and AI	PC	3	0	0	3	3	40	60	100


Note: Each programme should provide verticals for Honours degree


**SEMESTER-WISE CREDIT DISTRIBUTION**


<b>B.E. / B.TECH. PROGRAMMES</b>										
<b>S.No.</b>	<b>Course Area</b>	<b>Credits per Semester</b>								<b>Total Credits</b>
		<b>I</b>	<b>II</b>	<b>III</b>	<b>IV</b>	<b>V</b>	<b>VI</b>	<b>VII</b>	<b>VIII</b>	
1	HSC	3	3	-	2	-	3	-	-	11
2	BSC	7	9	4	-	-	-	-	-	23
3	ESC	6	2	5	-	-	2	-	-	15
4	PCC	-	5	13	20	12	5	9	-	61
5	PEC	-	-	-	-	9	6	3	-	18
6	OEC	-	-	-	-	-	6	6	-	12
7	EEC	3	3	3	1	1	2	2	10	25
8	MCC	✓	✓	-	-	-	-	-	-	-
<b>Total</b>		<b>19</b>	<b>22</b>	<b>25</b>	<b>23</b>	<b>22</b>	<b>24</b>	<b>20</b>	<b>10</b>	<b>165</b>

**CREDIT DISTRIBUTION R2022**

<b>Semester</b>	<b>I</b>	<b>II</b>	<b>III</b>	<b>IV</b>	<b>V</b>	<b>VI</b>	<b>VII</b>	<b>VIII</b>	<b>Total</b>
<b>Credits</b>	19	22	25	23	22	24	20	10	165

  
**Chairman BoS**  
**Chairman - BoS**  
**IT - HICET**

  
**Dean Academics**  
**Dean (Academics)**  
**HiCET**

  
**Principal**  
**PRINCIPAL**  
**Hindusthan College Of Engineering & Technology**  
**COIMBATORE - 641 032.**

# **SEMESTER - II**

# **SYLLABUS**

**SEMESTER II**

Programme /Sem	Course Code	Name of the Course	L	T	P	C
B.E/B.TECH/ II	22MA2103	DIFFERENTIAL EQUATIONS AND LINEAR ALGEBRA (AIML, CSE, IT)	3	1	0	4

The learner should be able to

**Course Objective**

1. Describe some methods to solve different types of first order differential equations.
2. Understand the various approach to find general solution of the ordinary differential equations
3. Evaluate the various types of Partial differential equations and methods to find solution.
4. Extend the knowledge of vector spaces
5. Extend the knowledge of inner product spaces

Unit	Description	Instructional Hours
I	<b>ORDINARY DIFFERENTIAL EQUATIONS OF FIRST ORDER</b> Basic concepts, separable differential equations, exact differential equations, integrating factors, linear differential equations, Bernoulli equation.	12
II	<b>LINEAR DIFFERENTIAL EQUATIONS OF SECOND ORDER</b> Second order linear differential equations with constant with RHS of the form $e^{ax}, x^n, \sin ax, \cos ax - e^{ax}, f(x)$ – Cauchy’s linear equations– Method of variation of parameters.	12
III	<b>PARTIAL DIFFERENTIAL EQUATIONS</b> Formation of partial differential equations by eliminating arbitrary constants and functions – Solution of first order partial differential equations of the form $f(p,q)=0$ , Clairaut’s equation – Lagrange’s equation.	12
IV	<b>VECTOR SPACES</b> Definition and examples of vector spaces, subspaces of a vector space and the quotient space, Linearly dependence and linearly independence of a set of vectors, Linear span.	12
V	<b>INNER PRODUCT SPACES</b> Complex matrices – Conjugate of the matrix – Symmetric and Skew symmetric matrices Hermitian and Skew Hermitian matrices – Properties (without proof) – Inner product spaces – Gram – Schmidt orthogonalization Unitary matrix – Properties (without proof) -	12
<b>Total Instructional Hours</b>		<b>60</b>

**At the end of the course, the learner will be able to**

**Course Outcome**

- CO1: Apply few methods to solve different types of first order differential equations.  
 CO2: Evaluate the solutions of higher order ordinary differential equations and its properties.  
 CO3: Compute the solution of first order partial differential equations.  
 CO4: Infer the knowledge of vector space  
 CO5: Infer the knowledge of Inner product space space

**TEXT BOOKS:**

- T1 – Erwin Kreyszig, “Advanced Engineering Mathematics”, 10<sup>th</sup> Edition, Wiley India Private Ltd., New Delhi, 2019  
 T2 - Stephen H. Friedberg, Arnold J. Insel, Lawrence E. Spence; Linear Algebra, Pearson 5<sup>th</sup> edition, 2022.

**REFERENCE BOOKS:**

- R1 - Dennis Zill, Warren S. Wright, Michael R. Cullen, Advanced Engineering Mathematics, Jones & Bartlett Learning, 2011  
 R2 - Ian N. Sneddon, Elements of Partial Differential Equations, Courier Corporation, 2013.  
 R3 - David Lay , Steven Lay , Judi McDonald “Linear Algebra and Its Applications” 5th Edition, Pearson ,2019.  
 R4 V.Krishnamurthi, J.L Arora of Linear Algebra, 2015.




*[Signature]*  
 Chairman, Board of Studies

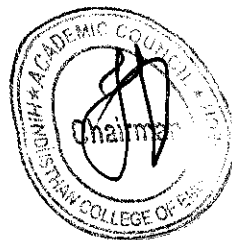
**Chairman - BoS  
 IT - HICET**


*[Signature]*  
 Dean - Academics

**Dean (Academics)  
 HICET**

PO& PSO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	3	3	2	2	1	1	-	-	1	2	2	2	2
CO2	3	3	3	2	3	1	1	-	-	1	2	2	2	2
CO3	3	3	3	3	3	1	1	-	-	1	2	2	2	2
CO4	3	3	3	3	3	1	-	-	-	1	-	2	3	2
CO5	3	3	3	3	3	1	-	-	-	1	-	2	3	2
Avg	3	3	3	2.6	2.8	1	1	-	-	1	2	2	2.4	2

  
 Chairman, Board of Studies  
**Chairman - BoS**  
**IT - HICET**



  
 Dean (Academics)  
**HICET**

Programme / Sem	Course Code	Name of the Course	L	T	P	C
BE/B.Tech II	22PH2101	<b>BASICS OF MATERIAL SCIENCE</b> (Common to all branches except MCT)	2	0	0	2

The student should be able to


1. Gain knowledge about Crystal systems and crystal structures
2. Understand the knowledge about electrical properties of materials
3. Enhance the fundamental knowledge in semiconducting materials.
4. Gain knowledge about magnetic materials
5. Acquire fundamental knowledge new engineering materials which is related to the engineering program

Course Objective


Unit	Description	Instructional Hours
<b>CRYSTAL PHYSICS</b>		
I	Crystal systems - Bravais lattice - Lattice planes - Miller indices – Inter planar spacing in cubic lattice - Atomic radius, Coordination number and Packing factor for SC, BCC and FCC crystal structures.	6
<b>ELECTRICAL PROPERTIES OF MATERIALS</b>		
II	Classical free electron theory - Expression for electrical conductivity – Thermal conductivity, expression – Widemann - Franz law – Success and failures – Fermi- Dirac statistics – Density of energy states .	6
<b>SEMICONDUCTING MATERIALS</b>		
III	Introduction – Compound and elemental semiconductor - direct and indirect band gap of semiconductors. Intrinsic semiconductor — electrical conductivity – band gap determination. - Extrinsic semiconductor – n type and p type semiconductor –Light Emitting Diode.	6
<b>MAGNETIC MATERIALS</b>		
IV	Origin of magnetic moment – Bohr magnetron – comparison of Dia, Para and Ferro magnetism – Domain theory – Hysteresis – soft and hard magnetic materials – anti ferromagnetic materials – Ferrites and its applications.	6
<b>NEW ENGINEERING MATERIALS</b>		
V	Metallic glasses: melt spinning process, Preparation and applications - shape memory alloys: phases, shape memory effect - Characteristics of SMA : Pseudoelastic effect, Super elasticity and Hystersis. Applications of SMA. Nanomaterials preparation (bottom up and top down approaches) – various techniques - pulsed laser deposition - Chemical vapor deposition	6
<b>Total Instructional Hours</b>		<b>30</b>

After completion of the course the learner will be able to

- Course Outcome** CO1: Understand the Crystal systems and crystal structures in the field of Engineering  
CO2: Illustrate the fundamental of electrical properties of materials

  
Chairman, Board of Studies  
Chairman - BoS  
IT - HICET



  
Dean - Academics  
Dean (Academics)  
HICET

- CO3: Discuss concept of acceptor or donor levels and the band gap of a semiconducting materials  
 CO4: Develop the technology of the magnetic materials and its applications in engineering field  
 CO5: Understand the advanced technology of new engineering materials in the field of Engineering

**TEXT BOOKS:**

T1 - Rajendran V, "Materials Science", Tata McGraw Hill Publishing Company Limited, New Delhi, 2017.

T2- M.N Avadhanulu and PG Kshirsagar "A Text Book of Engineering physics" S. Chand and Company ltd.,  
 New


Delhi 2022

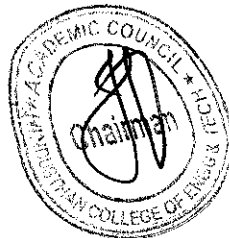
**REFERENCE BOOKS:**

R1 – Charles Kittel "Introduction to Solid State Physics". Wiley., New Delhi 2017

R2 - Dr. M.Arumugam "Materials Science " Anuradha publications., 2019

PO& PSO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	2	1	1	1	1	1	-	1	-	2	3		
CO2	3	3	1	1	2	-	-	-	1	-	2	2		
CO3	3	2	1	2	2	-	-	-	1	-	1	2		
CO4	3	3	1	2	2	1	-	-	1	-	1	2		
CO5	3	2	2	3	2	1	2	-	1	-	2	2		
Avg	3	2.4	1.2	1.8	1.8	1	1.5	-	1	-	2	3		

  
 Chairman, Board of Studies  
 Chairman - BoS  
 IT - HiCET



  
 Dean (Academics)  
 HiCET

Programme/ Sem	Course Code	Name of the Course	L	T	P	C
B.E./B.Tech/ II	22HE2151	EFFECTIVE TECHNICAL COMMUNICATION (Common to all Branches)	2	0	2	3

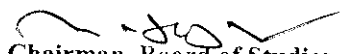
**The learner should be able**

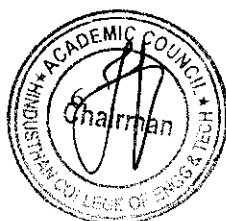
- Course Objective**
- To improve essential business communication skills.
  - To enrich employability knowledge.
  - To acquire the crucial organizing ability in official forum.
  - To impart important business writings.
  - To make effective presentation with essential etiquette.


Unit	Description	Instructional Hours
I	Language Proficiency: Types of sentences in English according to structure Writing: writing definitions, Describing product, work place and service (purpose, appearance, function) Vocabulary – words on nature <b>Practical Component: Listening- Watching and interpreting advertisements/short films Speaking- Extempore speech</b>	9
II	Language Proficiency: Direct and Indirect speech. Writing: Formal memos, Job application and resume preparation Vocabulary - words on offense and ethics <b>Practical Component: Listening- Comprehensions based on telephonic conversation Speaking- Vote of thanks&amp; welcome address</b>	9
III	Language Proficiency: Homophones and Homonyms, Writing: Preparing a detail plan for an official visit, schedule and Itinerary, reading comprehension, Vocabulary– words on society <b>Practical Component: Listening- Listening- paraphrasing the listened content Speaking- Group Discussion with preparation</b>	9
IV	Language Proficiency: Idioms Writing: Report writing (marketing, investigating) Vocabulary-words involved in business <b>Practical Component: Listening- Watching technical discussions and preparing MoM Speaking- On the spot Group Discussion</b>	9
V	Language Proficiency: spotting errors Writing: making /interpreting chart, sequencing of sentences Vocabulary- words involved in finance <b>Practical Component: Listening- Comprehensions based on announcements Speaking- Presentation on a technical topic with ppt.</b>	9
<b>Total Instructional Hours</b>		<b>45</b>

**At the end of the course, learners will be able**

- Course Outcome**
- CO1: To the business procedure and promotion skills.
- CO2: To make oral and written presentation in corporate forum.
- CO3: To schedule official events and participate in official discussions without reluctance.
- CO4: To take an effective role and manage in an organizational sector.
- CO5: To prepare and demonstrate a professional presentation

  
Chairman, Board of Studies  
**Chairman - BoS**  
**IT - HICET**



  
Dean Academics  
**Dean (Academics)**  
**HICET**




**TEXT BOOKS:**

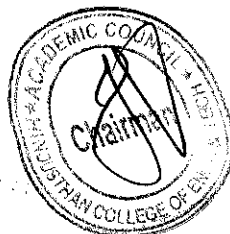
- T1 - NormanWhitby, "Business Benchmark-Pre-intermediate to Intermediate", Cambridge University Press, 2016.  
T2- Ian Wood and Anne Willams. "Pass Cambridge BEC Preliminary", Cengage Learning press 2015.

**REFERENCE BOOKS :**

- R1 -Michael Mc Carthy, "Grammar for Business", Cambridge University Press, 2009.  
R2- Bill Mascull, "Business Vocabulary in use: Advanced 2<sup>nd</sup> Edition", Cambridge University Press, 2009.  
R3-Frederick T. Wood, "Remedial English Grammar For Foreign Students", Macmillan publishers, 2001.

PO & PSO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO 10	PO 11	PSO1	PSO2
CO1	1	-	2	-	-	1	-	1	3	-	1	2	1
CO2	2	1	-	-	-	2	2	2	3	-	2	1	1
CO3	2	-	1	-	-	2	-	1	3	-	2	1	1
CO4	1	2	-	-	-	1	-	1	3	-	1	1	1
CO5	1	-	-	2	-	1	-	1	3	-	2	1	1
Avg	1.4	1.5	1.5	1	-	1.4	1	1.2	3	1.6	1.6	1.2	1

  
Chairman, Board of Studies  
Chairman - BoS  
IT - HICET



  
Dean (Academics)  
HICET


Programme /Sem	Course Code	Name of the Course	L	T	P	C
BE/B.Tech/ II	22PH2151	PHYSICS FOR CIRCUIT ENGINEERING PROGRAMME (AIML,CSE,ECE,EEE,EIE,IT & BME)	2	0	2	3

- The student should be able to**
1. Gain knowledge about laser, their applications, become conversant with principles of optical fiber and its applications
  2. Enhance his fundamental knowledge about properties of matter
  3. Understand the concept of wave optics
  4. Gain knowledge about quantum mechanics to explore the behavior of sub atomic particles
  5. Acquire fundamental knowledge of Ultrasonics and their applications.

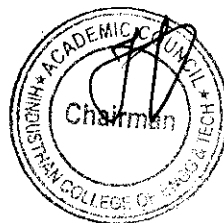
Unit	Description	Instructional Theory Hours
I	<b>LASER AND FIBER OPTICS</b> Spontaneous emission and stimulated emission – Type of lasers – Nd:YAG laser - Laser Applications – Holography – Construction and reconstruction of images. Principle and propagation of light through optical fibers – Derivation of numerical aperture and acceptance angle – Classification of optical fibers (based on refractive index and modes) – Fiber optical communication link.	6
II	<b>Determination of Wavelength and particle size using Laser</b> <b>PROPERTIES OF MATTER</b> Elasticity – Hooke's law – Poisson's ratio – Bending moment – Depression of a cantilever – Determination of Young's modulus of the material of the beam by Uniform bending theory and experiment. Twisting couple - torsion pendulum: theory and experiment <b>Determination of Young's modulus by uniform bending method</b> <b>Determination of Rigidity modulus – Torsion pendulum</b>	6
III	<b>WAVE OPTICS</b> Interference of light – air wedge – Thickness of thin paper( Testing of thickness of surface) - Michelson interferometer - Diffraction of light – Fraunhofer diffraction at single slit – Diffraction grating - Plane Diffraction grating – Rayleigh's criterion of resolution power - resolving power of grating. <b>Determination of wavelength of mercury spectrum – spectrometer grating</b> <b>Determination of thickness of a thin wire – Air wedge method</b>	6
IV	<b>QUANTUM PHYSICS</b> Black body radiation – Compton effect: theory and experimental verification – wave particle duality – concept of wave function and its physical significance – Schrödinger's wave equation – time independent and time dependent equations – particle in a one-dimensional rigid box .	6
V	<b>ULTRASONICS</b> Production – Piezoelectric generator – Properties of Ultrasonic waves. Determination of velocity using acoustic grating – Cavitation. Industrial applications – Drilling and welding – Non destructive testing (pulse echo system). Medical applications – Ultrasound Scanner – A – mode – B- mode and C –mode.	6
<b>Total Instructional Hours</b>		30
<b>Total Lab Instructional Hours</b>		30

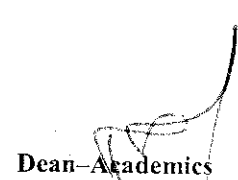
- After completion of the course the learner will be able to**
- CO1: Understand the advanced technology of LASER and optical communication in the field of engineering
- CO2: Illustrate the fundamental properties of matter
- CO3: Discuss the Oscillatory motions of particles
- CO4: Understand the dual nature of matter and the Necessity of quantum mechanics.
- CO5: Develop the Ultrasonics technology and its applications in NDT.

Course Outcome

  
Chairman, Board of Studies  
Chairman - BOS  
IT - HiCET

8



  
Dean - Academics  
Dean (Academics)  
HiCET

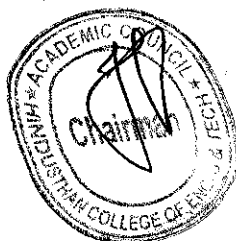
**TEXT BOOKS:**

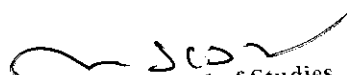
- T1 - Rajendran V, Applied Physics, Tata McGraw Hill Publishing Company Limited, New Delhi, 2017.  
T2- Gaur R.K. and Gupta S.L., Engineering Physics, 8<sup>th</sup> edition, Dhanpat Rai Publications (P) Ltd., New Delhi, 2015.

**REFERENCE BOOKS:**

- R1 - M.N Avadhanulu and PG Kshirsagar "A Text Book of Engineering physics" S.Chand and Company ltd., New Delhi 2016  
R2 - Dr. G. Senthilkumar "Engineering Physics – I" VRB publishers Pvt Ltd., 2021

PO& PSO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	3	3	2	3	1	1	-	1	-	2	3		
CO2	3	3	2	2	1	1	1	-	1	-	2	2		
CO3	3	3	2	2	2	1	1	-	1	-	1	2		
CO4	3	2	3	1	3	1	1	-	1	-	1	2		
CO5	3	2	3	1	2	1	1	-	1	-	2	2		
Avg	3	2.6	2.6	1.6	2.2	1	1	-	1	-	1.6	2.2		



  
Chairman, Board of Studies  
Chairman - BoS  
IT - HICET

  
Dean Academics  
Dean (Academics)  
HICET

Programme/ Sem	Course Code	Name of the Course	L	T	P	C
B.E/B.Tech/ II	22IT2251	PYTHON PROGRAMMING AND PRACTICES (IT, CSE)	2	0	2	3

- The student should be able**
- Course Objective**
- To know the basics of algorithmic problem solving
  - To read and write simple Python programs
  - To develop Python programs with conditionals and loops and to define Python functions and call them
  - To use Python data structures -- lists, tuples, dictionaries
  - To do input/output with files in Python


Unit	Description	Instructional Hours
<b>I</b>	<b>ALGORITHMIC PROBLEM SOLVING</b> Algorithms, building blocks of algorithms (statements, state, control flow, functions), notation (pseudo code, flow chart, programming language), algorithmic problem solving, simple strategies for developing algorithms (iteration, recursion).	(5+2)
<b>II</b>	<b>DATA, STATEMENTS, CONTROL FLOW</b> Data Types, Operators and precedence of operators, expressions, statements, comments; Conditionals: Boolean values and operators, conditional (if), alternative (if -else), chained conditional (if-elif-else); Iteration: state, while, for, break, continue, pass;	(6+4)
<b>III</b>	<b>FUNCTIONS, STRINGS</b> Functions, parameters and arguments; Fruitful functions: return values, local and global scope, function composition, recursive functions. Strings: string slices, immutability, string functions and methods, string module.	(6+4)
<b>IV</b>	<b>LISTS, TUPLES, DICTIONARIES</b> Lists: list operations, list slices, list methods, list loop, mutability, aliasing, cloning lists, list parameters; Tuples: tuple assignment, tuple as return value; Dictionaries: operations and methods; advanced list processing - list comprehension.	(6+4)
<b>V</b>	<b>FILES, MODULES, PACKAGES</b> Files and exception: text files, reading and writing files, errors and exceptions, handling exceptions, modules, packages	(6+2)

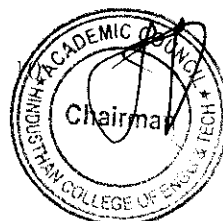
**TOTAL INSTRUCTIONAL HOURS 45**

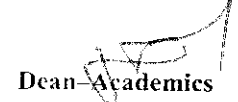
**S.No**

**List of Experiments**

- Read NAME, REG NO, PHYSICS, CHEMISTRY, MATHS MARKS and calculate cutoff marks out of 200 print the cutoff marks of the student
- Take two numbers of int data type, two numbers of float data type as input. Print the sum and difference of two int variable on a new line Print the sum and difference of two-float variable rounded to one decimal place on a new line.
- Get two integer inputs from user as dividend named as x and y. Find out Greatest Common Divisor Between both of the above two dividends
- Tony's Maths teacher ask him to solve an exponential problem but he don't know how to solve. Teacher gives two values as named base and exponent value ask tony to find the factor. Help him to do his task.
- Read four inputs from the user named X1, X2, Y1, Y2 and compute to find a distance between two points.
- Read the five different subject marks of the student, calculate total marks and print the total marks, grade.
- Given the age input as N from the user and check whether user is eligible for voting or not using if condition and print Eligible or Not Eligible. Hint: The minimum age to vote is 18 years.
- Write a program that reads a integer value as N from the user and then produces n lines of output The first line contains 1 star,the second line contains 2 stars and so on until the last line which

  
Chairman, Board of Studies  
**Chairman - BoS**  
**IT - HICET**



  
Dean Academics  
**Dean (Academics)**  
**HICET**

should have N stars.can you Write this using single loop? Hint: remember what the expression '+\*5' does.

- 9 Write a function that takes an integer value representing a year , and returns a Boolean result indicating whether or not the year is a leap year
- 10 sheela wants to convert time into minutes but she have no idea about it. Create a function named time() and get the input from the user as two integers hours, minutes and print the minutes as output. Help sheela to do this conversion
- 11 Get the two different matrix elements for (2x2) matrix. Perform addition operation and subtraction operation and print the result in matrix format using nested loop in python.
- 12 Read the input from the user for no of elements as N and then append it into the list. Write a python program to find the maximum element in the list.
- 13 Read the N no of elements from the user and append it into the list, perform linear search operations using python programming List operations
- 14 Read the List of Numbers from the user with N elements and perform Selection sorting operation using python programming.
- 15 Write a python program to take input as filename with extension, perform reading and writing operations in the file.

Course Outcome

At the end of the course, the learner will be able to

CO1: Develop algorithmic solutions to simple computational problems

CO2: Read, write, execute by hand simple Python programs

CO3: Structure simple Python programs for solving problems and Decompose a Python program into functions

CO4: Represent compound data using Python lists, tuples, dictionaries

CO5: Read and write data from/to files in Python Programs.

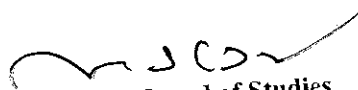
**TEXT BOOKS:**

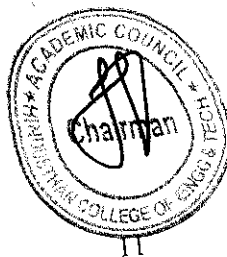
- T1: Guido van Rossum and Fred L. Drake Jr, An Introduction to Python – Revised and updated for Python 3.6.2, Shroff Publishers, First edition (2017).
- T2: S. Annadurai, S.Shankar, I.Jasmine, M.Revathi, Fundamentals of Python Programming, Mc-Graw Hill Education (India) Private Ltd, 2019

**REFERENCE BOOKS:**

- R1: Charles Dierbach, —Introduction to Computer Science using Python: A Computational Problem- Solving Focus, Wiley India Edition, 2013.
- R2: Timothy A. Budd, —Exploring Python!, Mc-Graw Hill Education (India) Private Ltd., 2015
- R3: Robert Sedgewick, Kevin Wayne, Robert Dondero, —Introduction to Programming in Python: An Inter-disciplinary Approach, Pearson India Education Services Pvt. Ltd., 2016

PO & PSO	PO1	PO2	PO3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2
CO1	2	3	3	-	2	-	-	-	-	-	-	2	2	2
CO2	2	3	3	-	2	-	-	-	2	-	-	2	2	2
CO3	2	3	3	-	2	-	-	-	2	-	-	2	2	2
CO4	2	3	3	-	2	-	-	-	2	-	-	2	2	2
CO5	2	3	3	-	2	-	-	-	2	-	-	2	2	2

  
 Chairman, Board of Studies  
**Chairman - BoS**  
**IT - HICET**



  
 Dean - Academics  
**Dean (Academics)**  
**HICET**

Programme/ Sem	Course Code	Name of the Course	L	T	P	C
B.Tech/B.E/II	22IT2253	DYNAMIC WEB DESIGN (IT, CSE & AIML)	2	0	2	2

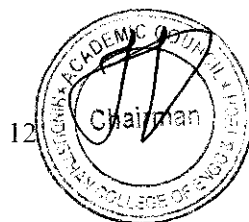
The student should be able

- Course Objective**
1. To get Introduction to Java Script
  2. To understand about Dialog box and functions in Java Script
  3. To learn about Control statements in Java script
  4. To study about Arrays and objects in Java Script
  5. To have a knowledge in Event handling in JavaScript

Unit	Description	Instructional Hours
<b>INTRODUCTION TO JAVASCRIPT</b>		
I	Introduction-History of JavaScript -Simple Program: Displaying a dynamic Line of Text in a Web Page-Modifying Our First Program Obtaining –DataTip- Identifiers-Operators. <i>Conversion of Celsius to Fahrenheit using JavaScript. Java Script to perform Arithmetic Operations-Calculation of diameter, circumference and area of the circle.</i>	7+2
<b>DIALOG BOX AND FUNCTIONS</b>		
II	User Input with prompt Dialogs (alert, prompt, confirm) -Arithmetic operations using prompt(Detail)-Display Date and Time with Greeting -Functions-Function Expression-Arrow Function. <i>Input two Integers from user and displays the sum, product, difference and quotient of the two numbers using functions and alert box. Input three integers from user and display sum, average in alert dialog using functions.</i>	7+2
<b>CONTROL STATEMENTS</b>		
III	If statement-if else statement-else-if statement-Switch statement-repetition statements-while repetition statement -do-while repetition statement -for repetition statement –break and continue statements. <i>Check for eligibility to drive a vehicle -Rate the student performance 5 to 1 using switch- loop that will iterate from 0 to 15.For each iteration, it will check if the current number is odd or even, and display a message to the screen.</i>	7+2
<b>ARRAYS AND OBJECT</b>		
IV	Arrays-Declaring and Allocation Arrays-Array Methods-Built in Object-Math –String-Date – Boolean – documents – window-using cookies. <i>Random Image Generator Using Arrays - Display current Date and Time in a Web page.</i>	7+2
<b>EVENT HANDLING AND REGULAR EXPRESSION</b>		
V	Document Object Model-Element Access in JavaScripts- Events and Event Handling- Basic Concepts of Event Handling- Events, Attributes, and Tag-Event Handler Attributes- Handling Events from Form Elements -Regular Expression. <i>Form validation-Design Job Skills web page-what happens for a failing applicant and a successful applicant.</i>	7+2
<b>TOTAL INSTRUCTIONAL HOURS</b>		<b>45</b>

  
Chairman, Board of Studies

**Chairman - BoS  
IT - HICET**



  
Dean-Academics

**Dean (Academics)  
HICET**

At the end of the course, the learner will be able to

- Course Outcome**
- CO1: Design simple dynamic web pages
  - CO2: Develop a web page using prompt and using functions.
  - CO3: Creation of dynamic web page using Control Statements
  - CO4: Creating an interactive webpage using Arrays and Objects
  - CO5: Design a web page that handles Events.

**TEXT BOOKS:**

T1: Deitel, Deitel, Goldberg, "Internet & World Wide Web How To Program", Fourth Edition, Pearson Education, 2006.

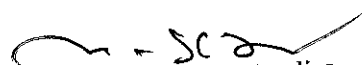
T2: Robert. W. Sebesta, "Programming the World Wide Web", Fourth Edition, Pearson Education, 2007.

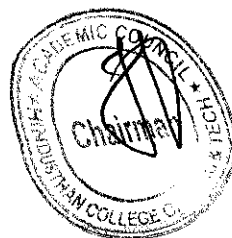
**REFERENCE BOOKS:**

R1: Jeffrey C. Jackson, "Web Technologies--A Computer Science Perspective", Pearson Education, 2006.

R2: John Dean "WEB PROGRAMMING with HTML5, CSS, and JavaScript", Bartlett Learning, LLC 2019.

PO & PSO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	3	3			1	1					1	1		3
CO2	3	3	3	1	2	1	1				1	1	1	1	3
CO3	3	2	3	2	1		2		1		2	2	3	2	3
CO4	3	3	3	1		1	2		1			2	2	3	3
CO5	3	3	3		2		2		1		1	3	3	3	3

  
Chairman, Board of Studies



  
Dean (Academics)  
HICET

Programme	Course Code	Name of the Course	L	T	P	C
B.E/B.Tech	22ME2001	ENGINEERING PRACTICES (Common to all branches)	0	0	4	2

Course Objective To provide exposure to the students with hands on experience on various basic engineering practices in Civil, Mechanical and Electrical Engineering.

**Unit**

**Description of the Experiments  
GROUP A ( CIVIL AND MECHANICAL)**

- 1 Preparation of Single pipe line and Double pipe line connection by using valves, taps, couplings, unions, reducers and elbows.
- 2 Arrangement of bricks using English Bond for one brick thick wall for right angle corner junction and T- junction
- 3 Arrangement of bricks using English Bond for one and a half brick thick wall for right angle corner and T- junction
- 4 Preparation of arc welding of Butt joints, Lap joints and Tee joints.
- 5 Practice on sheet metal Models- Trays and funnels
- 6 Hands-on-exercise in wood work, joints by sawing, planning and cutting.
- 7 Practice on simple step turning, taper turning and drilling.
- 8 Demonstration on Smithy operation.
- 9 Demonstration on Foundry operation.
- 10 Demonstration on Power tools.

**GROUP B ( ELECTRICAL ENGINEERING)**

- 1 Residential house wiring using switches, fuse, indicator, lamp and energy meter.
- 2 Fluorescent lamp wiring.
- 3 Stair case wiring.
- 4 Measurement of Electrical quantities – voltage, current, power & power factor in single phase circuits.
- 5 Measurement of energy using single phase energy meter.
- 6 Soldering practice using general purpose PCB.
- 7 Measurement of Time, Frequency and Peak Value of an Alternating Quantity using CRO and Function Generator.
- 8 Study of Energy Efficient Equipment's and Measuring Instruments.

**Total Instructional Hours 45**

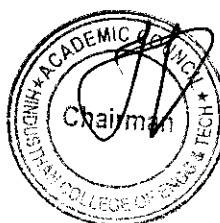
- Course Outcome
- Fabricate wooden components and pipe connections including plumbing works.
  - Fabricate simple weld joints.
  - Fabricate different electrical wiring circuits and understand the AC Circuits.


CO/PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	0	0	0	0	0	0	0	0	0	0	0	0
CO2	0	0	0	0	0	0	0	0	0	0	0	0
CO3	3	0	0	0	0	0	0	1	1	0	0	1
CO4	0	0	0	0	0	0	0	0	0	0	0	0
CO5	0	0	0	0	0	0	0	0	0	0	0	0
AVG	1	0	0	0	0	0	0	0.3	0.3	0	0	0.3

  
Chairman, Board of Studies

**Chairman - BoS  
IT - HICET**

14



  
Dean - Academics

**Dean (Academics)  
HICET**



Programme/ Sem	Course Code	Name of the Course	L	T	P	C
BE/B.TECH II	22HE2071	DESIGN THINKING	2	0	0	2

**The student should be able to**

Course Objective

1. To expose students to the design process
2. To develop and test innovative ideas through a rapid iteration cycle.
3. To provide an authentic opportunity for students to develop teamwork and leadership skills

Unit	Description	Instructional Hours
I	<b>DESIGN ABILITY</b> Asking Designers about what they Do – Deconstructing what Designers Do – Watching what Designers Do – Thinking about what Designers Do – The Natural Intelligence of Design Sources	6
II	<b>DESIGNING TO WIN</b> Formula One Designing – Radical Innovations – City Car Design – Learning From Failures – Design Process and Working Methods	5
III	<b>DESIGN TO PLEASE AND DESIGNING TOGETHER</b> Background – Product Innovations – Teamwork versus Individual work – Roles and Responsibilities – Avoiding and Resolving Conflicts.	6
IV	<b>DESIGN EXPERTISE</b> Design Process – Creative Design - Design Intelligence – Development of Expertise – Novice to Expert. Critical Thinking – Case studies: Brief history of Albert Einstein, Isaac Newton and Nikola Tesla	6
V	<b>DESIGN THINKING TOOLS AND METHODS</b> Purposeful Use of Tools and Alignment with Process - Journey Mapping - Value Chain Analysis - Mind Mapping – Brainstorming - Design Thinking Application: Design Thinking Applied to Product Development	7
<b>Total Instructional Hours</b>		<b>30</b>

**After completion of the course the learner will be able to**

Course Outcome

CO1: Develop a strong understanding of the Design Process  
CO2: Learn to develop and test innovative ideas through a rapid iteration cycle.  
CO3: Develop teamwork and leadership skills

**TEXT BOOKS:**

T1 - 1. Nigel Cross, "Design Thinking", Kindle Edition.

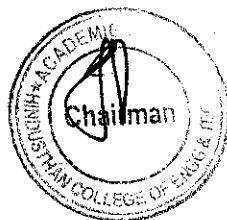
**REFERENCE BOOKS:**

R1 - Tom Kelley, "Creative Confidence", 2013.


R2 - 3. Tim Brown, "Change by Design", 2009.

  
Chairman, Board of Studies

**Chairman - BOS  
IT - HICET**



15

  
Dean - Academics  
**Dean (Academics)  
HiCET**

Programme	Course code	Name of the course	L	T	P	C
B.TECH.	22HE2072	SOFT SKILLS AND APTITUDE I	0	0	0	1

**The student should be able**

Course Objective	Description
1	To develop and nurture the soft skills of the students through instruction, knowledge acquisition, demonstration and practice.
2	To enhance the students ability to deal with numerical and quantitative skills.
3	To identify the core skills associated with critical thinking.
4	To develop and integrate the use of English language skills

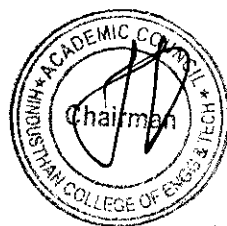
Unit	Description	Instructional Hours
I	<b>Lessons on excellence</b> Skill introspection, Skill acquisition, consistent practice	2
II	<b>Logical Reasoning</b> Problem Solving - Critical Thinking- Lateral Thinking - Coding and Decoding – Series – Analogy - Odd Man Out - Visual Reasoning - Sudoku puzzles - Attention to detail	11
III	<b>Quantitative Aptitude</b> Addition and Subtraction of bigger numbers - Square and square roots - Cubes and cube roots - Vedic maths techniques - Multiplication Shortcuts - Multiplication of 3 and higher digit numbers – Simplifications - Comparing fractions - Shortcuts to find HCF and LCM - Divisibility tests shortcuts - Algebra and functions	11
IV	<b>Recruitment Essentials</b> Resume Building - Impression Management	4
V	<b>Verbal Ability</b> Nouns and Pronouns – Verbs - Subject-Verb Agreement - Pronoun-Antecedent – Agreement - Punctuations	4

**Total Instructional Hours 30**

Course Outcome	Description
CO1	Students will analyze interpersonal communication skills. public speaking skills.
CO2	Students will exemplify tautology, contradiction and contingency by logical thinking.
CO3	Students will be able to develop an appropriate integral form to solve all sorts of quantitative problems.
CO4	Students can produce a resume that describes their education, skills, experiences and measurable achievements with proper grammar, format and brevity
CO5	Students will be developed to acquire the ability to use English language with an error while making optimum use of grammar

**REFERENCES:**

- R1 Quantitative Aptitude – Dr. R S Agarwal
- R2 Speed Mathematics: Secret Skills for Quick Calculation - Bill Handley
- R3 Verbal and Non – Verbal Reasoning – Dr. R S Agarwal
- R4 Objective General English – S.P.Bakshi



*[Signature]*  
Chairman, Board of Studies

**Chairman - BoS  
IT - HICET**

*[Signature]*  
Dean-Academics

**Dean (Academics)  
HICET**

டம்/ செம்	பாடநெறி குறியீடு	பாடத்தின் பெயர்	L	T	P	C
பி.இ/ க	22MC2094	தமிழரும்தொழில்நுட்பமும் (முதலாம் ஆண்டு பி.இ பொது பாடப்பிரிவு)	2	0	0	1

**கற்றவர்இயலவேண்டும்**

1. சங்க காலத்தில் தொழில்துறை பற்றிய அறிவைப் பெறுதல்.
2. சங்க காலத்தில் வீட்டின் பொருள், சிற்பங்கள் மற்றும் கோவில்கள் வடிவமைப்பு பற்றி கூட்டு கற்றல்
3. வரலாறு மற்றும் தொல்லியல் சான்றுகளின் ஆதாரமாக உலோகவியல் ஆய்வுகளில் அறிவை வளர்த்துக் கொள்ளுங்கள்.
4. வேளாண்மை மற்றும் வேளாண் செயலாக்கத்தில் பயன்படுத்தப்படும் பண்டைய நுட்பங்களைப் பற்றிய அறிவைப் பெறுதல்.
5. தமிழ் மொழியின் மென்பொருள் பற்றி அறிதல்

பாடத்தி  
ன்றோக்  
கம்

அலகு

விளக்கம்

பயிற்சி  
நேரம்

**நெசவுமற்றும்பானைத்தொழில்நுட்பம்**

- I சங்க காலத்தில் நெசவுத் தொழில் - பானைத் தொழில்நுட்பம்-கருப்பு சிவப்பு பாண்டங்கள் -பாண்டங்களில் கீறல் குறியீடுகள். 3

**வடிவமைப்புமற்றும்கட்டிடத்தொழில்நுட்பம்**

- II சங்க இலக்கியத்தில் வடிவமைப்பு மற்றும் கட்டுமானங்கள் மற்றும்சங்க காலத்தில் வீட்டுப் பொருட்களில் வடிவமைப்பு -சங்க காலத்தில் கட்டுமான பொருட்களும் நடுகல்லும்- சிலப்பதிகாரத்தில் மேடை அமைப்பு பற்றிய விவரங்கள் - மாமல்லபுரம் சிற்பங்களும், கோவில்களும் - சோழர் காலத்துப் பெருங்கோயில்கள் மற்றும் பிற வழிப்பாடுத் தளங்கள் - நாயக்கர் காலக் கோயில்கள் - மாதிரி கட்டமைப்புகள் பற்றி அறிதல், மதுரை மீனாட்சி அம்மன் ஆலயம் மற்றும் திருமலை நாயக்கர் மஹால் - செட்டி நாட்டு வீடுகள் - பிரிட்டிஷ் காலத்தில் சென்னையில் இந்தோ-சாரோச்செனிக் கட்டிடக் கலை. 3

**உற்பத்தி தொழில்நுட்பம்**

- III கப்பல் கட்டும் கலை- உலோகவியல் - இரும்புத் தொழிற்சாலை - இரும்பை உருகுதல் எஃகு - வரலாற்றுசாலை சான்றுகளாக செம்பு மற்றும் தங்க நாணயங்கள் - நாணயங்கள் அச்சடித்தல் - மணி உருவாக்கும் தொழிற்சாலைகள் - கல்மணிகள், கண்ணாடிமணிகள் - சுடுமண் மணிகள் - சங்கு மணிகள் - எலும்புத்துண்டுகள் - தொல்லியல் சான்றுகள் - சிலப்பதிகாரத்தில் மணிகளின்வகைகள். 3

**வேளாண்மைமற்றும்நீர்பாசனத்தொழில்நுட்பம்**

- IV அணை, ஏரி, குளங்கள், மதகு - சோழர்காலக் குழுழித் தூம்பின் முக்கியத்துவம் - கால்நடை பராமரிப்பு - கால்நடைகளுக்காக வடிவமைக்க பட்ட கிணறுகள் - வேளாண்மை மற்றும் வேளாண்மை சார்ந்த செயல்பாடுகள் - கடல்சார் அறிவு - மீன்வளம் - முத்து மற்றும் முத்துக்குளித்தல் - பெருங்கடல் குறித்த பண்டைய அறிவு - அறிவுசார் சமூகம். 3

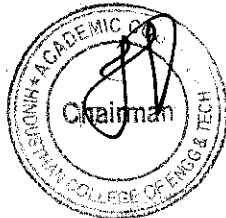
**அறிவியல்தமிழ்மற்றும்கணித்தமிழ்**

- V அறிவியல் தமிழின் வளர்ச்சி - கணித்தமிழ் வளர்ச்சி - தமிழ் நூல்களை மின்பதிப்பு செய்தல் - தமிழ் மென்பொருட்கள் உருவாக்கம் - தமிழ் 3

இணைய கல்விக்கழகம் - தமிழ் மின் நூலகம் - இணையத்தில் தமிழ் அகராதிகள் - சொற்குவைத் திட்டம்.

Chairman, Board of Studies

Chairman - BoS



Dean-Academics  
Dean (Academics)  
RIIET

**பாடநெறியின்முடிவில்கற்றவர்கற்றபின்**

பா மு1: பண்டைய தொழில்நுட்பதை அடையாளம் கொள்ள தெரியும்

பா மு2: சங்க கால கட்டுமானப் பொருட்கள்- சிற்ப வகைகளை வேறுபடுத்த முடியும்

பாடத்தி  
ன்முடிவு

பா மு3: வரலாறு மற்றும் தொல்லியல் சான்றுகளின் ஆதாரமாக உலோகவியல் ஆய்வுகளில் பட்டியலிட்டு அடையாளம் காண முடியும்

பா மு4: விவசாயம் மற்றும் வேளாண் செயலாக்கத்தில் பயன்படுத்தப்படும் பழங்கால நுட்பங்களைப் பற்றி விளக்கத்துடன் நிரூபிக்க முடியும்

பா மு5: தமிழ் மொழியின் புதிய மென்பொருள் பற்றி உருவாக்கக் கூடிய திறன் மேம்படுத்துதல்.

**உரைபுத்தகங்கள்**

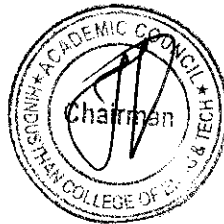
உ1- தமிழக வரலாறு - மக்களும் பண்பாடும் - கே .கே பிள்ளை (வெளியீடு தமிழ்நாடு பாடநூல் மற்றும் கல்வியியல் பணிகள் கழகம் )

உ2- எஸ்.கே. சிங், இடைக்கால இந்தியாவின் வரலாறு. புது தில்லி: ஆக்சிஸ் புகஸ் பிரைவேட் லிமிடெட், 2013.

**குறிப்புகள்**

கு1- கணிதத்தமிழ் -முனைவர் இல. சுந்தரம் .(விகடன் பிரசுரம் )

கு2- கீழடி வைகை நதிக்கரையில் சங்ககால நகர நாகரிகம் (தொல்லியல் துறை வெளியீடு).



  
Chairman, Board of Studies  
Chairman - BoS  
IT - HICET

  
Dean-Academics

Dean (Academics)  
HICET

Programme	Course Code	Name of the Course	L	T	P	C
B.E.	22MC2095	TAMILS AND TECHNOLOGY	2	0	0	1

- The student should be able to
- Course Objectives:**
- 1.Acquiring knowledge of industry during the Sangam Period.
  - 2.Collaborat learning about house design, sculpture and temples during Sangam Period
  - 3.Develop Knowledge in metallurgical studies as a source of historical and archaeological evidence.
  - 4.Acquiring knowledge about ancient techniques used in agriculture and agro processing
  - 5.Knowledge of Tamil language literature.

#### UNIT I WEAVING AND CERAMIC TECHNOLOGY

Weaving Industry during Sangam Age – Ceramic technology – Black and Red Ware Potteries (BRW) – Graffiti on Potteries.

#### UNIT II DESIGN AND CONSTRUCTION TECHNOLOGY

Designing and Structural construction House & Designs in household materials during Sangam Age – Building materials and Hero stones of Sangam age – Details of Stage Constructions in Silappathikaram – Sculptures and Temples of Mamallapuram – Great Temples of Cholas and other worship places – Temples of Nayaka Period – Type study (Madurai Meenakshi Temple)- Thirumalai Nayakar Mahal – Chetti Nadu Houses, Indo – Saracenic architecture at Madras during British Period.

#### UNIT III MANUFACTURING TECHNOLOGY

Art of Ship Building – Metallurgical studies – Iron industry – Iron smelting, steel -Copper and goldCoins as source of history – Minting of Coins – Beads making-industries Stone beads -Glass beads – Terracotta beads -Shell beads/ bone beats – Archeological evidences – Gem stone types described in Silappathikaram.

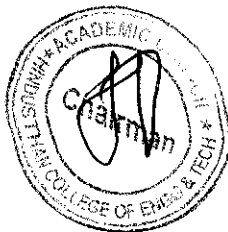
#### UNIT IV AGRICULTURE AND IRRIGATION TECHNOLOGY

Dam, Tank, ponds, Sluice, Significance of Kumizhi Thoompu of Chola Period, Animal Husbandry – Wells designed for cattle use – Agriculture and Agro Processing – Knowledge of Sea – Fisheries – Pearl – Conche diving – Ancient Knowledge of Ocean – Knowledge Specific Society.

#### UNIT V SCIENTIFIC TAMIL & TAMIL COMPUTING

Development of Scientific Tamil – Tamil computing – Digitalization of Tamil Books – Development of Tamil Software – Tamil Virtual Academy – Tamil Digital Library – Online Tamil Dictionaries – Sorkuvai Project.

- Course Outcome:**
- After completion of the course the learner will be able to**
- CO1:Recognize ancient business
  - CO2: Distinguish Sangam period building material and types of sculpture.
  - CO3: Identify the source of historical and archaeological
  - CO4: Demonstrate the techniques used in agriculture and agro processing.
  - CO5:Understand the new software of Tamil language.



19

  
Chairman, Board of Studies

**Chairman - BoS  
IT - HICET**

  
Dean Academics  
**Dean (Academics)  
HICET**