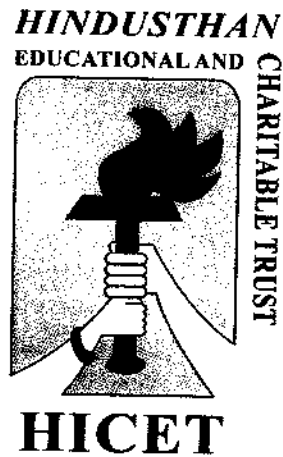


HINDUSTHAN COLLEGE OF ENGINEERING AND TECHNOLOGY
(An Autonomous Institution Affiliated to Anna University, Chennai)
(Approved by AICTE, New Delhi, Accredited by NAAC with 'A' Grade)
Coimbatore - 641 032.

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



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 Highway, Coimbatore, Tamil Nadu.



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	
THEORY												
1.	22MA1101	Matrices and Calculus	BSC	3	1	0	4	4	40	60	100	
THEORY WITH LAB COMPONENT												
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	
EEC COURSES (SE/AE)												
6.	22HE1072	Entrepreneurship & Innovation	AEC	1	0	0	1	1	100	0	100	
MANDATORY COURSE												
				TOTAL	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
THEORY											
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
THEORY WITH LAB COMPONENT											
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
PRACTICAL											
7.	22ME2001	Engineering Practices	ESC	0	0	4	2	2	60	40	100
EEC COURSES (SE/AE)											
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
MANDATORY COURSE											
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							
TOTAL				17	1	14	23	32	640	360	1000

SEMESTER III

S. No	Course Code	Course Title	Category	L	T	P	C	TCP	CIA	ESE	Total
THEORY											
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
THEORY WITH LAB COMPONENT											
5.	22IT3251	Java Programming	PCC	2	0	2	4	4	50	50	100
PRACTICAL											
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
EEC COURSES (SE/AE)											
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
MANDATORY COURSE											
10.	22MC3191	Essence of Indian Traditional Knowledge	MC	2	0	0	0	2	40	60	100
TOTAL				15	3	14	25	32	490	410	900

SEMESTER IV

S. No	Course Code	Course Title	Category	L	T	P	CT	CP	CIA	ESE	Total	
THEORY												
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	
THEORY WITH LAB COMPONENT												
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	
PRACTICAL												
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	
EEC COURSES (SE/AE)												
9.	22HE4071	Soft Skills -III	SEC	1	0	0	1	1	100	0	100	
MANDATORY COURSE												
10.		Indian Constitution	MC	2	0	0	0	2	40	60	100	
				TOTAL	16	0	12	23	29	480	420	900
<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
THEORY											
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
THEORY WITH LAB COMPONENT											
6.	22IT5251	Artificial Intelligence & Machine Learning	PCC/ICC	2	0	2	3	4	50	50	100
PRACTICAL											
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
TOTAL				18	1	6	22	25	410	390	800

SEMESTER VI

S. No	Course Code	Course Title	Category	L	T	P	C	TCP	CIA	ESE	Total
THEORY											
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
PRACTICAL											
8.	22IT6001	Data Science Laboratory	PCC	0	0	4	2	4	60	40	100
EEC COURSES (SE/AE)											
9.	22HE6071	Soft Skills – 5	SEC	2	0	0	2	2	100	0	100
TOTAL				22	0	4	24	27	440	460	900

SEMESTER VII

S. No	Course Code	Course Title	Category	L	T	P	C	TCP	CIA	ESE	Total
THEORY											
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
PRACTICAL											
6.	22IT7001	Cryptography and Network Security Laboratory	PCC	0	0	4	2	4	60	40	100
EEC COURSES (SE/AE)											
7.	22IT7701	Internship - II*	SEC	0	0	0	2	2	100	0	100
TOTAL				15	1	4	20	22	360	340	700

* - 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
EEC COURSES (SE/AE)											
1.	22IT8901	Project Work/Granted Patent	SEC	0	0	20	10	20	100	100	200
TOTAL				0	0	20	10	20	100	100	200

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	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	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.E. / B.TECH. PROGRAMMES										
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	✓	✓	-	-	-	-	-	-	-
Total		19	22	25	23	22	24	20	10	165

CREDIT DISTRIBUTION R2022

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

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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>UNIT –I Language Proficiency: Types of Sentences, Functional Units, Framing question. Writing: process description, Writing Checklist. Vocabulary – words on environment. Practical Component: Listening- Watching short videos and answer the questions, Speaking- Self introduction ,formal & semi-formal</p> <p>UNIT –II Language Proficiency: Tenses, Adjectives and adverbs. Writing: Formal letters (letters conveying positive and negative news), Formal and informal email writing (using emoticons, abbreviations& acronyms), reading comprehension. Vocabulary– words on entertainment. Practical Component: Listening-Comprehensions based on TED talksSpeaking- Narrating a short story or an event happened in their life</p>	<p>UNIT –I Language Proficiency: Types of Sentences, Functional Units, Framing question. Writing: process description, Writing Checklist. Vocabulary – words on environment. Practical Component: Listening- Watching short videos and answer the questions, Speaking- Self introduction ,formal & semi-formal,Reading- Purpose of Reading - Churning & Assimilation, Interpreting Ideas - Interpreting Graphs in <i>Technical Writing</i>.</p> <p>UNIT –II Language Proficiency: Tenses, Adjectives and adverbs. Writing: Formal letters (letters conveying positive and negative news), Formal and informal email writing (using emoticons, abbreviations& acronyms), reading comprehension. Vocabulary– words on entertainment. Practical Component: Listening-Comprehensions based on TED talksSpeaking- Narrating a short story or an event happened in their life Reading - 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 .		
		<p>UNIT –III Language Proficiency: Prepositions, phrasal verbs. Writing: Formal thanks giving, Congratulating, warning and apologizing letters, cloze test. Vocabulary – words on tools. Practical Component: Listening- Listen to songs and answer the questions Speaking- Just a minute</p>	<p>UNIT –III Language Proficiency: Prepositions, phrasal verbs. Writing: Formal thanks giving, Congratulating, warning and apologizing letters, cloze test. Vocabulary – words on tools. Practical Component: Listening- Listen to songs and answer the questions Speaking- Just a minute Reading- Reading feature articles (from newspapers and magazines) -Reading to identify point of view and perspective (opinion pieces, editorials etc.)</p>		
		<p>UNIT –IV Language Proficiency: Subject verb concord, Prefixes & suffixes. Writing: Preparing agenda & minutes, writing an event report. Vocabulary– words on engineering process. Practical Component: Listening- Comprehensions based on Talk of orators or interview shows Speaking- Presentation on a general topic with ppt.</p>	<p>UNIT –IV Language Proficiency: Subject verb concord, Prefixes & suffixes. Writing: Preparing agenda & minutes, writing an event report. Vocabulary– words on engineering process. Practical Component: Listening- Comprehensions based on Talk of orators or interview shows Speaking- Presentation on a general topic with ppt. Reading- Reading Comprehension - Techniques for Good Comprehension - - Sequencing of Sentences.</p>		
	<p>UNIT –IV Language Proficiency: Modal Auxiliaries, Active & passive voice, Writing: Project report (proposal & progress) ,sequencing of sentences Vocabulary –words on engineering</p>	<p>UNIT V Language Proficiency: Modal Auxiliaries, Active & passive voice, Writing: Project report (proposal & progress) ,sequencing of sentences</p>			

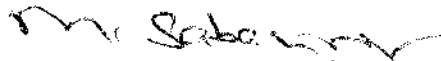


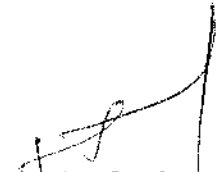
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(An Autonomous Institution, Affiliated to Anna University, Chennai
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Valley Campus, Pollachi Highways, Coimbatore, Tamilnadu.



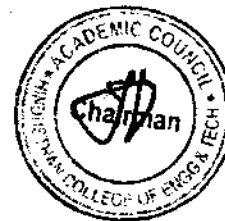
SYLLABUS REVISION DETAILS FOR THE REGULATION 22 – ACADEMIC YEAR 2023-24 ODD SEMESTER

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

SEMESTER I

Programme	Course Code	Name of the Course	L	T	P	C
B.Tech IT	22MA1101	MATRICES AND CALCULUS (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
Matrices		
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
Single Variate Calculus		
II	Rolle's Theorem–Lagrange's Mean Value Theorem–Maxima and Minima–Taylor's and Maclaurin's Series.	12
Functions of Several Variables		
III	Partial derivatives–Total derivative, Jacobian, Maxima, minima and saddle points; Method of Lagrange multipliers.	12
Integral Calculus		
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
Vector Calculus		
V	Gradient, divergence and curl; Green's theorem, Stoke's and Gauss divergence theorem(statement only) for cubes only.	12
Total Instructional Hours		60

- 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", 9th 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.



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

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.


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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"-4th edition Cambridge University Press, 2004.

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



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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	CHEMISTRY IN EVERYDAY LIFE 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	WATER TECHNOLOGY 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	ELECTROCHEMISTRY AND CORROSION 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	ENERGY SOURCES AND STORAGE DEVICES 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 ₂ -O ₂ fuel cell applications.	6
V	SPECTROSCOPY 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
Total Instructional Hours		45

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).

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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"> • The first line of the input consists of an integer – N, representing the total number of apples that Josh wants to buy. • 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. • 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. | 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

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- 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

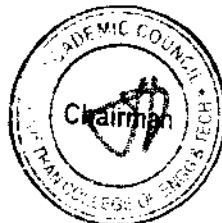
Designing Structured Programs – Functions in C – User defined functions – Inter-Function Communication – Standard Function – Passing Arrays to Functions – Passing Pointers to Function – Recursion – Passing an array to a function – typedef – Enumerated types - Structure – Union – Programming Application.

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



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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, 3rd edition, 2017.

REFERENCE BOOKS:

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


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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	Unit-1 Software Development Life Cycle Software Development Model -Waterfall Model- Incremental Process Models- Evolutionary Process Models- Spiral Model-Agile Software Development –Agile process-Agility principles-Introduction Github.	5
II	Unit-2 Hyper Text Markup Language-I 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. Illustrative problems: 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	Unit-3 Hyper Text Markup Language-II 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. Illustrative problems: Designing the Login form with username, password and submit field, Designing a course registration form.	(6+4)
IV	Unit-4 Cascading Style Sheet-I 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. Illustrative problems: Developing a web application using internal, external and embedded style sheet, Applying style specification in HTML page using CSS.	(6+4)
V	Unit-5 Cascading Style Sheet-II 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. Illustrative problems: Developing an web application using CSS Positioning.	(6+4)
Total Instructional Hours		45

- 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.

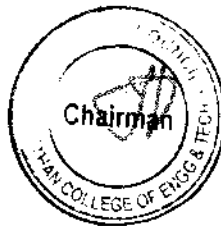
T3- Deitel, Deitel, Goldberg, "Internet & World Wide Web How To Program", Third Edition, Pearson Education, 2006.

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/>



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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>



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Programme	Course Code	Course Title	L	T	P	C
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- 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	Lessons on excellence Skill introspection, Skill acquisition, consistent practice	2
II	Logical Reasoning Problem Solving - Critical Thinking- Lateral Thinking - Coding and Decoding – Series – Analogy - Odd Man Out - Visual Reasoning - Sudoku puzzles - Attention to detail	11
III	Quantitative Aptitude 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	Recruitment Essentials Resume Building - Impression Management	2
V	Verbal Ability Nouns and Pronouns – Verbs - Subject-Verb Agreement - Pronoun-Antecedent – Agreement - Punctuations	4
Total Instructional Hours		30

- 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.



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COURSE CODE – 22MC1093

GE3152

தமிழர் மரபு

LTPC
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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 - குமரமூரணியில் திருவள்ளுவர் சிலை - இசைக் கருவிகள் - மிருதங்கம், பறை, வீணை, யாழ், நாடஸ்வரம் - 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 அச்சு வரலாறு.



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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.



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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
	Language and Literature	
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
	Heritage _ Rock Art Paintings to Modern Art – Sculpture	
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
	Folk and Martial Arts	
III	Therukoothu, Karagattam, Villupattu, Kaniyan koothu, Oyilattam, Leather puppetry, Silambattam., Valari Tiger dance – Sports and Games of Tamils.	6
	Thinai Concept of Tamils	
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
	Contribution of Tamils to Indian National Movement and Indian Culture	
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
	Total Instructional Hours	30

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.

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Programme	Course Code	Name of the Course	L	T	P	C
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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

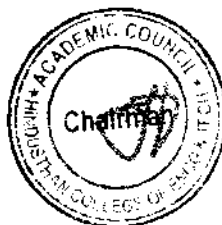
I	Introduction to Value Education Right Understanding, Relationship and Physical Facility (Holistic Development and the Role of Education)-Understanding Value Education - Self-exploration as the Process for Value Education - Continuous Happiness and Prosperity – the Basic Human Aspirations - Happiness and Prosperity – Current Scenario - Method to Fulfill the Basic Human Aspirations	6
II	Harmony in the Human Being and Harmony in the Family 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	Harmony in the Family and Society 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	Harmony in the Nature / Existence 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	Implications of the Holistic Understanding – a Look at Professional Ethics 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
Total Instructional Hours		30

Course Outcome	At the end of the course, the learner will be able 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.
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Reference Books:

- R1.A Foundation Course in Human Values and Professional Ethics, R R Gaur, R Asthana, G P Bagaria, 2nd 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, 2nd 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.

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Service Course

Programme	Course code	Name of the course	L	T	P	C
B.TECH.	22IT1151	PYTHON PROGRAMMING AND PRACTICES (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	ALGORITHMIC PROBLEM SOLVING 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	DATA, STATEMENTS, CONTROL FLOW 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	FUNCTIONS, STRINGS 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	LISTS, TUPLES, DICTIONARIES 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	FILES, MODULES, PACKAGES 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

- 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.

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- 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.

Course Outcome	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



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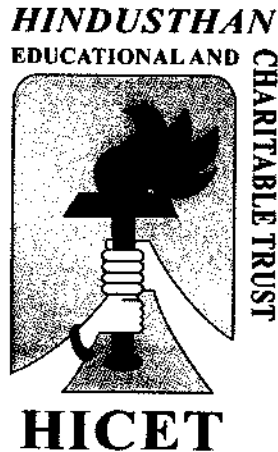
HINDUSTHAN COLLEGE OF ENGINEERING AND TECHNOLOGY

(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
THEORY											
1.	22MA1101	Matrices and Calculus	BSC	3	1	0	4	4	40	60	100
THEORY WITH LAB COMPONENT											
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
EEC COURSES (SE/AE)											
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
MANDATORY COURSE											
8.	22MC1091/ 22MC1092	தமிழரும் தொழில் நுட்பமும் / Indian Constitution	MC	2	0	0	0	2	0	0	0
TOTAL				16	1	8	19	26	480	320	800

SEMESTER II

S. No	Course Code	Course Title	Category	L	T	P	C	TCP	CIA	ESE	Total
THEORY											
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
THEORY WITH LAB COMPONENT											
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	
PRACTICAL												
7.	22ME2001	Engineering Practices	ESC	0	0	4	2	2	60	40	100	
EEC COURSES (SE/AE)												
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	
MANDATORY COURSE												
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								
TOTAL				17	1	14	22	32	640	360	1000	

SEMESTER III

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

SEMESTER IV

SEMESTER IV

S. No	Course Code	Course Title	Category	L	T	P	C	TCP	CIA	ESE	Total
THEORY											
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
THEORY WITH LAB COMPONENT											
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
PRACTICAL											
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
EEC COURSES (SE/AE)											
9.	22HE4071	Soft Skills -III	SEC	1	0	0	1	1	100	0	100
TOTAL				16	0	12	23	29	480	420	900
<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
THEORY											
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
THEORY WITH LAB COMPONENT											
6.	22IT5251/ 22IT5252	Artificial Intelligence & Machine Learning / Business Intelligence	PCC/CC	2	0	2	3	4	50	50	100
PRACTICAL											
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
TOTAL				18	1	6	22	25	410	390	800

SEMESTER VI

S. No	Course Code	Course Title	Category	L	T	P	C	TCP	CIA	ESE	Total
THEORY											
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
PRACTICAL											
8.	22IT6001	Data Science Laboratory	PCC	0	0	4	2	4	60	40	100
EEC COURSES (SE/AE)											
9.	22HE6071	Soft Skills – 5	SEC	2	0	0	2	2	100	0	100
TOTAL				22	0	4	24	27	440	460	900

SEMESTER VII

S. No	Course Code	Course Title	Category	L	T	P	C	TCP	CIA	ESE	Total
THEORY											
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
PRACTICAL											
6.	22IT7001	Cryptography and Network Security Laboratory	PCC	0	0	4	2	4	60	40	100
EEC COURSES (SE/AE)											
7.	22IT7701	Internship - II*	SEC	0	0	0	2	2	100	0	100
TOTAL				15	1	4	20	22	360	340	700
* - 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
EEC COURSES (SE/AE)											
1.	22IT8901	Project Work/Granted Patent	SEC	0	0	20	10	20	100	100	200
TOTAL				0	0	20	10	20	100	100	200

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
SKILLED / INTEGRATED COURSES OFFERED THROUGH CHOICE BASED CREDIT SYSTEM										
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.E. / B.TECH. PROGRAMMES										
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	✓	✓	-	-	-	-	-	-	-
Total		19	22	25	23	22	24	20	10	165

CREDIT DISTRIBUTION R2022

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

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SYLLABUS

SEMESTER III

Programme	Course code	Name of the course	L	T	P	C
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Unit	Description	Instructional Hours
The student should be able		
Course Objective	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.	
I	DISCRIPTIVE STATISTICS Descriptive statistics - Measures of central tendency - mean - median - mode, Measures of dispersion - range - quartile deviation - standard deviation - coefficient of variation.	12
II	CORRELATION AND REGRESSION Correlation - Karl Pearson's correlation coefficient - Spearman's Rank Correlation - Regression lines (problems based on Raw data only).	12
III	HYPOTHESIS TESTING 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
IV	ANALYSIS OF VARIANCE Introduction, assumptions of analysis of variance, completely randomized design, randomized block design, Latin square design.	12
V	QUEUEING THEORY 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
Total Instructional Hours		60
Course Outcome	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, 6th 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.



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	The student should be able		
Course Objective	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	
Unit	Description	Instructional Hours	
	LIST		
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	
	STACK AND QUEUE		
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	
	SEARCHING, SORTING AND HASHING TECHNIQUES		
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	
	TREE STRUCTURES		
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	
	GRAPH STRUCTURES		
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	
	Total Instructional Hours	45	
Course Outcome	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.



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Unit	Description	Instructional Hours
The student should be able		
Course Objective	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	
OPERATING SYSTEMS OVERVIEW		
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
PROCESS MANAGEMENT		
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
DEADLOCK & MEMORY MANAGEMENT		
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
STORAGE MANAGEMENT		
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
VIRTUAL MACHINES		
V	Overview– Building Blocks –Types of Virtual Machines and Their Implementations –Virtualization– Virtual Machine Examples.	6
Total Instructional Hours		45
Course Outcome	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



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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	COMBINATIONAL LOGIC Combinational Circuits – Karnaugh Map -Analysis and Design Procedures–Binary Adder – Subtractor – BCD Adder-Magnitude Comparator–Decoder–Encoder– Multiplexers-Demultiplexers	9
II	SYNCHRONOUS SEQUENTIAL LOGIC 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	COMPUTER FUNDAMENTALS 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	PROCESSOR Instruction Execution–Building a Data Path–Designing a Control Unit–Hardwired Control, Microprogrammed Control–Pipelining–Data Hazard–Control Hazards.	9
V	MEMORY AND I/O 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
Total Instructional Hours		45

- 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.

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Programme	Course code	Name of the course	L	T	P	C
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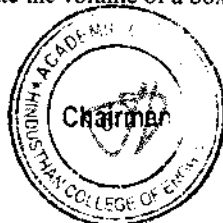


Unit	Description	Instructional Hours
	The student should be able	
Course Objective	1 Learn the basics of Java programming language 2 Discuss about classes and object in Java Programming. 3 Understanding Interface and package in Java Programming 4 Learn about Exception handling and IO Streams 5 Understanding about Multithreading And Applet	
I	INTRODUCTION TO OBJECT ORIENTED PROGRAMMING 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
II	CLASS AND OBJECT Classes and objects –Methods-Access Specifier -constructor-Method overloading-static members -Inheritance – overriding methods – final keyword – abstract classes.	15
III	INTERFACE AND PACKAGE Interfaces-Defining Interface-Extending Interface -Implementing interface-Accessing Interface Variables. Packages-creating a package-accessing package –using package	15
IV	EXCEPTION HANDLING AND IO STREAMS 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	
V	MULTITHREADING AND APPLLET 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
	Total Instructional Hours	60

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.

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- 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

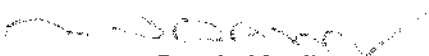
- CO1 Understand the basics of Java Programming
- CO2 Implementation of classes, object and methods in Java
- CO3 Developing a Java Program that uses Interface and package.
- CO4 Creating a Java Program that handles Exception and uses IO Streams
- CO5 To Develop a Java program using Multithreading And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

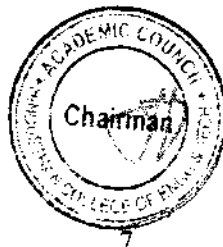
TEXT BOOK:


- 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


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The student should be able

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|-------------------------|---|---|
| Course Objective | 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
INTRODUCTION TO STATISTICS		
I	Data collection methods, Descriptive Statistics Mean, Median, Mode, Inferential Statistics, Random Variables, Probability Distributions, Normal Distribution, Sampling and Sampling Distribution.	15
VISUALIZATION USING R		
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
WATSON STUDIO		
III	Data visualization in Watson studio, Adding data to data refiner, Visualization of data in Watson studio.	15
DATA ANALYSIS USING PYTHON		
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
VISUALIZATION USING PYTHON		
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
Total Instructional Hours		60

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|-----------------------|-----|--|
| Course Outcome | 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.



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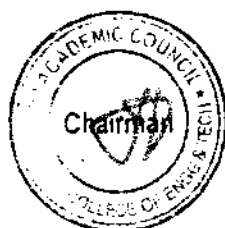


Course Objective	The student should be able
	1 Learn shell programming and the UNIX environment
	2 Be exposed to programming in C using system calls
	3 Learn to use the file system related system calls
	4 Be exposed to process creation and inter process communication.
5 Be familiar with implementation 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

Course Outcome	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



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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



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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	Logical Reasoning Clocks - Calendars - Direction Sense - Cubes - Data Interpretation: Tables, Pie Chart, Bar Graph - Data Sufficiency	9
II	Quantitative Aptitude 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	Verbal Ability 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	Writing skills for placements Essay writing: Idea generation for topics, Best practices, Practice and feedback	2
Total Instructional Hours		30

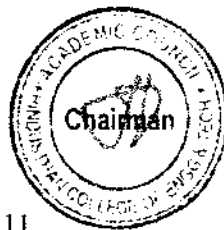
Course Outcome	CO1	CO2	CO3	CO4
	Students will avoid the various fallacies that can arise through the misuse of logic.	Students would opt for alternate methods to solve the problems rather than conventional methods.	Students will heighten their awareness of correct usage of English grammar in writing and speaking	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

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Course Objective	The student should be able		
	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	
Exp. No	Description of the Experiments		
	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.		
Course Outcome	Total Instructional Hours		
		60	
	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		



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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
	Introduction to traditional knowledge: 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	Protection of traditional knowledge: The need for protecting traditional knowledge, Significance of TK Protection, value of TK in global economy, Role of Government to harness TK	9
II	Itihas and Dharma-Shastra Itihas: The Mahabharata - The Puranas - The Ramayana Dharma-Shastra: Manu Needhi - The Tirukkural – Thiru Arutpa	9
III	Traditional knowledge and intellectual property: 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	Indian philosophy Jain – Buddhist – Charvaka – Samkhya - Yoga - Nyaya - Vaisheshika - Saiva Siddhanta	9
V	Total Instructional Hours	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.

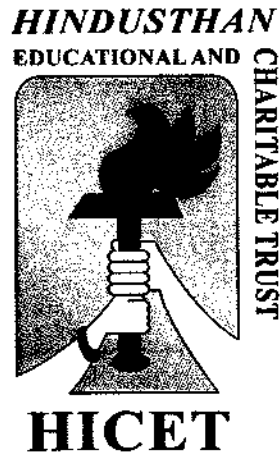


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HINDUSTHAN COLLEGE OF ENGINEERING AND TECHNOLOGY
(An Autonomous Institution Affiliated to Anna University, Chennai)
(Approved by AICTE, New Delhi, Accredited by NAAC with 'A' Grade)
Coimbatore - 641 032.

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
THEORY										
1.	21HE1101	Technical English	HS	2	1	0	3	40	60	100
2.	21MA1101	Calculus	BS	3	1	0	4	40	60	100
THEORY & LAB COMPONENT										
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
PRACTICAL										
7.	21HE1071	Language Competency Enhancement Course-I	HS	0	0	2	1	100	0	100
MANDATORY COURSES										
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
Total:				16	2	10	20	580	320	900

SEMESTER II

S.No.	Course Code	Course Title	Type	L	T	P	C	CIA	ESE	TOTAL
THEORY										
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
THEORY & LAB COMPONENT										
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
PRACTICALS										
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								
MANDATORY COURSES										
9.	21HE2072	Career Guidance Level – II Personality, Aptitude and Career Development	EEC	2	0	0	0	100	0	100
Total:				14	2	16	22	530	370	900

SEMESTER III

S.No.	Course Code	Course Title	Type	L	T	P	C	CIA	ESE	TOTAL
THEORY										
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
THEORY & LAB COMPONENT										
5.	21IT3251*	Digital Principles and System Design	PC	3	0	2	4	50	50	100
PRACTICALS										
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
MANDATORY COURSES										
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
Total:				20	0	10	20	575	425	1000

SEMESTER IV

S.No.	Course Code	Course Title	Type	L	T	P	C	CIA	ESE	TOTAL
THEORY										
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
THEORY & LAB COMPONENT										
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
PRACTICALS										
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
MANDATORY COURSES										
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
Total:				20	2	8	21	620	380	1000

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
PRACTICALS										
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
MANDATORY COURSES										
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
TOTAL				19	0	8	23	550	450	1000

S.No.	Course Code	Course Title	Type	L	T	P	C	CIA	ESE	TOTAL
PROFESSIONAL ELECTIVE I										
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
THEORY										
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
THEORY & LAB COMPONENT										
6.	21IT6251*	Cryptography and Network Security	PC	3	0	2	4	50	50	100
PRACTICALS										
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
MANDATORY COURSES										
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
TOTAL				20	0	8	25	575	525	1100

S.No.	Course Code	Course Title	Type	L	T	P	C	CIA	ESE	TOTAL
PROFESSIONAL ELECTIVE II										
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
THEORY										
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
PRACTICALS										
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
PROJECT WORK -										
8.	21IT7901	Project Work - Phase I	EEC	0	0	4	2	50	50	100
TOTAL				15	0	10	20	335	465	800

PROFESSIONAL ELECTIVE III										
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

OPEN ELECTIVE - II										
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
THEORY										
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
SKILLED / INTEGRATED COURSES OFFERED THROUGH CHOICE BASED CREDIT SYSTEM									
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.E. / B.TECH. PROGRAMMES										
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
Total		20	22	20	21	23	25	20	14	165

CREDIT DISTRIBUTION R2019

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


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S. No	Year	Semester	Course Code & Title	Existing Syllabus	Revised Syllabus	% of change
1.	III	V	2HITS202 COMPUTER NETWORKS	<p>COURSE CODE: 19ITS202</p> <p>Unit 1: OVERVIEW & PHYSICAL LAYER Networks – Network Types – Protocol Layering – TCP/IP Protocol suite – OSI Model – Physical Layer :Performance – Transmission Media – Switching – Circuit-switched Networks – Packet Switching</p> <p>Unit 2: DATA LINK LAYER 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>Unit 4: TRANSPORT LAYER 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>Unit 5: APPLICATION LAYER 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>COURSE CODE: 2HITS202</p> <p>Unit 1: OVERVIEW & PHYSICAL LAYER 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>Unit 2 : DATA LINK LAYER 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>Unit 4: TRANSPORT LAYER Introduction – Transport Layer Protocols – Services – Port Numbers – User Datagram Protocol – Transmission Control Protocol – SCTP</p> <p>Unit 5: APPLICATION LAYER WWW and HTTP – FTP – Email – Telnet – SSH – DNS – SNMP.</p>	40

2.	III	V	21IT5203 Embedded System Design	<p>COURSE NAME & CODE: 19IT5203 MICROCONTROLLER AND EMBEDDED SYSTEM</p> <p>Unit 1: THE MICROCONTROLLER ARCHITECTURE Introduction to 8051 Microcontroller- Pin Configuration - Architecture- Input /Output Ports-Addressing Modes</p> <p>Unit 4: EMBEDDED COMPUTING AND MEMORY MANAGEMENT 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>Unit 5: EMBEDDED SYSTEM DEVELOPMENT Embedded Software Development Tools-Emulators and Debuggers-Design Methodologies-Case Studies- Digital Camera, Smart Card, Mobile Phone Software.</p>	<p>COURSE NAME & CODE: 21IT5203 EMBEDDED SYSTEM DESIGN</p> <p>Unit 1: INTRODUCTION TO EMBEDDED SYSTEM DESIGN 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>Unit 4: PROCESSES AND OPERATING SYSTEMS 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>Unit 5: CASE STUDY Audio Player - Digital Still Cameras - Engine Control Unit - Video Accelerator - Telephone Answering Machine - Data Compressor</p>	60
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SYLLABUS

SEMESTER V

Programme	Course code	Name of the course	L	T	P	C
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

Unit	Description	Instructional Hours
	CELLULAR TECHNOLOGY	
I	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
	MOBILE APPLICATION DEVELOPMENT AND OPERATING SYSTEMS	
II	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
	MAC PROTOCOLS	
III	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
	MOBILE INTERNET PROTOCOL AND MOBILE DATABASE	
IV	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
	MOBILE ADHOC NETWORKS & WIRELESS SENSOR NETWORKS	
V	MANET: Characteristics – Routing Protocols- VANET –Security issues in MANET – Attacks on Adhoc Networks – Sensor Networks: Characteristics - Routing Protocols.	9
	Total Instructional Hours	45

Course Outcome	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

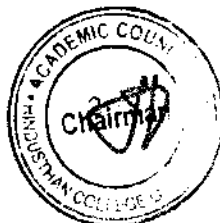
TEXT BOOK:

- 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

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The student should be able

- | | | |
|-------------------------|---|---|
| Course Objective | 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
OVERVIEW & PHYSICAL LAYER		
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
DATA LINK LAYER		
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
NETWORK AND ROUTING		
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
TRANSPORT LAYER		
IV	Introduction - Transport Layer Protocols - Services - Port Numbers - User Datagram Protocol - Transmission Control Protocol - SCTP.	9
APPLICATION LAYER		
V	WWW and HTTP - FTP - Email -Telnet -SSH - DNS - SNMP.	9
Total Instructional Hours		45

Course Outcome	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..



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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
INTRODUCTION TO EMBEDDED SYSTEM DESIGN		
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
ARM PROCESSOR		
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
EMBEDDED PROGRAMMING		
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
PROCESSES AND OPERATING SYSTEMS		
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
CASE STUDY		
V	Audio Player – Digital Still Cameras - Engine Control Unit – Video Accelerator - Telephone Answering Machine – Data Compressor	9
Total Instructional Hours		45

- 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

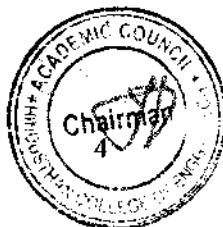
TEXT BOOK:


- 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.


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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	INTRODUCTION AND PROBLEM SOLVING 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	PROBLEM SOLVING METHODS 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	INTRODUCTION TO MACHINE LEARNING 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	SUPERVISED AND UNSUPERVISED LEARNING Classification: Introduction – Fundamentals of Classification-k-nearest neighbor Classifier-Classification with Support Vector Machines- Clustering: Introduction- K means Algorithm – Mean Shift Algorithm	9
V	EXPERT SYSTEMS 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
TOTAL INSTRUCTIONAL HOURS		45

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-(1st Edition) 2018.

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

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

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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	DATA WAREHOUSING AND OLAP: Basic Concepts - Operational database systems Vs Data warehouses- A Multi-tiered Architecture – Data Warehouse Models- Transformation and Loading- Metadata Repository Data Cube and OLAP: A Multidimensional Data Model- Stars, Snowflakes and Fact Constellations, Dimensions and Measures, Typical OLAP Operations and Server Architecture	9
II	KNOWING DATA AND DATA PREPROCESSING: Knowing Data: Data objects and attributes - Statistical description of data -Data visualization. Data preprocessing: Data cleaning - Data integration and transformation -Data reduction	8
III	DATA MINING 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	ASSOCIATION RULE MINING AND CLASSIFICATION 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	CLUSTERING Cluster Analysis – Partitioning Methods: K-Means, K-Medoids- Hierarchical Methods: Agglomerative versus Divisive Hierarchical Clustering , BIRCH, Chameleon and Other clustering Methods	9
TOTAL INSTRUCTIONAL HOURS		45


- 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.


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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



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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

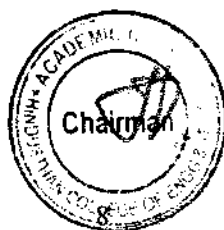
- 1 Develop an application that uses GUI component, Font and Colors.
- 2 Develop an application that uses Layout Managers and Event Listeners.
- 3 Develop a Native Calculator Application.
- 4 Write an application that draws basic Graphical Primitives on the Screen.
- 5 Develop an application that makes 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.


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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>HTML</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>Illustrative programs: Design a static web page using HTML – Mark Sheet, Curriculum Vitae, College Website; Design a Registration Form using HTML</p>	9
II	<p>CASCADING STYLE SHEET</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>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</p>	9
III	<p>CLIENT SIDE SCRIPTING: JAVA SCRIPT</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>Illustrative programs: Mobile Number Validation, Rupee to Dollar & Dollar to Rupee Conversion using DOM, RGB Range Selector.</p>	9
IV	<p>SERVER SIDE SCRIPTING: SERVLET AND JSP</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>Illustrative programs: Create a web application with Login Operation, Session Tracking</p>	9
V	<p>SERVER SIDE SCRIPTING: NODE JS</p> <p>Introduction to Node.js -Node.js Module- HTTP module- Express Framework- Request & Response-Basic Routing-Serving Static Files- Sessions & Cookies- DB</p>	9

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Connection Setup with mongo DB.

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

		Total Instructional Hours	45
Course Outcome	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/>.

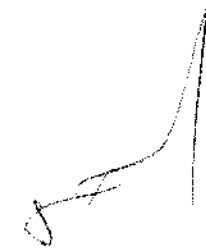
REFERENCES:

- 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/>


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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
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I	OVERVIEW OF JAVA PROGRAMMING: Introduction to Java Programming-Features of Java Language, JVM, Inheritance, Interfaces and Packages, Exception Handling, Multithreaded Programming. Programs to demonstrate use of implementing Interfaces and Packages	9
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II	ENUMERATIONS, AUTOBOXING AND ANNOTATIONS(METADATA): 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. Program to implement Wrapper Classes and their Methods.	9
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III	SERVLETS: 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. Programs to Demonstrate the use of Servlet Program.	9
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IV	JAVA SPRING FRAMEWORK: 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. Create a Program using Bean Development Kit and JAR files.	9
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V	JAVA DATABASE CONNECTIVITY: 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. Programs to Illustrate the use of JDBC Connection.	9
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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.

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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.


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

- 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.

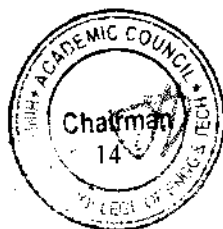
TEXT BOOKS:

- 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 (7th 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.

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

Unit	Description	Instructional Hours
I	Introduction to Data Structures , 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. Programs using Singly Linked List, Stacks and Queues.	9
II	Dictionaries: Linear list representation, Skip list representation, Operations - Insertion, Deletion and Searching. Hash Table Representation: Hash functions, Collision resolution- Separate Chaining, Open Addressing-Linear probing, Quadratic probing, Double hashing, Rehashing, Extendible Hashing. Programs using Hash.	9
III	Search Trees: 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. Program using Search Trees.	9
IV	Graphs: Graph Implementation Methods. Graph Traversal Methods. Sorting: Heap Sort, External Sorting- Model for external sorting, Merge Sort. Program using Graph Traversal Methods and Sorting.	9
V	Pattern Matching and Tries: Pattern Matching Algorithms-Brute Force, The Boyer –Moore Algorithm, The Knuth-Morris-Pratt algorithm, Standard Tries, Compressed Tries, Suffix Tries. Program using Pattern Matching.	9
TOTAL INSTRUCTIONAL HOURS		45

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.

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TEXT BOOKS:

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

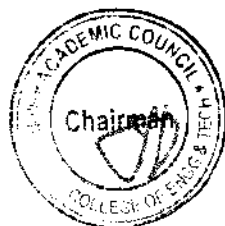
T2: A. M. Tanenbaum, Y. Langsam, and M.J. Augenstein, "Data Structures using C, PHI/Pearson Education, 2008.

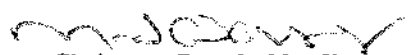
REFERENCE BOOKS:


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




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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
	PARALLEL AND DISTRIBUTED DATABASES	
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. Implementation of client server application and 2 phase locking algorithms	9
	OBJECT AND OBJECT RELATIONAL DATABASES	
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 Creating Object Oriented Database using PL/SQL oracle	9
	XML DATABASES AND MOBILE DATABASES	
III	XML Databases: XML Hierarchical Data Model– XML Documents,DTD– XML Schema – XML Querying–Mobile Databases: System Architecture - Location and Handoff Management Design XML document with DTD and XML Schema using Eclipse.	9
	QUERY PROCESSING AND OPTIMIZATION	
IV	Query Processing - SQL Query Translation - Pipelining - Query Optimization - Query Trees and Heuristics-Overview of Query Optimization in Oracle - Semantic Query Optimization	9
	INTELLIGENT DATABASE TECHNOLOGIES	
V	Intelligent Databases: Active databases and Triggers – Temporal Database- Spatial Database- Multimedia Database- Deductive Databases- Information Retrieval concepts. Implementation of Triggers using PL/SQL.	9
TOTAL INSTRUCTIONAL HOURS		45

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**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.

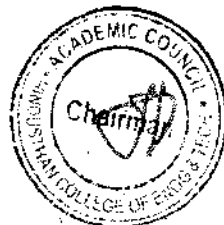
REFERENCE BOOKS:

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.




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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
	INTRODUCTION	
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
	ETHICAL INITIATIVES IN AI	
II	International ethical initiatives-Ethical harms and concerns-Case study: healthcare robots, Autonomous Vehicles, Warfare and weaponization.	9
	AI STANDARDS AND REGULATION	
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
	ROBOETHICS: SOCIAL AND ETHICAL IMPLICATION OF ROBOTICS	
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
	AI AND ETHICS- CHALLENGES AND OPPORTUNITIES	
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
	Total Instructional Hours	45

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

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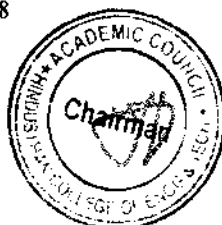
- T1 Y. Eleanor Bird, Jasmin Fox-Skelly, Nicola Jenner, Ruth Larbey, Emma Weitkamp and Alan Winfield, "The ethics of artificial intelligence: Issues and initiatives", EPRS | European Parliamentary Research Service Scientific Foresight Unit (STOA) PE 634.452 – March 2020
- T2 Patrick Lin, Keith Abney, 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
- 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>



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**B. Tech IT
MINOR
DEGREE**

Programme	Course code	Name of the course	L	T	P	C
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The student should be able

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| Course Objective | 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
	INTRODUCTION TO DATABASES	
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
	RELATIONAL DATABASE AND DESIGN	
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
	TRANSACTIONS AND CONCURRENCY CONTROL	
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
	STORAGE & INDEXING	
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
	NOSQL	
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
Total Instructional Hours		45

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| Course Outcome | 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.

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The student should be able

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| Course Objective | 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
	INTRODUCTION TO FINANCIAL MANGEMENT	
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
	SOURCES OF FINANCE	
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
	INVESTMENT DECISIONS:	
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
	FINANCING AND DIVIDEND DECISION	
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
	WORKING CAPITAL DECISION	
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
	Total Instructional Hours	45

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|-----------------------|-----|--|
| Course Outcome | 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



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Unit	Description	Instructional Hours
	The student should be able	
Course Objective	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.	
I	Introduction to Entrepreneurship: 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
II	Product Development: 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
III	Business Opportunity Identification: Need and Importance - Steps in identification of Business Opportunity. Techniques of market Survey – Market Research Procedure.	9
IV	Business Plan Development: 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
V	Feasibility Report & trends: 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
	Total Instructional Hours	45
Course Outcome	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.



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- 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
	INTRODUCTION TO SUSTAINABLE DEVELOPMENT	
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
	ENVIRONMENTAL SUSTAINABILITY	
II	Land, Water and Food production - Moving towards sustainability: Energy powering Sustainable Development - Financing the environment and Sustainable Development.	9
	SUSTAINABILITY INDICATORS	
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
	URBAN PLANNING AND ENVIRONMENT	
IV	Environment and Resources, Sustainability Assessment, Future Scenarios, Form of Urban Region, Managing the change, Integrated Planning, Sustainable Development.	9
	THE BUILT-IN ENVIRONMENT	
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
	Total Instructional Hours	45

- 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.



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**B. Tech IT
HONOURS
DEGREE**

Programme Course code Name of the course L T P C



The student should be able

- Course Objective**
- 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

	INTRODUCTION	
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
	SUPERVISED LEARNING	
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
	UNSUPERVISED LEARNING	
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	GRAPHICAL MODELS Naive Bayes Classifiers - Bayesian Networks – Markov Model - Markov Random Fields – Learning – Hidden Markov Model- Conditional Independence.	9
V	ADVANCED LEARNING Reinforcement Learning – Representation Learning – Neural Networks – Active Learning – Ensemble Learning – Bootstrap Aggregation – Boosting – Gradient Boosting Machines	9
	Total Instructional Hours	45

- Course Outcome**
- 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

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Unit	Description	Instructional Hours
	The student should be able	
Course Objective	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.	
I	INTRODUCTION TO HACKING 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
II	SCANNING AND ENUMERATION Introduction to Scanning – Objectives – Scanning Methodology – Tools – Introduction to Enumeration – Enumeration Techniques – Enumeration Procedure – Tools.	9
III	SYSTEM HACKING Introduction – Cracking Passwords – Password Cracking Websites – Password Guessing – Password Cracking Tools – Password Cracking Counter measures – Escalating Privileges –Executing Applications – Key loggers and Spyware.	9
IV	HACKING WEB SERVICES & SESSION HIJACKING 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
V	HACKING WIRELESS NETWORKS Introduction to 802.11-Role of WEP- Cracking WEP Keys- SniffingTrafficWirelessDOSattacks-WLANScanners-WLANSniffers- HackingTools-Securing Wireless Networks.	9
	Total Instructional Hours	45
Course Outcome	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.



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Programme	Course code	Name of the course	L	T	P	C
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- The student should be able**
- Course Objective**
- To Understand how Blockchain systems (mainly Bitcoin and Ethereum) work.
 - To impart knowledge in block chain techniques and able to present the concepts clearly and structured.
 - To get familiarity with future currencies and to create own crypto token.
 - To Design, build, and deploy smart contracts and distributed applications.
 - To assess blockchain applications in a structured manner.

Unit	Description	Instructional Hours
	INTRODUCTION TO BLOCKCHAIN	
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
	BITCOIN	
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
	ETHEREUM	
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
	HYPERLEDGER	
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
	BLOCKCHAIN APPLICATIONS	
V	Case studies in Financial Sector, Energy sector, Identity management, Supply chains, Pharma sector, Trade & Logistics, Media, and Government sector.	9
	Total Instructional Hours	45

- 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:

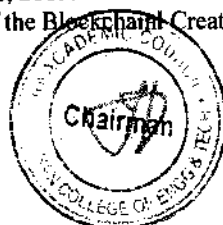
- T1 Joseph J. Bambara ,Paul R. Allen —Blockchain A Practical Guide to Developing Business, Law, and Technology Solutions! McGraw-Hill Education; 1 edition, 2018.
- T2 Andreas M. Antonopoulos” Mastering Bitcoin: Unlocking Digital Cryptocurrencies — O’Reilly Media; 2nd edition (March 2018).

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.

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**SKILLED /
INTEGRATED
COURSES**

Program	Course code	Name of the course	L	T	P	C
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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
I	INTRODUCTION 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
II	DATA STRUCTURE 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
III	REPORTS 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
IV	GRAPHICAL REPORT 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
V	DATA SOURCE 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
Total Instructional Hours		45

- 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 Volitich 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

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(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	
THEORY											
1.	19HE1101	Technical English	HS	2	1	0	3	25	75	100	
2.	19MA1101R	Calculus	BS	3	1	0	4	25	75	100	
THEORY & LAB COMPONENT											
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	
PRACTICAL											
7.	19HE1071	Language Competency Enhancement Course-I	HS	0	0	2	1	0	100	100	
MANDATORY COURSES											
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	
				Total:	16	2	10	20	450	450	900
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
THEORY										
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
THEORY & LAB COMPONENT										
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
PRACTICALS										
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								
MANDATORY COURSES										
9.	19HE2072	Career Guidance Level – II Personality, Aptitude and Career Development	EEC	2	0	0	0	100	0	100
Total:				14	2	16	22	400	500	900

SEMESTER III

S.No	Course Code	Course Title	Type	L	T	P	C	CIA	ESE	TOTAL
THEORY										
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
THEORY AND LAB COMPONENT										
5.	19IT3251	Digital Principles and System Design	PC	3	0	2	4	50	50	100
PRACTICALS										
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
MANDATORY COURSES										
8.	19MC3191	Indian Constitution	MC	2	0	0	0	100	0	100
9.	19HE3071	Career Guidance Level – III 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
Total				20	0	10	20	575	425	1000

SEMESTER IV

S.No	Course Code	Course Title	Type	L	T	P	C	CIA	ESE	TOTAL
THEORY										
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
THEORY AND LAB COMPONENT										
5.	19IT4251	Object Oriented Software Engineering	PC	3	0	2	4	50	50	100
PRACTICALS										
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								
MANDATORY COURSES										
8.	19AC4191	Essence of Indian tradition knowledge/Value Education	AC	2	0	0	0	100	0	100
9.	19HE4072	Career Guidance Level – 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
Total				20	2	8	21	550	450	1000

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	Professional Elective-I	PE	2	0	2	3	50	50	100
PRACTICALS										
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
MANDATORY COURSES										
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
TOTAL				19	0	8	23	475	525	1000

S.No.	Course Code	Course Title	Type	L	T	P	C	CIA	ESE	TOTAL
PROFESSIONAL ELECTIVE I										
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
THEORY										
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
THEORY AND LAB COMPONENT										
6.	19IT6251	Cryptography and Network Security	PC	3	0	2	4	50	50	100
PRACTICALS										
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
MANDATORY COURSES										
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
TOTAL				20	0	8	25	575	525	1100

S.No.	Course Code	Course Title	Type	L	T	P	C	CIA	ESE	TOTAL
PROFESSIONAL ELECTIVE II										
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
THEORY										
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
PRACTICALS										
7.	19IT7002R	Data Analytics Laboratory	PC	0	0	3	1.5	50	50	100
PROJECT WORK										
8.	19IT7901	Project Work - Phase I	EEC	0	0	4	2	50	50	100
TOTAL				15	0	10	20	275	525	800

PROFESSIONAL ELECTIVE III										
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

OPEN ELECTIVE II - INFORMATION TECHNOLOGY										
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
THEORY										
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
PRACTICAL										
3.	19IT8901	Project Work – Phase II	EEC	0	0	24	8	50	50	100
Total				6	0	24	14	100	200	300

PROFESSIONAL ELECTIVE IV										
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

PROFESSIONAL ELECTIVE V										
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
LIFE SKILL COURSES										
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
SKILLED / INTEGRATED COURSES OFFERED THROUGH CHOICE BASED CREDIT SYSTEM									
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.E. / B.TECH. PROGRAMMES										
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
Total		20	22	20	21	23	25	20	14	165

CREDIT DISTRIBUTION R2019

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

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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	Distributed Communication: 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	Distributed Resource Management: 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	Cloud Architecture: 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	Cloud Platform and Thread Programming: 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	Resource Management and Cloud Applications: 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
TOTAL INSTRUCTIONAL HOURS		45

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.

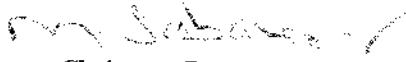
REFERENCE BOOKS:

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)

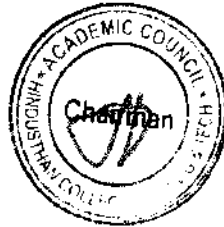
R3-Toby Velte, Anthony Velte, Robert Elsenpeter, "Cloud Computing - A Practical Approach, TataMcGraw Hill Publication, 2009.

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



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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
	INTRODUCTION TO DATA SCIENCE AND BIG DATA	
I	Data Science and Analytics - Big Data - Relations: Data Scales - Set and Matrix Representations-Relations - Similarity Measures - Dissimilarity Measures - Sequence Relations.	9
	PREPROCESSING AND VISUALIZATION	
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
	CORRELATION, REGRESSION AND FORECASTING	
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
	CLASSIFICATION AND CLUSTERING	
IV	Classification Criteria - Naive Bayes_ Classifier - Linear Discriminant Analysis - Support Vector Machine -Nearest Neighbour Classifier - Learning Vector Quantization - Decision Trees - Cluster Partitions - Clustering: Sequential - Prototype-Based - Fuzzy - Relational - Cluster Tendency Assessment-Cluster Validity - Self Organizing Maps	9
	SYSTEM ARCHITECTURE AND APPLICATIONS	
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
TOTAL INSTRUCTIONAL HOURS		45

- 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

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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	INTRODUCTION 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	SOFTWARE TESTING METHODS AND TESTING LEVELS 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	CONTROLLING MONITORING AND REVIEW 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	INTRODUCTION TO SOFTWARE QUALITY 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	STANDARDS, CERTIFICATION AND ASSESSMENT 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
TOTAL INSTRUCTIONAL HOURS		45


- 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.


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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

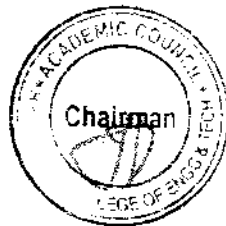
Total Practical Hours 45

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. |

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

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.

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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	INTRODUCTION 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	WEB DATA AND KNOWLEDGE REPRESENTATION 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	MODELLING AND AGGREGATING 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	MINING COMMUNITIES IN WEB SOCIAL NETWORKS 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	VISUALIZATION AND APPLICATIONS 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
TOTAL INSTRUCTIONAL HOURS		45

- 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.


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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	INTRODUCTION TO CYBER FORENSICS: 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	COMPUTER FORENSICS TECHNOLOGY AND SYSTEMS: 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	EVIDENCE COLLECTION AND FORENSICS TOOLS: Processing Crime and Incident Scenes - Working with DOS and Windows Systems - Current Computer Forensics Tools: Software/ Hardware Tools.	9
IV	ANALYSIS AND VALIDATION: Validating Forensics Data - Data Hiding Techniques - Performing Remote Acquisition - Network Forensics - Email Investigations - Cell Phone and Mobile Devices Forensics.	9
V	ETHICAL HACKING: Introduction to Ethical Hacking - Footprinting and Reconnaissance - Scanning Networks - Enumeration - System Hacking - Malware Threats - Sniffing - Social Engineering.	9
TOTAL INSTRUCTIONAL HOURS		45

- 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.


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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
	INTRODUCTION	
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
	DOCUMENTATION	
II	Planning and Writing Documents - Task List and Schedule - Guidelines - Documentation Process -Documentation Plan - Document Review Form - Review Plan - Schedule -Checklist.	9
	DOCUMENTATION TESTING	
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
	DOCUMENTATION LAYOUTS	
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
	DOCUMENTATION GUIDELINES	
V	Writing to Guide - Procedures - Guidelines - Writing to Support - Reference - Structural – ReferenceEntry - Checklist - Designing Index -User Oriented Index - Case Studies.	9
	TOTAL INSTRUCTIONAL HOURS	45

- 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.



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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
	INTRODUCTION TO MANAGEMENT AND ORGANIZATIONS	
	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
	PLANNING	
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
	ORGANISING	
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
	DIRECTING	
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
	CONTROLLING	
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
	TOTAL INSTRUCTIONAL HOURS	45

**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


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

Unit	Description	Instructional Hours
	INTRODUCTION AND ARCHITECTURAL DRIVERS	
I	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
	QUALITY ATTRIBUTE WORKSHOP	
II	Quality Attributes– Documenting Quality Attributes – Functionality and Quality Attributes -System Quality Attributes – Quality Attribute Scenarios -Six Part Scenarios – Case studies.	9
	ARCHITECTURAL VIEWS	
III	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
	ARCHITECTURAL STYLES	
IV	Introduction – Data Flow Styles – Call-Return Styles – SharedInformation Styles – Event Styles – Case Studies for Each Style	9
	DOCUMENTING THE ARCHITECTURE	
V	Good practices – Documenting the Views using UML – Merits andDemerits of using Visual Languages– Need for Formal Languages - Architectural Description Languages – ACME – 9Case Studies.	9
	TOTAL INSTRUCTIONAL HOURS	45

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


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

Unit	Description	Instructional Hours
	FUNDAMENTALS	
I	Green IT Fundamentals: Business, IT, and the Environment – Green computing: carbon foot print, scoop on power – Green IT Strategies: Drivers, Dimensions, and Goals	9
	GREEN ASSETS AND MODELING	
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
	GRID FRAMEWORK	
III	Virtualization of IT systems – Role of electric utilities, Telecommuting, teleconferencing andteleporting – Materials recycling – Best ways for Green PC – Green Data center – Green Grid framework.	9
	GREEN COMPLIANCE	
IV	Socio-cultural aspects of Green IT – Green Enterprise Transformation Roadmap – GreenCompliance: Protocols, Standards, and Audits – Emergent Carbon Issues: Technologies and Future.	9
	CASE STUDIES	
V	The Environmentally Responsible Business Strategies (ERBS) – Case Study Scenarios for TrialRuns – Case Studies – Applying Green IT Strategies and Applications to a Home, Hospital, Packaging Industry and Telecom Sector	9
	Total Instructional Hours	45

Course Outcome	Description
CO1	Acquire knowledge to adopt green computing practices to minimize negative impacts on theenvironment
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.

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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:

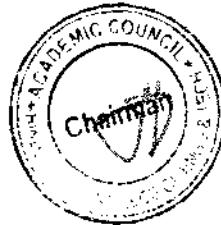
R1: Learning React: Functional Web Development with React and Redux 1st Edition by Alex Banks, Eve Porcello .O'REILLY publication.

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



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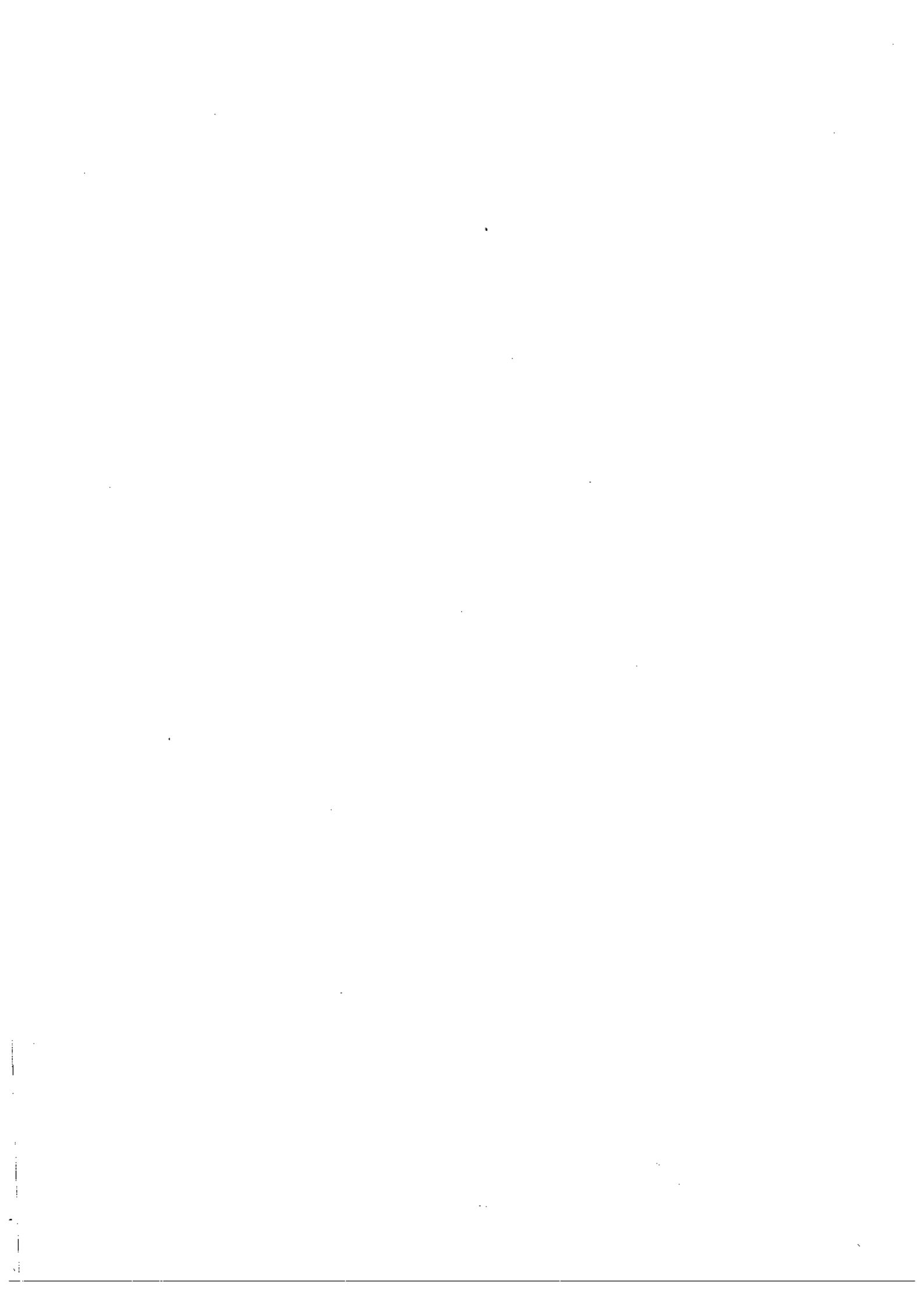
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INTEGRATED
COURSE**



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
	INFORMATION SYSTEMS AND SECURITY	
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
	OVERVIEW OF SECURITY TECHNIQUES	
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
	CYBERCRIME AND CYBER OFFENCES	
III	Introduction to Cybercrime, Classifications of Cybercrimes planning of attacks, social engineering: Human based, Computer based: Cyberstalking, Cybercafe and Cybercrimes.	9
	CYBER THREATS, ATTACKS AND PREVENTION	
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
	CYBER SECURITY IMPLICATIONS	
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
	Total Instructional Hours	45
Course Outcome	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>.

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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

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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	2	3
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	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: 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	0	1	1	0	0
CO3	3	2	3	2	1	1	1	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	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	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	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: 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

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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
		19IT53XX PROFESSIONAL ELECTIVE - I																	
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
19IT73XX Professional Elective - III																		
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
19ITXX74XX Open Elective - II																		
IV	VII	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

