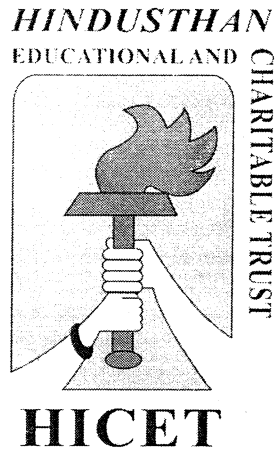


*HINDUSTHAN COLLEGE OF ENGINEERING AND TECHNOLOGY*  
(An Autonomous Institution Affiliated to Anna University, Chennai)  
(Approved by AICTE, New Delhi, Accredited by NAAC with 'A' Grade)  
Coimbatore - 641 032.

**B.E. MECHATRONICS ENGINEERING**

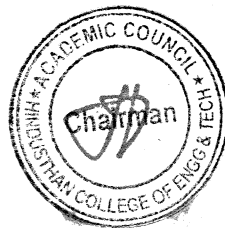


**CHOICE BASED CREDIT SYSTEM**

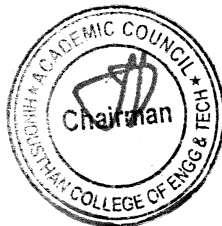
**Revised Curriculum and Syllabus for the Odd Semester**

**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.E. MECHATRONICS ENGINEERING (UG)**

**REGULATION-2022**

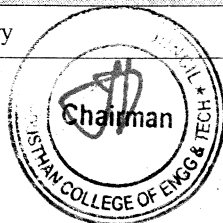
For the students admitted during the academic year 2023-2024 and onwards

**SEMESTER I**

S. No	Course Code	Course Title	Category	L	T	P	C	TCP	CIA	ESE	Total
<b>THEORY</b>											
1	22MA1101	Matrices and Calculus	BSC	3	1	0	4	4	40	60	100
2	22ME1201	Engineering Drawing	ESC	1	4	0	3	5	40	60	100
<b>THEORY WITH LAB COMPONENT</b>											
3	22HE1151	English for Engineers	HSC	2	0	2	3	4	40	60	100
4	22PH1151	Physics for Non-Circuit Engineering	BSC	2	0	2	3	4	50	50	100
5	22IT1151	Python Programming and practices	ESC	2	0	2	3	4	50	50	100
<b>EEC COURSES (SE/AE)</b>											
6	22HE1072	Entrepreneurship & Innovation	AEC	1	0	0	1	1	100	0	100
7	22HE1073	Introduction to Soft Skills	SEC	1	0	0	0	1	100	0	100
<b>MANDATORY COURSE</b>											
8.	22MC1093/ 22MC1094	தமிழர் மரபு / Heritage of Tamils	MC	2	0	0	1	2	100	0	100
9.	22MC1095	Universal Human Values	MC	2	0	0	0	2	40	60	100
<b>TOTAL</b>				<b>15</b>	<b>5</b>	<b>6</b>	<b>18</b>	<b>27</b>	<b>470</b>	<b>330</b>	<b>800</b>

**SEMESTER II**

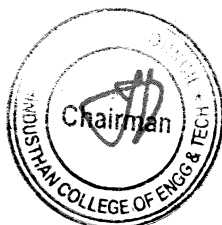
S. No	Course Code	Course Title	Category	L	T	P	C	TCP	CIA	ESE	Total
<b>THEORY</b>											
1	22MA2101	Complex Analysis and Differential Equations	BSC	3	1	0	4	4	40	60	100
2	22PH2102	Applied Mechanics	BSC	2	0	0	2	2	40	60	100
3	22CY2101	Environmental Studies	ESC	2	0	0	2	2	40	60	100
<b>THEORY WITH LAB COMPONENT</b>											
4	22HE2151	Effective Technical Communication	HSC	2	0	2	3	4	50	50	100
5	22CY2152	Applied Chemistry	BSC	2	0	2	3	4	50	50	100



6	22MT2251	Fundamentals of Mechatronics	PCC	2	0	2	3	4	50	50	100	
<b>PRACTICAL COURSES</b>												
7	22ME2001	Engineering Practices	ESC	0	0	4	2	4	60	40	100	
<b>EEC COURSES (SE/AE)</b>												
8	22HE2071	Design Thinking	AEC	1	0	2	2	3	100	0	100	
9	22HE2073	Soft Skills and Aptitude -I	SEC	1	0	0	1	1	100	0	100	
<b>MANDATORY COURSE</b>												
10.	22MC2094/ 22MC2095	தமிழரும் தொழில் நுட்பமும் / Tamils and Technology	MC	2	0	0	1	2	100	0	100	
11.	22MC2093	NCC */NSS / YRC / Sports / Clubs / Society Service - Enrollment (Common)	MC	All students shall enroll, on admission, in anyone of the personality and character development programmes and undergo training for about 80 hours								-
<b>TOTAL</b>				<b>17</b>	<b>1</b>	<b>12</b>	<b>23</b>	<b>30</b>	<b>630</b>	<b>370</b>	<b>1000</b>	

### SEMESTER III

S. No	Course Code	Course Title	Category	L	T	P	C	TCP	CIA	ESE	Total
<b>THEORY</b>											
1	22MA3105	Fourier Series and Transforms	BSC	3	1	0	4	4	40	60	100
2	22MT3201	Industrial Motor Control	ESC	3	0	0	3	3	40	60	100
3	22MT3202	Solid and Fluid Mechanics	PCC	3	1	0	4	4	40	60	100
4	22MT3203	Digitronics	PCC	3	1	0	4	4	40	60	100
<b>THEORY WITH LAB COMPONENT</b>											
5	22MT3251	Manufacturing Process	PCC	2	0	2	3	4	50	50	100
<b>PRACTICAL</b>											
6	22MT3001	Industrial Motor Control Lab	ESC	0	0	4	2	4	60	40	100
7	22MT3002	Solid and Fluid Mechanics Lab	PCC	0	0	4	2	4	60	40	100
<b>EEC COURSES (SE/AE)</b>											
8	22HE3071	Soft Skills and Aptitude -II	SEC	1	0	0	1	1	100	0	100
9	22MT3072	Home Automation	AEC	0	0	4	2	4	60	40	100
<b>MANDATORY COURSE</b>											
10	22MC3091	Essence of Indian Traditional Knowledge	MC	1	0	0	0	1	0	100	100
<b>TOTAL</b>				<b>16</b>	<b>3</b>	<b>14</b>	<b>25</b>	<b>33</b>	<b>490</b>	<b>510</b>	<b>1000</b>

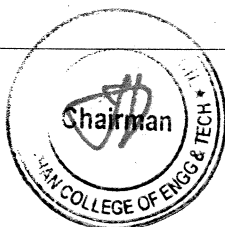


**SEMESTER IV**

S. No	Course Code	Course Title	Category	L	T	P	C	TCP	CIA	ESE	Total
<b>THEORY</b>											
1	22HE4101	IPR and Start-ups	HSC	2	0	0	2	2	40	60	100
2	22MT4201	Processor and controller	PCC	3	0	0	3	3	40	60	100
3	22MT4202	Metrology and Measurements	PCC	3	0	0	3	3	40	60	100
4	22MT4203	Theory of Machines	PCC	3	1	0	4	4	40	60	100
<b>THEORY WITH LAB COMPONENT</b>											
5	22MT4251	Sensors and Transducers	PCC	2	0	2	3	4	50	50	100
6	22MT4252	Fluid Power System	PCC	2	0	2	3	4	50	50	100
<b>PRACTICAL</b>											
7	22MT4001	Processor and controller Laboratory	PCC	0	0	4	2	4	60	40	100
8	22MT4002	CAD Laboratory	PCC	0	0	4	2	4	60	40	100
<b>EEC COURSES (SE/AE)</b>											
9	22HE4071	Soft Skills and Aptitude -III	SEC	1	0	0	1	1	100	0	100
<b>MANDATORY COURSE</b>											
10	22MC4091	Indian Constitution	MC	1	0	0	0	1	0	100	100
<b>TOTAL</b>				<b>17</b>	<b>1</b>	<b>12</b>	<b>23</b>	<b>30</b>	<b>480</b>	<b>520</b>	<b>1000</b>

**SEMESTER V**

S. No	Course Code	Course Title	Category	L	T	P	C	TCP	CIA	ESE	Total
<b>THEORY</b>											
1	22MT5201	Machine Design	PCC	3	1	0	4	4	40	60	100
2	22MT5202	Control System	PCC	3	0	0	3	3	40	60	100
3	22MT53XX	Professional Elective-1	PEC	3	0	0	3	3	40	60	100
4	22MT53XX	Professional Elective-2	PEC	3	0	0	3	3	40	60	100
5	22MT53XX	Professional Elective-3	PEC	3	0	0	3	3	40	60	100
<b>THEORY WITH LAB COMPONENT</b>											
6	22MT5251	Embedded System with C	PCC	2	0	2	3	4	50	50	100
<b>PRACTICAL</b>											
7	22MT5001	Computer Aided Analysis Laboratory	PCC	0	0	4	2	4	60	40	100
<b>EEC COURSES (SE/AE)</b>											
8	22HE5071	Soft Skills -4/Foreign languages	SEC	1	0	0	1	1	100	0	100
<b>TOTAL</b>				<b>18</b>	<b>0</b>	<b>6</b>	<b>21</b>	<b>25</b>	<b>410</b>	<b>390</b>	<b>800</b>



**SEMESTER VI**

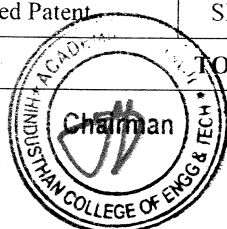
S. No	Course Code	Course Title	Category	L	T	P	C	TCP	CIA	ESE	Total
<b>THEORY</b>											
1	22MT6201	Industrial Automation	PCC	3	0	0	3	3	40	60	100
2	22HE6101	Professional Ethics	HSC	3	0	0	3	3	40	60	100
3	22MT63XX	Professional Elective-4	PEC	3	0	0	3	3	40	60	100
4	22MT63XX	Professional Elective-5	PEC	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
<b>PRACTICAL</b>											
7	22MT6001	Industrial Automation Laboratory	PCC	0	0	4	2	4	60	40	100
8	22MT6002	CAM Laboratory	PCC	0	0	4	2	4	60	40	100
<b>EEC COURSES (SE/AE)</b>											
9.	22HE6071	Soft Skills – 5	SEC	2	0	0	2	2	100	0	100
<b>TOTAL</b>				<b>20</b>	<b>0</b>	<b>8</b>	<b>24</b>	<b>28</b>	<b>460</b>	<b>440</b>	<b>900</b>

**SEMESTER VII**

S. No	Course Code	Course Title	Category	L	T	P	C	TCP	CIA	ESE	Total
<b>THEORY</b>											
1	22MT7201	Virtual Instrumentation	PCC	3	0	0	3	3	40	60	100
2	22MT7202	Robotics and Machine Vision	PCC	3	1	0	4	4	40	60	100
3	22MT73XX	Professional Elective-6	PEC	3	0	0	3	3	40	60	100
4	22XX74XX	Open Elective – 3*	OEC	3	0	0	3	3	40	60	100
5	22XX74XX	Open Elective – 4*	OEC	3	0	0	3	3	40	60	100
<b>PRACTICAL</b>											
6	22MT7001	Robotics Laboratory	PCC	0	0	4	2	4	60	40	100
<b>EEC COURSES (SE/AE)</b>											
7	22MT7701	Internship*	SEC	0	0	0	2	2	100	0	100
<b>TOTAL</b>				<b>15</b>	<b>1</b>	<b>4</b>	<b>20</b>	<b>22</b>	<b>360</b>	<b>340</b>	<b>700</b>
* - Four weeks internship carries 2 credit and it will be done in before Semester VI summer vacation/placement training and same will be evaluated in Semester VII.											

**SEMESTER VIII**

S. No	Course Code	Course Title	Category	L	T	P	C	TCP	CIA	ESE	Total
<b>EEC COURSES (SE/AE)</b>											
1	22MT8901	Project Work/Granted Patent	SEC	0	0	20	10	20	100	0	100
<b>TOTAL</b>				<b>0</b>	<b>0</b>	<b>20</b>	<b>10</b>	<b>20</b>	<b>100</b>	<b>0</b>	<b>100</b>



**Note:**

1. As per the AICTE guideline, in Semester 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 2022 – 23.

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

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

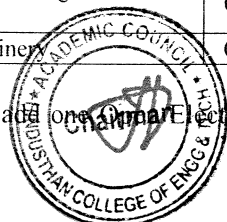
S. NO.	COURSE CODE	COURSE TITLE	CATE GORY	PERIODS PER WEEK			TOTAL CONTACT PERIODS	CREDITS
				L	T	P		
1	22AI6451	Artificial Intelligence and Machine Learning Fundamentals	OEC	2	0	2	4	3
2	22CS6451	Blockchain Technology	OEC	2	0	2	4	3
3	22EC6451	Cyber security	OEC	2	0	2	4	3
4	22EC6452	IoT Concepts and 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 Non-Circuit 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)

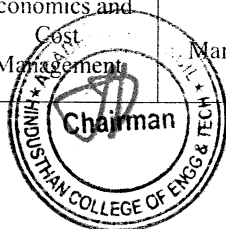
S. NO.	COURSE CODE	COURSE TITLE	CATEGORY	PERIODS PER WEEK			TOTAL CONTACT PERIODS	CREDITS
				L	T	P		
1	22MT7401	Project Management (Must in the list)	OEC	3	0	0	3	3

### OPEN ELECTIVE IV

S. NO.	COURSE CODE	COURSE TITLE	CATEGORY	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 Information Systems	Vertical II Mechanical Engineering	Vertical III Management Studies	Vertical IV Manufacturing Process	Vertical V Vehicle Technology	Vertical VI Robotics and Automation
22MT5301 Database Management System	22MT5304 Composite Materials	22MT5307 Principles of Management	22MT5310 Non-Traditional Machining Techniques	22MT5313 Automobile System	22MT5316 Mobile Robotics
22MT5302 Data Science	22MT5305 Product Design and Development	22MT5308 Disaster Management	22MT5311 Computer Integrated Manufacturing	22MT5314 Automotive Electronics	22MT5317 Soft Robotics
22MT5303 Data Visualization	22MT5306 Applied Thermodynamics	22MT5309 Supply Chain Management	22MT5312 Flexible Manufacturing System	22MT5315 Electrical Vehicles	22MT5318 Micro Robotics
22MT6301 Cyber Safety	22MT6303 Non-Destructive Testing	22MT6305 Economics and Cost Management	22MT6307 Micro Manufacturing	22MT6309 Hybrid Vehicles	22MT6311 Textile Automation





22MT6302 AI for Mechatronics	22MT6304 Diagnostics Techniques	22MT6306 Digital Management	22MT6308 Industrial 4.0	22MT6310 Unmanned Aerial Vehicles	22MT6312 Factory Automation
22MT7301 Optimization Techniques	22MT7302 Machineries in Agriculture	22MT7303 Marketing Management	22MT7304 Rapid Prototyping	22MT7305 Modern Vehicles Technology	22MT7306 Automatic System

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

### PROFESSIONAL ELECTIVE COURSES: VERTICALS

#### Details of Vertical I: Information Systems

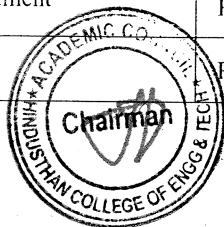
S. NO.	COURSE CODE	COURSE TITLE	CATE GORY	PERIODS PER WEEK			TOTAL CONTACT PERIODS	CREDITS
				L	T	P		
1	22MT5301	Database Management System	PEC	3	0	0	3	3
2	22MT5302	Data Science	PEC	3	0	0	3	3
3	22MT5303	Data Visualization	PEC	3	0	0	3	3
4	22MT6301	Cyber Safety	PEC	3	0	0	3	3
5	22MT6302	AI for Mechatronics	PEC	3	0	0	3	3
6	22MT7301	Optimization Techniques	PEC	3	0	0	3	3

#### Details of Vertical II: Mechanical Engineering

S. NO.	COURSE CODE	COURSE TITLE	CATE GORY	PERIODS PER WEEK			TOTAL CONTACT PERIODS	CREDITS
				L	T	P		
1	22MT5304	Composite Materials	PEC	3	0	0	3	3
2	22MT5305	Product Design and Development	PEC	3	0	0	3	3
3	22MT5306	Applied Thermodynamics	PEC	3	0	0	3	3
4	22MT6303	Non-Destructive Testing	PEC	3	0	0	3	3
5	22MT6304	Diagnostics Techniques	PEC	3	0	0	3	3
6	22MT7302	Machineries in Agriculture	PEC	3	0	0	3	3

#### Details of Vertical III: Management Studies

S. NO.	COURSE CODE	COURSE TITLE	CATE GORY	PERIODS PER WEEK			TOTAL CONTACT PERIODS	CREDITS
				L	T	P		
1	22MT5307	Principles of Management	PEC	3	0	0	3	3
2	22MT5308	Disaster Management	PEC	3	0	0	3	3
3	22MT5309	Supply Chain Management	PEC	3	0	0	3	3
4	22MT6305	Economics and Cost Management	PEC	3	0	0	3	3



5	22MT6306	Digital Management	PEC	3	0	0	3	3
6	22MT7303	Marketing Management	PEC	3	0	0	3	3

#### Details of Vertical IV: Manufacturing Process

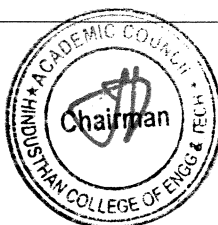
S. NO.	COURSE CODE	COURSE TITLE	CATEGORY	PERIODS PER WEEK			TOTAL CONTACT PERIODS	CREDITS
				L	T	P		
1	22MT5310	Non-Traditional Machining Techniques	PEC	3	0	0	3	3
2	22MT5311	Computer Integrated Manufacturing	PEC	3	0	0	3	3
3	22MT5312	Flexible Manufacturing System	PEC	3	0	0	3	3
4	22MT6307	Micro Manufacturing	PEC	3	0	0	3	3
5	22MT6308	Industrial 4.0	PEC	3	0	0	3	3
6	22MT7304	Rapid Prototyping	PEC	3	0	0	3	3

#### Details of Vertical V: Vehicle Technology

S. NO.	COURSE CODE	COURSE TITLE	CATEGORY	PERIODS PER WEEK			TOTAL CONTACT PERIODS	CREDITS
				L	T	P		
1	22MT5313	Automobile System	PEC	3	0	0	3	3
2	22MT5314	Automotive Electronics	PEC	3	0	0	3	3
3	22MT5315	Electrical Vehicles	PEC	3	0	0	3	3
4	22MT6309	Hybrid Vehicles	PEC	3	0	0	3	3
5	22MT6310	Unmanned Aerial Vehicles	PEC	3	0	0	3	3
6	22MT7305	Modern Vehicles Technology	PEC	3	0	0	3	3

#### Details of Vertical VI: Robotics and Automation

S. NO.	COURSE CODE	COURSE TITLE	CATEGORY	PERIODS PER WEEK			TOTAL CONTACT PERIODS	CREDITS
				L	T	P		
1	22MT5316	Mobile Robotics	PEC	3	0	0	3	3
2	22MT5317	Soft Robotics	PEC	3	0	0	3	3
3	22MT5318	Micro Robotics	PEC	3	0	0	3	3
4	22MT6311	Textile Automation	PEC	3	0	0	3	3
5	22MT6312	Factory Automation	PEC	3	0	0	3	3
6.	22MT7306	Automatic System	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.

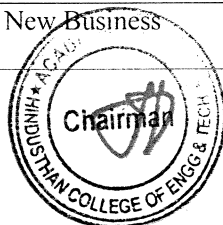
Note: Each programme should provide verticals for minor degree

S. NO.	COURSE CODE	COURSE TITLE	CATEGORY	PERIODS PER WEEK			TOTAL CONTACT PERIODS	CREDITS
				L	T	P		
1	22MT5601	Sem 5: Basics of Mechatronics System	MDC	3	0	0	3	3
2	22MT6601	Sem 6: Sensors and Interfacing	MDC	3	0	0	3	3
3	22MT6602	Sem6: Hydraulics and Pneumatics	MDC	3	0	0	3	3
4	22MT7601	Sem 7: PLC and SCADA	MDC	3	0	0	3	3
5	22MT7602	Sem 7: Industrial Robotics	MDC	3	0	0	3	3
6	22MT8601	Sem 8: Design of Mechatronics System	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	Introduction to Business Venture	Sustainable Agriculture and Environmental Management
Banking, Financial Services and Insurance	Team Building & Leadership Management for Business	Sustainable Bio Materials
Introduction to Blockchain and its Applications	Creativity & Innovation in Entrepreneurship	Materials for Energy Sustainability
Fintech Personal Finance and Payments	Principles of Marketing Management for Business	Green Technology
Introduction to Fintech	Human Resource Management for Entrepreneurs	Environmental Quality Monitoring and Analysis
	Financing New Business Ventures	



### VERTICALS FOR HONOURS DEGREE

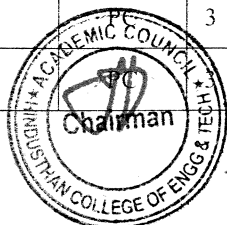
Vertical I Industrial Automation	Vertical II Medical Mechatronics	Vertical III Applied Robotics
22MT5203 Concepts of Machines and Mechanisms	22MT5204 Robotics in Medicine	22MT5205 Robots and Systems in Smart Manufacturing
22MT6202 Drives and Actuators for Automation	22MT6204 Brain Computer Interface and its Applications	22MT6206 Medical Robotics
22MT6203 Power Electronics	22MT6205 Digital Image Processing	22MT6207 Agricultural Robotics and Automation
22MT7203 Advanced PLC	22MT7205 Radiological Equipment	22MT7207 Collaborative Robotics
22MT7204 Distributed Control System	22MT7206 Biomaterials	22MT7208 Robot Operating Systems
22MT8201 HMI & SCADA	22MT8202 Bionics	22MT8203 Humanoid Robotics

#### B.E (Hons) Mechatronics Engineering Specialization in Industrial Automation

S.No.	Course Code	Course Title	Category	Periods per Week				TCP	CIA	ESE	Total
				L	T	P	C				
1	22MT5203	Sem 5: Concepts of Machines and Mechanisms	PC	3	0	0	3	3	40	60	100
2	22MT6202	Sem 6: Drives and Actuators for Automation	PC	3	0	0	3	3	40	60	100
3	22MT6203	Sem 6: Power Electronics	PC	3	0	0	3	3	40	60	100
4	22MT7203	Sem 7: Advanced PLC	PC	3	0	0	3	3	40	60	100
5	22MT7204	Sem 7: Distributed Control System	PC	3	0	0	3	3	40	60	100
6	22MT8201	Sem 8: HMI & SCADA	PC	3	0	0	3	3	40	60	100

#### B.E. (Hons) Mechatronics Engineering Specialization in Medical Mechatronics

S.No.	Course Code	Course Title	Category	Periods per Week				TCP	CIA	ESE	Total
				L	T	P	C				
1.	22MT5204	Sem 5: Robotics in Medicine	PC	3	0	0	3	3	40	60	100
2.	22MT6204	Sem 6: Brain Computer Interface and its Applications	PC	3	0	0	3	3	40	60	100
3.	22MT6205	Sem 6: Digital Image Processing	PC	3	0	0	3	3	40	60	100
4.	22MT7205	Sem 7: Radiological Equipments	PC	3	0	0	3	3	40	60	100
5.	22MT7206	Sem 7: Biomaterials	PC	3	0	0	3	3	40	60	100
6.	22MT8202	Sem 8: Bionics	PC	0	0	0	3	3	40	60	100



**B.E (Hons) Mechatronics Engineering with Specialization in Applied Robotics**

S.No.	Course Code	Course Title	Category	Periods per Week				TCP	CIA	ESE	Total
				L	T	P	C				
1.	22MT5205	Sem 5: Robots and Systems in Smart Manufacturing	PC	3	0	0	3	3	40	60	100
2.	22MT6206	Sem 6: Medical Robotics	PC	3	0	0	3	3	40	60	100
3.	22MT6207	Sem 6: Agricultural Robotics and Automation	PC	3	0	0	3	3	40	60	100
4.	22MT7207	Sem 7: Collaborative Robotics	PC	3	0	0	3	3	40	60	100
5.	22MT7208	Sem 7: Robot Operating Systems	PC	3	0	0	3	3	40	60	100
6.	22MT8203	Sem 8: Humanoid Robotics	PC	3	0	0	3	3	40	60	100

Note: Each programme should provide verticals for Honours degree

**SEMESTER-WISE CREDIT DISTRIBUTION**

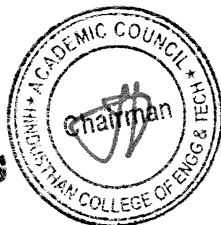
B.E. / B.TECH. PROGRAMMES										
S.No.	Course Area	Credits per Semester								Total Credits
		I	II	III	IV	V	VI	VII	VIII	
1	HSC	3	3	-	2	-	3	-	-	11
2	BSC	7	9	4	-	-	-	-	-	20
3	ESC	6	4	5	-	-	-	-	-	15
4	PCC	-	3	13	20	12	7	9	-	64
5	PEC	-	-	-	-	9	9	-	-	18
6	OEC	-	-	-	-	-	3	9	-	12
7	EEC	3	3	3	1	1	2	2	10	25
8	MCC		✓	✓	✓					
<b>Total</b>		<b>19</b>	<b>22</b>	<b>25</b>	<b>23</b>	<b>22</b>	<b>24</b>	<b>20</b>	<b>10</b>	<b>165</b>

**CREDIT DISTRIBUTION R2022**

Semester	I	II	III	IV	V	VI	VII	VIII	Total
Credits	18	23	25	23	22	24	20	10	165

*P. Suman*  
Chairman of BoS

**Chairman - BoS**  
**MCT - HICET**



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

*[Signature]*  
Principal

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

**The learner should be able to**

- Construct the characteristic polynomial of a matrix and use it to identify eigen values and Eigenvectors
- Impart the knowledge of sequences and series.
- Analyse and discuss the maxima and minima of the functions of several variables.
- Evaluate the multiple integrals and apply in solving problems.
- Apply vector differential operator for vector function and theorems to solve engineering problems.

Unit	Description	Instructional Hours
I	<b>Matrices</b> 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
II	<b>Single Variate Calculus</b> Rolle's Theorem–Lagrange's Mean Value Theorem–Maxima and Minima–Taylor's and Maclaurin's Series.	12
III	<b>Functions of Several Variables</b> Partial derivatives–Total derivative, Jacobian, Maxima, minima and saddle points; Method of Lagrange multipliers	12
IV	<b>Integral Calculus</b> 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
V	<b>Vector Calculus</b> Gradient, divergence and curl; Green's theorem, Stoke's and Gauss divergence theorem (statement only) for cubes only.	12
<b>Total Instructional Hours</b>		<b>60</b>

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

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

**TEXTBOOKS:**

T1: G.B. Thomas and R.L. Finney, "Calculus and Analytical Geometry", 9<sup>th</sup> Edition Addison Wesley Publishing Company, 2016.

T2: Erwin Kreyszig, "Advanced Engineering Mathematics", John Wiley & Sons, 2019.

T3: K.P. Uma and S. Padma, "Engineering Mathematics I (Matrices and Calculus)", Pearson Ltd, 2022.

**REFERENCE BOOKS:**

R1- Jerrold E. Marsden, Anthony Tromba, "Vector Calculus", W.H. Freeman, 2003

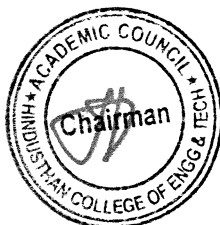
R2- Strauss M.J, G.L. Bradley and K.J. Smith, "Multivariable Calculus", Prentice Hall, 2002.

R3- Veerarajan T, "Engineering Mathematics", McGraw Hill Education (India) Pvt Ltd, New Delhi, 2016.

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

CHAIRMAN, BOARD OF STUDIES

Chairman - BoS  
MCT - HICET



DEAN ACADEMICS  
Dean (Academics)  
HICET

Programme	Course Code	Name of the Course	L	T	P	C
B.E./B.Tech	22ME1201	ENGINEERING DRAWING (AGRI, BME. (CHEM.,AERO, AUTO, CIVIL,MECH, MECT,FT,EEE)	1	4	0	3

**The learner should be able**

- Course Objective
- To gain the knowledge of Engineer's language of expressing complete details about objects and construction of conics and special curves.
  - To learn about the orthogonal projections of straight lines and planes.
  - To acquire the knowledge of projections of simple solid objects in plan and elevation.
  - To learn about the projection of sections of solids and development of surfaces.
  - To study the isometric projections of different objects.

Unit	Description	Instructional Hours
	<b>PLANE CURVES</b> Importance of engineering drawing: drafting instruments; drawing sheets – layout and folding; Lettering and dimensioning, BIS standards, scales.Geometrical constructions, Engineering Curves Conic sections –Construction of ellipse, parabolaand hyperbola by eccentricity method. Construction of cycloids and involutes of square and circle – Drawing of tangents and normal to the above curves.	12
I	<b>PROJECTIONS OF POINTS, LINES AND PLANE SURFACES</b> Introduction to Orthographic projections- Projection of points. Projection of straight lines inclined to both the planes, Determination of true lengths and true inclinations by rotating line method. Projection of planes (polygonal and circular surfaces) inclined to both the planes by rotating object method (First angle projections only).	12
II	<b>PROJECTIONS OF SOLIDS</b> Projection of simple solids like prisms, pyramids, cylinder and cone when the axis is perpendicular and inclined to one plane by rotating object method.	12
III	<b>SECTION OF SOLIDS AND DEVELOPMENT OF SURFACES</b> Sectioning of simple solids with their axis in vertical position when the cutting plane is inclined to one of the principal planes and perpendicular to the other – Obtaining true shape of section. Development of lateral surfaces of simple and sectioned solids – Prisms, pyramids, cylinder and cone. Development of lateral surfaces of truncated solids.	12
IV	<b>ISOMETRIC AND ORTHOGRAPHIC PROJECTIONS</b> Isometric views and projections simple and truncated solids such as - Prisms, pyramids, cylinders, cones- combination of two solid objects in simple vertical positions.Free hand sketching of multiple views from a pictorial drawing. Basics of drafting using AutoCAD software.	12
V		
<b>Total Instructional Hours</b>		<b>60</b>

- Course Outcome
- At the end of the course, the learner will be able to
- CO1: Understand and interpret the engineering drawings in order to visualize the objects and draw the conics and special curves.
- CO2: Draw the orthogonal projections of straight lines and planes.
- CO3: Interpret the projections of simple solid objects in plan and elevation.
- CO4: Draw the projections of section of solids and development of surfaces of solids.
- CO5: Draw the isometric projections and the perspective views of different objects.

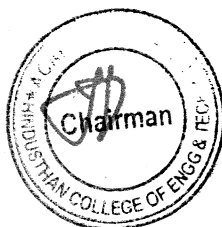
**TEXT BOOK:**

- T1. K.Venugopal, V.Prabu Raja, "Engineering Drawing, AutoCAD, Building Drawings", 5th edition New Age International Publishers, New Delhi 2016.
- T2. K.V.Natarajan, "A textbook of Engineering Graphics", Dhanlaxmi Publishers, Chennai 2016.

**REFERENCES:**

- R1. BasantAgrawal and C.M.Agrawal, "Engineering Drawing", Tata McGraw Hill Publishing company Limited, New Delhi,2013.
- R2. N.S. Parthasarathy, Vela Murali, "Engineering Drawing", Oxford University PRESS. India 2015.

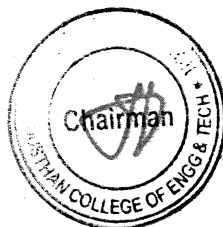
*R. Kumar*  
CHAIRMAN, BOARD OF STUDIES  
**Chairman - B.S  
MCT - HICET**



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

CO/PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO-1	PSO-2
CO1	3	3	3	2	2	-	-	-	-	-	-	2	1	1
CO2	3	3	3	2	2	-	-	-	-	-	-	3	2	2
CO3	3	3	3	2	2	-	-	-	-	-	-	3	3	3
CO4	3	3	3	2	2	-	-	-	-	-	-	3	1	1
CO5	3	3	3	2	2	-	-	-	-	-	-	3	2	2
AVG	3	3	3	2	2	-	-	-	-	-	-	2.8	1.8	1.8

*P. Ramya*  
 CHAIRMAN, BOARD OF STUDIES  
**Chairman - BoS**  
**MCT - HiCET**



*[Signature]*  
 DEAN ACADEMICS  
**Dean (Academics)**  
**HiCET**



B.E./B.Tech / I 22HE1151 ENGLISH FOR ENGINEERS (Common to all Branches) L2 T0 P2 C3

The student should be able

- Course Objective
- To improve the communicative proficiency of learners.
  - To help learners use language effectively in professional writing.
  - To advance the skills of maintaining the suitable one of communication.
  - To introduce the professional life skills.
  - To impart official communication etiquette.

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

After completion of the course the learner will be able

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

**TEXTBOOKS:**

T1- Norman Whitby, "Business Benchmark-Pre-intermediate to Intermediate", Cambridge University Press, 2016. T2-

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

**REFERENCEBOOKS:**

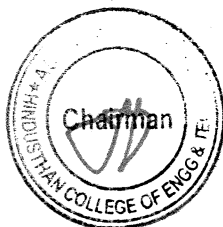
R1- Meenakshi Raman and Sangeetha Sharma. "Technical Communication- Principles and Practice", Oxford University Press, 2009.

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

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

*Pranay*  
 CHAIRMAN, BOARD OF STUDIES

**Chairman - BoS  
 MCT - HICET**



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

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

*Prasanna*  
 CHAIRMAN, BOARD OF STUDIES  
**Chairman - BoS**  
**MCT - HICET**



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

Programme	Course Code	Name of the Course	L	T	P	C
BE/B.Tech	22PH1151	PHYSICS FOR NON- CIRCUIT ENGINEERING I – SEM (AERO,AUT,AGRI,CHEM,CIVIL,MECH,MCI &FT)	2	0	2	3

**The student should be able to**

- Course Objective
1. Gain knowledge about laser, their applications, become Conversant with principles of optical fiber, types and applications of optical fiber
  2. Enhance his fundamental knowledge about properties of matter
  3. Understand the concept of Wave optics
  4. Gain knowledge about Quantum Physics.
  5. Acquire fundamental knowledge of thermal physics which is related to the engineering program

Unit	Description	Instructional Hours
	<b>LASER AND FIBRE OPTICS</b>	
I	Spontaneous emission and stimulated emission –Type of lasers – Nd:YAG laser - Laser Applications – Holography – Construction and reconstruction of images. Principle and propagation of light through optical fibers – Derivation of numerical aperture and acceptance angle – Classification of optical fibers (based on refractive index and modes) – Fiber optical communication link. <b>Determination of Wavelength and particle size using Laser</b>	6
II	<b>PROPERTIES OF MATTER</b> Elasticity – Hooke's law – Poisson's ratio – Bending moment – Depression of a cantilever – Deteremination of Young's modulus of the material of the beam by Uniform bending theory and experiment. Twisting couple - torsion pendulum: theory and experiment <b>Determination of Young's modulus by uniform bending method</b> <b>Determination of Rigidity modulus – Torsion pendulum</b>	6
III	<b>WAVE OPTICS</b> Interference of light – air wedge –Thickness of thin paper -Testing of thickness of surface- Michelson interferometer. Diffraction of light –Fraunhofer diffraction at single slit – Diffraction grating – Rayleigh's criterion of resolution power - resolving power of grating. <b>Determination of wavelength of mercury spectrum – spectrometer grating</b> <b>Determination of thickness of a thin wire – Air wedge method</b>	6
IV	<b>QUANTUM PHYSICS</b> Black body radiation –Compton effect: theory and experimental verification – wave particle duality –concept of wave function and its physical significance – Schrödinger's wave equation – time independent and time dependent equations – particle in a one-dimensional rigid box .	6
V	<b>THERMAL PHYSICS</b> Transfer of heat energy –thermal conduction, convection and radiation – thermal conductivity - Lee's disc method: theory and experiment - conduction through compound media (series and parallel) – applications: solar water heaters.	6
	<b>Total Instructional Hours</b>	30
	<b>Total Lab Instructional Hours</b>	30

**After completion of the course the learner will be able to**

- Course Outcome
- CO1: Understand the advanced technology of LASER and optical communication in the field of Engineering
  - CO2: Illustrate the fundamental properties of matter
  - CO3: Discuss the Oscillatory motions of particles
  - CO4: Understand the advanced technology of Quantum Physics in the field of Engineering
  - CO5: Develop the technology of thermal physics in engineering field

**TEXT BOOKS:**

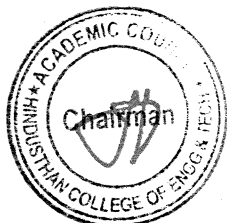
- T1 - Rajendran V, Applied Physics, Tata McGraw Hill Publishing Company Limited, New Delhi, 2017.  
T2- Gaur R.K. and Gupta S.L., Engineering Physics, 8<sup>th</sup> edition, Dhanpat Rai Publications (P) Ltd., New Delhi, 2015.

**REFERENCE BOOKS:**

- R1 - M.N Avadhanulu and PG Kshirsagar "A Text Book of Engineering physics" S. Chand and Company Ltd., New Delhi 2016  
R2 - Dr. G. Senthilkumar "Engineering Physics – I" VRB publishers Pvt Ltd., 2021

*Pravara*  
CHAIRMAN, BOARD OF STUDIES

**Chairman - BoS  
MCT - HiCET**



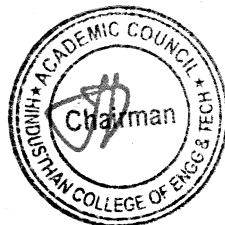
*[Signature]*  
DEAN ACADEMICS

**Dean (Academics)  
HiCET**

PO& PSO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	3	3	2	3	1	1	-	1	-	2	3	3	2
CO2	3	3	2	2	1	1	1	-	1	-	2	2	3	1
CO3	3	3	2	2	2	1	1	-	1	-	1	2	2	2
CO4	3	2	3	1	3	1	1	-	1	-	1	2	2	1
CO5	3	2	3	1	2	1	1	-	1	-	2	2	2	1
Avg	3	2.6	2.6	1.6	2.2	1	1	-	1	-	1.6	2.2	2.4	1.4

*P. N. M. S.*  
CHAIRMAN, BOARD OF STUDIES

**Chairman - BoS**  
**MCT - HiCET**



*[Handwritten Signature]*  
DEAN ACADEMICS

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

Programme	Course Code	Name of the Course	L	T	P	C
B.E./B.Tech	22IT1151	<b>PYTHON PROGRAMMING AND PRACTICES</b> AGRI, CHEM, FT, AERO, AUTO, CIVIL, MECH, MECT, ECE, BME)	2	0	2	3

**The learner should be able**

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

Unit	Description	Instructional Hours
I	<b>ALGORITHMIC PROBLEM SOLVING</b> Algorithms, building blocks of algorithms (statements, state, control flow, functions), notation (pseudo code, flow chart, programming language), algorithmic problem solving, simple strategies for developing algorithms (iteration, recursion). <b>Illustrative problems: To find the Greatest Common Divisor (GCD) of two numbers, Fahrenheit to Celsius, Perform Matrix addition.</b>	5+4
II	<b>DATA, STATEMENTS, CONTROL FLOW</b> Data Types, Operators and precedence of operators, expressions, statements, comments; Conditionals: Boolean values and operators, conditional (if), alternative (if -else), chained conditional (if -elif-else); Iteration: state, while, for, break, continue, pass; <b>Simple algorithms and programs: Area of the circle, check the given year is Leap year or not, Factorial of a Number.</b>	5+4
III	<b>FUNCTIONS, STRINGS</b> Functions, parameters and arguments: Fruitful functions: return values, local and global scope, function composition, recursive functions. Strings: string slices, immutability, string functions and methods, string module. <b>Illustrative programs: Perform Linear Search, Selection sort, Sum of all elements in a List, Pattern Programs</b>	5+4
IV	<b>LISTS, TUPLES, DICTIONARIES</b> Lists: list operations, list slices, list methods, list loop, mutability, aliasing, cloning lists, list parameters; Tuples: tuple assignment, tuple as return value; Dictionaries: operations and methods; advanced list processing - list comprehension. <b>Illustrative programs: List Manipulation, Finding Maximum in a List, String processing.</b>	5+4
V	<b>FILES, MODULES, PACKAGES</b> Files and exception: text files, reading and writing files, errors and exceptions, handling exceptions, modules, packages <b>Illustrative programs: Reading writing in a file, word count, Handling Exceptions</b>	9
<b>Total Instructional Hours</b>		<b>45</b>

- Course Outcome
- At the end of the course, the learner will be able to
- CO1: Develop algorithmic solutions to simple computational problems
  - CO2: Read, write, execute by hand simple Python programs
  - CO3: Structure simple Python programs for solving problems and Decompose a Python program into functions
  - CO4: Represent compound data using Python lists, tuples, dictionaries
  - CO5: Read and write data from/to files in Python Programs.

**TEXT BOOKS:**

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

*Reviewed*  
**CHAIRMAN, BOARD OF STUDIES**  
**Chairman - BOS**  
**MCT - HICET**



*[Signature]*  
**DEAN ACADEMICS**  
**Dean (Academics)**  
**HiCET**

**REFERENCE BOOKS:**

R1: Charles Dierbach. — Introduction to Computer Science using Python: A Computational Problem- Solving Focus, Wiley India Edition, 2013.

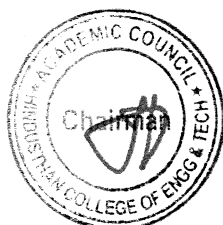
R2: Timothy A. Budd. — Exploring Python!, Mc-Graw Hill Education (India) Private Ltd., 2015

R3: Robert Sedgewick, Kevin Wayne, Robert Dondero. — Introduction to Programming in Python: An Inter-disciplinary Approach. Pearson

India Education Services Pvt. Ltd., 2016

CO/PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO-1	PSO-2
CO1	3	3	2	2	3	1						2	1	2
CO2	3	3	2	2	3	1						2	1	2
CO3	3	3	2	2	3	1						2	1	2
CO4	3	3	2	2	3	1						2	1	2
CO5	3	3	2	2	3	1						2	1	2
AVG	3	3	2	2	3	1	-	-	-	-	-	2	1	2

*Prasanna*  
CHAIRMAN, BOARD OF STUDIES  
**Chairman - BoS**  
**MCT - HICET**



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

Programme	Course Code	Name of the Course	L	T	P	C
B.E./B.Tech	22HE1072	<b>ENTREPRENEURSHIP &amp; INNOVATION</b>	1	0	0	1

**(Common for all Branches)**

The student should be made

**Course Objectives**

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  | <b>Entrepreneurial Thinking</b>                      |
| 2  | <b>Innovation Management</b>                         |
| 3  | <b>Design Thinking</b>                               |
| 4  | <b>Opportunity Spotting / Opportunity Evaluation</b> |
| 5  | <b>Industry and Market Research</b>                  |
| 6  | <b>Innovation Strategy and Business Models</b>       |
| 7  | <b>Financial Forecasting</b>                         |
| 8  | <b>Business Plans/ Business Model Canvas</b>         |
| 9  | <b>Entrepreneurial Finance</b>                       |
| 10 | <b>Pitching to Resources Providers / Pitch Deck</b>  |
| 11 | <b>Negotiating Deals</b>                             |
| 12 | <b>New Venture Creation</b>                          |
| 13 | <b>Lean Start-ups</b>                                |
| 14 | <b>Entrepreneurial Ecosystem</b>                     |
| 15 | <b>Velocity Venture</b>                              |

**TOTAL INSTRUCTIONAL HOURS 15**

**Course Outcome**

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

- 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

**TEXTBOOKS**

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

**REFERENCEBOOKS**

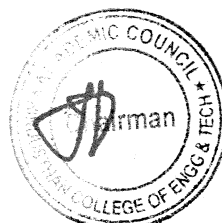
- R1: Christopher Golis "Enterprise & Venture Capital", Allen & Unwin Publication, Fourth Edition (2007).  
R2: Thomas Lockwood & Edger Papke "Innovation by Design", Career Press.com, Second Edition (2017).  
R3: Jonathan Wilson "Essentials of Business Research", Sage Publication, First Edition (2010).

**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>

*P. Srinivas*  
**CHAIRMAN, BOARD OF STUDIES**

**Chairman - BoS  
MCT - HICET**



*[Signature]*  
**DEAN ACADEMICS**

**Dean (Academics)  
HICET**

Programme	Course Code	Course Title	L	T	P	C
BE/BTECH	22HE1073	INTRODUCTION TO SOFT SKILLS	0	0	0	1

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

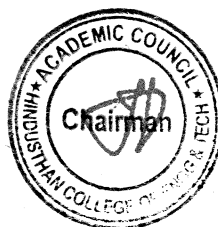
Unit	Description	Instructional Hours
I	<b>Lessons on excellence</b> Skill introspection, Skill acquisition, consistent practice	2
II	<b>Logical Reasoning</b> Problem Solving - Critical Thinking- Lateral Thinking - Coding and Decoding – Series – Analogy - Odd Man Out - Visual Reasoning - Sudoku puzzles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

*Prasanna*  
CHAIRMAN, BOARD OF STUDIES

**Chairman - BoS  
MCT - HICET**



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



Programme	Course code	Name of the course	L	P	S	A
B.Tech	22MC2093	தமிழர்மரபு	2	0	0	0

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

**அலகு I** மொழி மற்றும் இலக்கியம் 3  
இந்திய மொழிக் குடும்பங்கள் - இராவிட மொழிகள் - தமிழ் ஒரு செய்மொழி - தமிழ் செவ்விலக்கியங்கள் - சங்க இலக்கியத்தின் சமயச் சார்பற்ற தன்மை - சங்க இலக்கியத்தில் யதிரதல் அறம் - திருக்குறளில் மேலாண்மைக் கருத்துக்கள் - தமிழக காய்மியங்கள். தமிழகத்தில் சமண பெளத்த சமயங்களின் தாக்கம் - பக்தி இலக்கியம் அழ்வார்கள் 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, பொய்க்கைகள் - தேர் செய்யும் கலை - சுருமண சிற்பங்கள் - நாட்டுப்பறக் கலைகள் - குமரிமுனையில் திருவள்ளூர் சிலை - இசைக் கருவிகள் - பிறுக்கலம் பறை, வீணை, பாழ், நாடஸ்வரம் - தமிழர்களின் சமூக பொருளாதார வாழ்வில் கோவில்களின் பங்கு.

**அலகு III** நாட்டுப்புறக் கலைகள் மற்றும் வீர விளையாட்டுகள் 3  
தெருக்கூத்து கரகாட்டம், வில்லுப்பாட்டு, கணியான கூத்த ஒயிலாட்டம், தோலபாவைக் கூத்து, சிவம்பாட்டம், வளரி, பவியாட்டம், 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 - கடல்கடந்த நாடுகளில் சோழர்களின் வெற்றி.

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

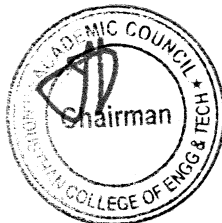
**TOTAL : 15 PERIODS**

**TEXT-CUM-REFERENCE BOOKS**

1. தமிழக வரலாறு - மக்களும் பண்பாடும் - கே.கே. பிள்ளை (வெளியீடு: தமிழ்நாடு பாடநூல் மற்றும் கல்வியியல் பணிகள் கழகம்).
2. கணினித் தமிழ் - முனைவர் இல. சுந்தரம். (விகடன் பிரசுரம்).
3. கீழடி - வைகை நதிக்கரையில் சங்ககால நகர நாகரிகம் (தொல்காப்பியல் துறை வெளியீடு)
4. பொருளை - ஆற்றுங்கரை நாகரிகம் (தொல்காப்பியல் துறை வெளியீடு)
5. Social Life of Tamils (Dr.K.K.Pillay) A joint publication of TNTS & 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.Subatamanian, Dr.K.D. Thirunavukkarasu) (Published by: International Institute of Tamil Studies).
8. The Contributions of the Tamils to Indian Culture (Dr.M.Valarmathi) (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. Porunai Civilization (Jointly Published by: Department of Archaeology & Tamil Nadu Text Book and Educational Services Corporation, Tamil Nadu)
12. Journey of Civilization Indus to Vaigai (R.Balakrishnan) (Published by: RMRL) - Reference Book.

**CHAIRMAN, BOARD OF STUDIES**

**Chairman - BoS  
MCT - HICET**



**DEAN ACADEMICS  
Dean (Academics)  
HICET**

Programme	Course Code	Name of the Course	L	T	P	C
B.E./B.Tech	22MC1094	HERITAGE OF TAMIL	2	0	0	0

**The learner should be able to**

- 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
I	<b>Language and Literature</b> 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
II	<b>Heritage _ Rock Art Paintings to Modern Art – Sculpture</b> 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
III	<b>Folk and Martial Arts</b> Therukoothu, Karagattam, Villupattu, Kaniyan koothu, Oyilattam, Leather puppetry, Silambattam., Valari Tiger dance – Sports and Games of Tamils. <b>Thinai Concept of Tamils</b>	6
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. <b>Contribution of Tamils to Indian National Movement and Indian Culture</b>	6
V	Contribution of Tamils to Indian freedom struggle – The cultural influence of Tamils over the other parts of India – Self respect movement – Role of Siddha Medicine in indigenous systems of Medicine – Inscriptions & Manuscripts – Print History of Tamil books.	6
<b>Total Instructional Hours</b>		<b>30</b>

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

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

**TEXTBOOKS:**

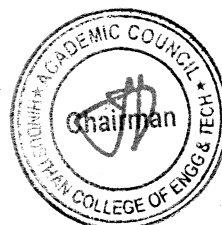
- T1: Social Life of Tamils (Dr.K.K.Pillay) A joint publication of TNTB & ESC and RMRL – (in print)  
T2: Social Life of the Tamils - The Classical Period (Dr.S.Singaravelu) (Published by: International Institute of Tamil Studies).  
T3: Historical Heritage of the Tamils (Dr.S.V.Subatamanian, Dr.K.D.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

**REFERENCEBOOKS:**

- R1-The Contributions of the Tamils to Indian Culture (Dr.M.Valarmathi) (Published by: International Institute of Tamil Studies)  
R2- Porunai 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.

*P. S. S. S.*  
CHAIRMAN, BOARD OF STUDIES

**Chairman - BoS  
MCT - HiCET**



*[Signature]*  
DEAN ACADEMICS

**Dean (Academics)  
HiCET**

Programme	Course Code	Name of the Course	L	T	P	C
B.E./B.Tech/	22HE1095	UNIVERSAL HUMAN VALUES (COMMON TO ALL BRANCHES)	2	0	0	0

- The student should be made**
- Course Objectives**
- 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.
  - 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.
  - 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.

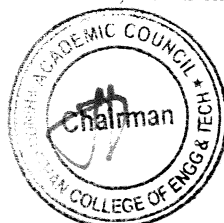
Unit	Description	Instructional Hours
	<b>Introduction to Value Education</b>	
I	Right Understanding, Relationship and Physical Facility (Holistic Development and the Role of Education)-Understanding Value Education - Self-exploration as the Process for Value Education - Continuous Happiness and Prosperity – the Basic Human Aspirations - Happiness and Prosperity – Current Scenario - Method to Fulfill the Basic Human Aspirations	6
	<b>Harmony in the Human Being and Harmony in the Family</b>	
II	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
	<b>Harmony in the Family and Society</b>	
III	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
	<b>Harmony in the Nature / Existence</b>	
IV	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 pervasivespace Realizing Existence as Co-existence at All Levels The Holistic Perception of Harmony in Existence. Vision for the Universal Human Order	6
	<b>Implications of the Holistic Understanding – a Look at Professional Ethics</b>	
V	Natural Acceptance of Human Values Definitiveness of (Ethical) Human Conduct. A Basis for Humanistic Education, Humanistic Constitution and Universal Human Order-Competence in Professional Ethics Holistic Technologies, Production Systems and Management Models-Typical Case Studies Strategies for Transition towards Value-based Life and Profession	6
<b>Total Instructional Hours</b>		<b>30</b>

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

**Reference Books:**

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

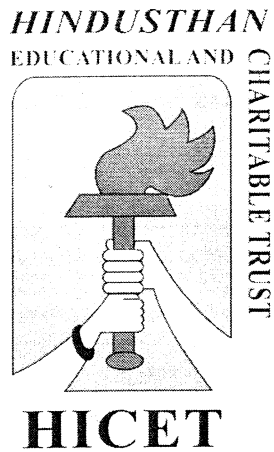
*Penary*  
**CHAIRMAN, BOARD OF STUDIES**  
 Chairman - BoS  
 MCT - HICET



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

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

**B.E. MECHATRONICS ENGINEERING**

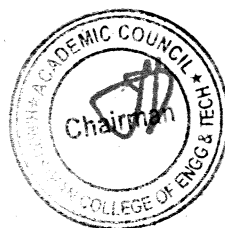


**CHOICE BASED CREDIT SYSTEM**

**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.E. MECHATRONICS ENGINEERING (UG)**

**REGULATION-2022**

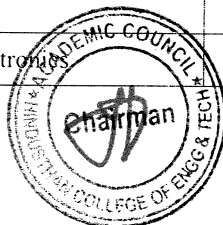
For the students admitted during the academic year 2022-2023 and onwards

**SEMESTER I**

S. No	Course Code	Course Title	Category	L	T	P	C	TCP	CIA	ESE	Total
<b>THEORY</b>											
1	22MA1101	Matrices and Calculus	BSC	3	1	0	4	4	40	60	100
2	22ME1201	Engineering Drawing	ESC	1	4	0	3	5	40	60	100
<b>THEORY WITH LAB COMPONENT</b>											
3	22HE1151	English for Engineers	HSC	2	0	2	3	4	40	60	100
4	22PH1151	Physics for Non-Circuit Engineering	BSC	2	0	2	3	4	50	50	100
5	22IT1151	Python Programming and practices	ESC	2	0	2	3	4	50	50	100
<b>EEC COURSES (SE/AE)</b>											
6	22HE1071	Universal Human Values II	AEC	2	0	0	2	2	40	60	100
7	22HE1072	Entrepreneurship & Innovation	AEC	1	0	0	1	1	100	0	100
<b>MANDATORY COURSE</b>											
8.	22MC1091/ 22MC1092	தமிழரும் தொழில் நுட்பமும் / Indian Constitution	MC	2	0	0	0	2	100	0	100
<b>TOTAL</b>				<b>15</b>	<b>5</b>	<b>6</b>	<b>19</b>	<b>27</b>	<b>470</b>	<b>330</b>	<b>800</b>

**SEMESTER II**

S. No	Course Code	Course Title	Category	L	T	P	C	TCP	CIA	ESE	Total
<b>THEORY</b>											
1	22MA2101	Complex Analysis and Differential Equations	BSC	3	1	0	4	4	40	60	100
2	22PH2102	Applied Mechanics	BSC	2	0	0	2	2	40	60	100
3	22CY2101	Environmental Studies	ESC	2	0	0	2	2	40	60	100
<b>THEORY WITH LAB COMPONENT</b>											
4	22HE2151	Effective Technical Communication	HSC	2	0	2	3	4	50	50	100
5	22CY2152	Applied Chemistry	BSC	2	0	2	3	4	50	50	100
6	22MT2251	Fundamentals of Mechatronics	PCC	2	0	2	3	4	50	50	100



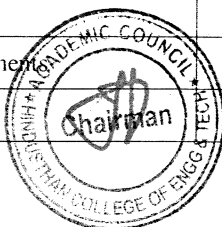
PRACTICAL COURSES											
7	22ME2001	Engineering Practices	ESC	0	0	4	2	4	60	40	100
EEC COURSES (SE/AE)											
8	22HE2071	Design Thinking	AEC	1	0	2	2	3	100	0	100
9	22HE2072	Soft Skills -1	SEC	1	0	0	1	1	100	0	100
MANDATORY COURSE											
10.	22MC2091/ 22MC2092	தமிழர் மரபு / Heritage of Tamils	MC	2	0	0	0	2	100	0	100
11.	22MC2093	NCC */NSS / YRC / Sports - Clubs - Society Service - Enrollment (Common)	MC	All students shall enroll, on admission, in anyone of the personality and character development programmes and undergo training for about 80 hours							
<b>TOTAL</b>				<b>17</b>	<b>1</b>	<b>12</b>	<b>22</b>	<b>30</b>	<b>630</b>	<b>370</b>	<b>1000</b>

### SEMESTER III

S. No	Course Code	Course Title	Category	L	T	P	C	TCP	CIA	ESE	Total
THEORY											
1	22MA3105	Fourier Series and Transforms	BSC	3	1	0	4	4	40	60	100
2	22MT3201	Industrial Motor Control	ESC	3	0	0	3	3	40	60	100
3	22MT3202	Solid and Fluid Mechanics	PCC	3	1	0	4	4	40	60	100
4	22MT3203	Digitronics	PCC	3	1	0	4	4	40	60	100
THEORY WITH LAB COMPONENT											
5	22MT3251	Manufacturing Process	PCC	2	0	2	3	4	50	50	100
PRACTICAL											
6	22MT3001	Industrial Motor Control Lab	ESC	0	0	4	2	4	60	40	100
7	22MT3002	Solid and Fluid Mechanics Lab	PCC	0	0	4	2	4	60	40	100
EEC COURSES (SE/AE)											
8	22HE3071	Soft Skills and Aptitude -II	SEC	1	0	0	1	1	100	0	100
9	22MT3072	Home Automation	AEC	0	0	4	2	4	60	40	100
<b>TOTAL</b>				<b>15</b>	<b>3</b>	<b>14</b>	<b>25</b>	<b>32</b>	<b>490</b>	<b>410</b>	<b>900</b>

### SEMESTER IV

S. No	Course Code	Course Title	Category	L	T	P	C	TCP	CIA	ESE	Total
THEORY											
1	22HE4101	IPR and Start-ups	HSC	2	0	0	2	2	40	60	100
2	22MT4201	Processor and controller	PCC	3	0	0	3	3	40	60	100
3	22MT4202	Metrology and Measurement	PCC	3	0	0	3	3	40	60	100
4	22MT4203	Theory of Machines	PCC	3	1	0	4	4	40	60	100



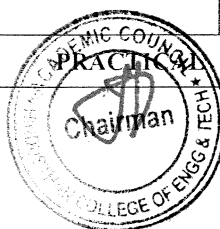
THEORY WITH LAB COMPONENT											
5	22MT4251	Sensors and Transducers	PCC	2	0	2	3	4	50	50	100
6	22MT4252	Fluid Power System	PCC	2	0	2	3	4	50	50	100
PRACTICAL											
7	22MT4001	Processor and controller Laboratory	PCC	0	0	4	2	4	60	40	100
8	22MT4002	CAD Laboratory	PCC	0	0	4	2	4	60	40	100
EEC COURSES (SE/AE)											
9	22HE4071	Soft Skills and Aptitude -II	SEC	1	0	0	1	1	100	0	100
<b>TOTAL</b>				<b>16</b>	<b>1</b>	<b>12</b>	<b>23</b>	<b>29</b>	<b>480</b>	<b>420</b>	<b>900</b>

#### SEMESTER V

S. No	Course Code	Course Title	Category	L	T	P	C	TCP	CIA	ESE	Total
THEORY											
1	22MT5201	Machine Design	PCC	3	1	0	4	4	40	60	100
2	22MT5202	Control System	PCC	3	0	0	3	3	40	60	100
3	22MT53XX	Professional Elective-1	PEC	3	0	0	3	3	40	60	100
4	22MT53XX	Professional Elective-2	PEC	3	0	0	3	3	40	60	100
5	22MT53XX	Professional Elective-3	PEC	3	0	0	3	3	40	60	100
THEORY WITH LAB COMPONENT											
6	22MT5251	Embedded System with C	PCC	2	0	2	3	4	50	50	100
PRACTICAL											
7	22MT5001	Computer Aided Analysis Laboratory	PCC	0	0	4	2	4	60	40	100
EEC COURSES (SE/AE)											
8	22HE5071	Soft Skills -4/Foreign languages	SEC	1	0	0	1	1	100	0	100
<b>TOTAL</b>				<b>18</b>	<b>0</b>	<b>6</b>	<b>21</b>	<b>25</b>	<b>410</b>	<b>390</b>	<b>800</b>

#### SEMESTER VI

S. No	Course Code	Course Title	Category	L	T	P	C	TCP	CIA	ESE	Total
THEORY											
1	22MT6201	Industrial Automation	PCC	3	0	0	3	3	40	60	100
2	22HE6101	Professional Ethics	HSC	3	0	0	3	3	40	60	100
3	22MT63XX	Professional Elective-4	PEC	3	0	0	3	3	40	60	100
4	22MT63XX	Professional Elective-5	PEC	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	22MT6001	Industrial Automation Laboratory	PCC	0	0	4	2	4	60	40	100
8	22MT6002	CAM Laboratory	PCC	0	0	4	2	4	60	40	100
<b>EEC COURSES (SE/AE)</b>											
9.	22HE6071	Soft Skills – 5	SEC	2	0	0	2	2	100	0	100
<b>TOTAL</b>				<b>20</b>	<b>0</b>	<b>8</b>	<b>24</b>	<b>28</b>	<b>460</b>	<b>440</b>	<b>900</b>

#### SEMESTER VII

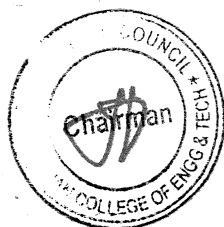
S. No	Course Code	Course Title	Category	L	T	P	C	TCP	CIA	ESE	Total
<b>THEORY</b>											
1	22MT7201	Virtual Instrumentation	PCC	3	6	0	3	3	40	60	100
2	22MT7202	Robotics and Machine Vision	PCC	3	1	0	4	4	40	60	100
3	22MT73XX	Professional Elective-6	PEC	3	0	0	3	3	40	60	100
4	22XX74XX	Open Elective – 3*	OEC	3	0	0	3	3	40	60	100
5	22XX74XX	Open Elective – 4*	OEC	3	0	0	3	3	40	60	100
<b>PRACTICAL</b>											
6	22MT7001	Robotics Laboratory	PCC	0	0	4	2	4	60	40	100
<b>EEC COURSES (SE/AE)</b>											
7	22MT7701	Internship*	SEC	0	0	0	2	2	100	0	100
<b>TOTAL</b>				<b>15</b>	<b>1</b>	<b>4</b>	<b>20</b>	<b>22</b>	<b>360</b>	<b>340</b>	<b>700</b>
* - Four weeks internship carries 2 credit and it will be done in before Semester VI summer vacation/placement training and same will be evaluated in Semester VII.											

#### SEMESTER VIII

S. No	Course Code	Course Title	Category	L	T	P	C	TCP	CIA	ESE	Total
<b>EEC COURSES (SE/AE)</b>											
1	22MT8901	Project Work/Granted Patent	SEC	0	0	20	10	20	100	0	100
<b>TOTAL</b>				<b>0</b>	<b>0</b>	<b>20</b>	<b>10</b>	<b>20</b>	<b>100</b>	<b>0</b>	<b>100</b>

**Note:**

- As per the AICTE guideline, in Semester 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 2022 – 23.



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

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

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

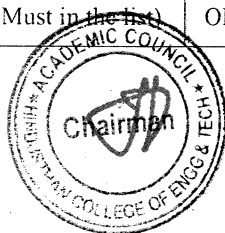
**Note:** Non-Circuit Departments can add one Open Elective course in the above list to offer for the circuit branches

### 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	22MT7401	Project Management (Must in the list)	OEC	3	0	0	3	3



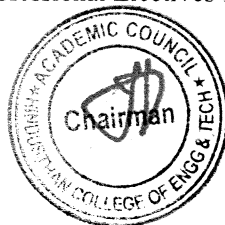
**OPEN ELECTIVE IV**

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 Information Systems	Vertical II Mechanical Engineering	Vertical III Management Studies	Vertical IV Manufacturing Process	Vertical V Vehicle Technology	Vertical VI Robotics and Automation
22MT5301 Database Management System	22MT5304 Composite Materials	22MT5307 Principles of Management	22MT5310 Non-Traditional Machining Techniques	22MT5313 Automobile System	22MT5316 Mobile Robotics
22MT5302 Data Science	22MT5305 Product Design and Development	22MT5308 Disaster Management	22MT5311 Computer Integrated Manufacturing	22MT5314 Automotive Electronics	22MT5317 Soft Robotics
22MT5303 Data Visualization	22MT5306 Applied Thermodynamics	22MT5309 Supply Chain Management	22MT5312 Flexible Manufacturing System	22MT5315 Electrical Vehicles	22MT5318 Micro Robotics
22MT6301 Cyber Safety	22MT6303 Non-Destructive Testing	22MT6305 Economics and Cost Management	22MT6307 Micro Manufacturing	22MT6309 Hybrid Vehicles	22MT6311 Textile Automation
22MT6302 AI for Mechatronics	22MT6304 Diagnostics Techniques	22MT6306 Digital Management	22MT6308 Industrial 4.0	22MT6310 Unmanned Aerial Vehicles	22MT6312 Factory Automation
22MT7301 Optimization Techniques	22MT7302 Machineries in Agriculture	22MT7303 Marketing Management	22MT7304 Rapid Prototyping	22MT7305 Modern Vehicles Technology	22MT7306 Automatic System

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



## PROFESSIONAL ELECTIVE COURSES: VERTICALS

### Details of Vertical I: Information Systems

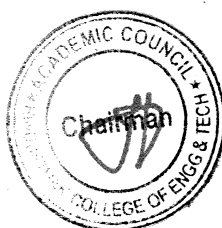
S. NO.	COURSE CODE	COURSE TITLE	CATEGORY	PERIODS PER WEEK			TOTAL CONTACT PERIODS	CREDITS
				L	T	P		
1	22MT5301	Database Management System	PEC	3	0	0	3	3
2	22MT5302	Data Science	PEC	3	0	0	3	3
3	22MT5303	Data Visualization	PEC	3	0	0	3	3
4	22MT6301	Cyber Safety	PEC	3	0	0	3	3
5	22MT6302	AI for Mechatronics	PEC	3	0	0	3	3
6	22MT7301	Optimization Techniques	PEC	3	0	0	3	3

### Details of Vertical II: Mechanical Engineering

S. NO.	COURSE CODE	COURSE TITLE	CATEGORY	PERIODS PER WEEK			TOTAL CONTACT PERIODS	CREDITS
				L	T	P		
1	22MT5304	Composite Materials	PEC	3	0	0	3	3
2	22MT5305	Product Design and Development	PEC	3	0	0	3	3
3	22MT5306	Applied Thermodynamics	PEC	3	0	0	3	3
4	22MT6303	Non Destructive Testing	PEC	3	0	0	3	3
5	22MT6304	Diagnostics Techniques	PEC	3	0	0	3	3
6	22MT7302	Machineries in Agriculture	PEC	3	0	0	3	3

### Details of Vertical III: Management Studies

S. NO.	COURSE CODE	COURSE TITLE	CATEGORY	PERIODS PER WEEK			TOTAL CONTACT PERIODS	CREDITS
				L	T	P		
1	22MT5307	Principles of Management	PEC	3	0	0	3	3
2	22MT5308	Disaster Management	PEC	3	0	0	3	3
3	22MT5309	Supply Chain Management	PEC	3	0	0	3	3
4	22MT6305	Economics and Cost Management	PEC	3	0	0	3	3
5	22MT6306	Digital Management	PEC	3	0	0	3	3
6	22MT7303	Marketing Management	PEC	3	0	0	3	3



**Details of Vertical IV: Manufacturing Process**

S. NO.	COURSE CODE	COURSE TITLE	CATEGORY	PERIODS PER WEEK			TOTAL CONTACT PERIODS	CREDITS
				L	T	P		
1	22MT5310	Non-Traditional Machining Techniques	PEC	3	0	0	3	3
2	22MT5311	Computer Integrated Manufacturing	PEC	3	0	0	3	3
3	22MT5312	Flexible Manufacturing System	PEC	3	0	0	3	3
4	22MT6307	Micro Manufacturing	PEC	3	0	0	3	3
5	22MT6308	Industrial 4.0	PEC	3	0	0	3	3
6	22MT7304	Rapid Prototyping	PEC	3	0	0	3	3

**Details of Vertical V: Vehicle Technology**

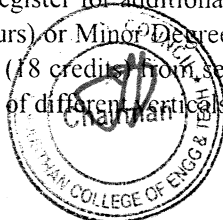
S. NO.	COURSE CODE	COURSE TITLE	CATEGORY	PERIODS PER WEEK			TOTAL CONTACT PERIODS	CREDITS
				L	T	P		
1	22MT5313	Automobile System	PEC	3	0	0	3	3
2	22MT5314	Automotive Electronics	PEC	3	0	0	3	3
3	22MT5315	Electrical Vehicles	PEC	3	0	0	3	3
4	22MT6309	Hybrid Vehicles	PEC	3	0	0	3	3
5	22MT6310	Unmanned Aerial Vehicles	PEC	3	0	0	3	3
6	22MT7305	Modern Vehicles Technology	PEC	3	0	0	3	3

**Details of Vertical VI: Robotics and Automation**

S. NO.	COURSE CODE	COURSE TITLE	CATEGORY	PERIODS PER WEEK			TOTAL CONTACT PERIODS	CREDITS
				L	T	P		
1	22MT5316	Mobile Robotics	PEC	3	0	0	3	3
2	22MT5317	Soft Robotics	PEC	3	0	0	3	3
3	22MT5318	Micro Robotics	PEC	3	0	0	3	3
4	22MT6311	Textile Automation	PEC	3	0	0	3	3
5	22MT6312	Factory Automation	PEC	3	0	0	3	3
6	22MT7306	Automatic System	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	22MT5601	Sem 5: Basics of Mechatronics System	MDC	3	0	0	3	3
2	22MT6601	Sem 6: Sensors and Interfacing	MDC	3	0	0	3	3
3	22MT6602	Sem6: Hydraulics and Pneumatics	MDC	3	0	0	3	3
4	22MT7601	Sem 7: PLC and SCADA	MDC	3	0	0	3	3
5	22MT7602	Sem 7: Industrial Robotics	MDC	3	0	0	3	3
6	22MT8601	Sem 8: Design of Mechatronics System	MDC	3	0	0	3	3

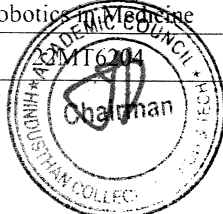
\*MDC – Minor Degree Course

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	Introduction to Business Venture	Sustainable Agriculture and Environmental Management
Banking, Financial Services and Insurance	Team Building & Leadership Management for Business	Sustainable Bio Materials
Introduction to Blockchain and its Applications	Creativity & Innovation in Entrepreneurship	Materials for Energy Sustainability
Fintech Personal Finance and Payments	Principles of Marketing Management for Business	Green Technology
Introduction to Fintech	Human Resource Management for Entrepreneurs	Environmental Quality Monitoring and Analysis
	Financing New Business Ventures	

### VERTICALS FOR HONOURS DEGREE

Vertical I Industrial Automation	Vertical II Medical Mechatronics	Vertical III Applied Robotics
22MT5203 Concepts of Machines and Mechanisms	22MT5204 Robotics in Medicine	22MT5205 Robots and Systems in Smart Manufacturing
22MT6202	22MT6204	22MT6206



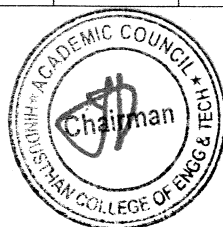
Drives and Actuators for Automation	Brain Computer Interface and its Applications	Medical Robotics
22MT6203 Power Electronics	22MT6205 Digital Image Processing	22MT6207 Agricultural Robotics and Automation
22MT7203 Advanced PLC	22MT7205 Radiological Equipment	22MT7207 Collaborative Robotics
22MT7204 Distributed Control System	22MT7206 Biomaterials	22MT7208 Robot Operating Systems
22MT8201 HMI & SCADA	22MT8202 Bionics	22MT8203 Humanoid Robotics

### B.E (Hons) Mechatronics Engineering Specialization in Industrial Automation

S.No.	Course Code	Course Title	Category	Periods per Week				TCP	CIA	ESE	Total
				L	T	P	C				
1	22MT5203	Sem 5: Concepts of Machines and Mechanisms	PC	3	0	0	3	3	40	60	100
2	22MT6202	Sem 6: Drives and Actuators for Automation	PC	3	0	0	3	3	40	60	100
3	22MT6203	Sem 6: Power Electronics	PC	3	0	0	3	3	40	60	100
4	22MT7203	Sem 7: Advanced PLC	PC	3	0	0	3	3	40	60	100
5	22MT7204	Sem 7: Distributed Control System	PC	3	0	0	3	3	40	60	100
6	22MT8201	Sem 8: HMI & SCADA	PC	3	0	0	3	3	40	60	100

### B.E (Hons) Mechatronics Engineering Specialization in Medical Mechatronics

S.No.	Course Code	Course Title	Category	Periods per Week				TCP	CIA	ESE	Total
				L	T	P	C				
1.	22MT5204	Sem 5: Robotics in Medicine	PC	3	0	0	3	3	40	60	100
2.	22MT6204	Sem 6: Brain Computer Interface and its Applications	PC	3	0	0	3	3	40	60	100
3.	22MT6205	Sem 6: Digital Image Processing	PC	3	0	0	3	3	40	60	100
4.	22MT7205	Sem 7: Radiological Equipments	PC	3	0	0	3	3	40	60	100
5.	22MT7206	Sem 7: Biomaterials	PC	3	0	0	3	3	40	60	100
6.	22MT8202	Sem 8: Bionics	PC	3	0	0	3	3	40	60	100



**B.E (Hons) Mechatronics Engineering with Specialization in Applied Robotics**

S.No.	Course Code	Course Title	Category	Periods per Week				TCP	CIA	ESE	Total
				L	T	P	C				
1.	22MT5205	Sem 5: Robots and Systems in Smart Manufacturing	PC	3	0	0	3	3	40	60	100
2.	22MT6206	Sem 6: Medical Robotics	PC	3	0	0	3	3	40	60	100
3.	22MT6207	Sem 6: Agricultural Robotics and Automation	PC	3	0	0	3	3	40	60	100
4.	22MT7207	Sem 7: Collaborative Robotics	PC	3	0	0	3	3	40	60	100
5.	22MT7208	Sem 7: Robot Operating Systems	PC	3	0	0	3	3	40	60	100
6.	22MT8203	Sem 8: Humanoid Robotics	PC	3	0	0	3	3	40	60	100


Note: Each programme should provide verticals for Honours degree

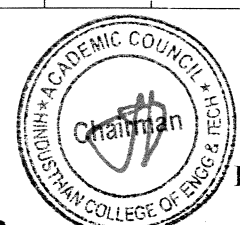
**SEMESTER-WISE CREDIT DISTRIBUTION**

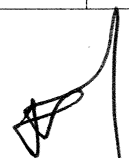
B.E. / B.TECH. PROGRAMMES										
S.No.	Course Area	Credits per Semester								Total Credits
		I	II	III	IV	V	VI	VII	VIII	
1	HSC	3	3	-	2	-	3	-	-	11
2	BSC	7	9	4	-	-	-	-	-	20
3	ESC	6	4	5	-	-	-	-	-	15
4	PCC	-	3	13	20	12	7	9	-	64
5	PEC	-	-	-	-	9	9	-	-	18
6	OEC	-	-	-	-	-	3	9	-	12
7	EEC	3	3	3	1	1	2	2	10	25
8	MCC		✓	✓	✓					
<b>Total</b>		<b>19</b>	<b>22</b>	<b>25</b>	<b>23</b>	<b>22</b>	<b>24</b>	<b>20</b>	<b>10</b>	<b>165</b>


**CREDIT DISTRIBUTION R2022**

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

  
 Chairman BoS  
 Chairman - BOS  
 MCT - HiCET

  
 Chairman

  
 Dean Academics  
 Dean (Academics)  
 HiCET

  
 Principal



Programme	Course Code	Name of the Course	L	T	P	C
B.E	22MA3105	FOURIER SERIES AND TRANSFORMS (MECT, MECH)	3	1	0	4

The learner should be able to

- Course Objective
- Analyze Fourier series which is central to many applications in engineering.
  - Apply the effective tools for the solutions of one dimensional boundary value problems.
  - Apply the effective tools for the solutions of two dimensional heat equations.
  - Apply Fourier transform techniques in various situations.
  - Analyze Z transform techniques for discrete time systems

Unit	Description	Instructional Hours
	<b>FOURIER SERIES</b>	
I	Dirichlet's conditions- General Fourier Series – Odd and Even Functions – Half range sine and cosine series – Change of Interval - Parseval's Identity - Harmonic analysis.	12
	<b>BOUNDARY VALUE PROBLEMS</b>	
II	Classification of PDE - Solutions of one-dimensional wave equation - One dimensional equation of heat conduction (excluding insulated edges).	12
	<b>TWO DIMENSIONAL HEAT EQUATIONS</b>	
III	General and Steady state solution of two-dimensional equation of heat conduction in infinite plate and semicircular plate.	12
	<b>FOURIER TRANSFORMS</b>	
IV	Fourier Transform Pairs - Fourier sine and cosine transforms – Properties - Transforms of Simple functions – Convolution Theorem (Statement only) – Parseval's identity(Statement only).	12
	<b>Z - TRANSFORMS AND DIFFERENCE EQUATIONS</b>	
V	Z- Transforms - Elementary properties – Inverse Z - transform (using partial fraction and residues) – Convolution theorem (excluding proof)– Solution of difference equations using Z – transform.	12
<b>Total Instructional Hours</b>		<b>60</b>

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

- Course Outcome
- CO1: Understand the principles of Fourier series which helps them to solve physical problems of engineering.  
CO2: Employ Fourier series in solving the boundary value problems.  
CO3: Understand Fourier series in solving the two-dimensional heat equations.  
CO4: Apply Fourier transform techniques which extend its applications.  
CO5: Illustrate the Z- transforms for analyzing discrete-time signals and systems.

**TEXT BOOKS:**

- T1 - Erwin Kreyszig, "Advanced Engineering Mathematics", 10<sup>th</sup> Edition, Wiley India Private Ltd., New Delhi, 2018  
T2 - Bali. N.P and Manish Goyal & Watkins, "Advanced Engineering Mathematics", 7th Edition, Laxmi Publications Pvt Ltd, 2007

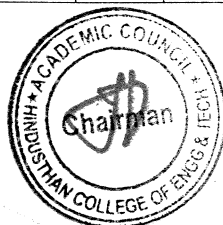
**REFERENCE BOOKS:**

- R1 - Veera Rajan. T., "Transforms and Partial Differential Equations", Tata McGraw Hill Education Pvt. Ltd., Second reprint, New Delhi, 2012.  
R2 - Grewal B.S., "Higher Engineering Mathematics", 44th Edition, Khanna Publishers, Delhi, 2018.  
R3 - Ramana. B.V., "Higher Engineering Mathematics", Tata McGraw Hill Publishing Company Limited, New Delhi, 2018.

PO& PSO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	2	3	1	2	-	-	-	-	-	-	2	3	2
CO2	3	3	3	2	1	-	-	-	-	-	-	3	2	2
CO3	3	3	3	1	1	-	-	-	-	-	-	2	2	2
CO4	3	3	3	3	3	-	-	-	-	-	-	2	2	2
CO5	3	3	3	3	3	-	-	-	-	-	-	2	2	2
Avg	3	2.8	3	2	2	-	-	-	-	-	-	2.2	2.2	2

CHAIRMAN, BOARD OF STUDIES

Chairman - BoS  
MCT - HiCET



DEAN ACADEMICS  
Dean (Academics)  
HiCET

Programme	Course code	Name of the course	L	T	P	C
B.E	22MT3201	INDUSTRIAL MOTOR CONTROL	3	0	0	3

The student should be made

- Course Objective**
- To identify the control circuit components used in electrical circuit
  - To illustrate the basic control circuits for industrial motors
  - To select the suitable starting and braking methods for electrical machines
  - To study the principle and construction of different Motors.
  - To impart knowledge on operation, switching techniques and basics topologies for power electronics

Unit	Description	Instructional Hours
<b>BASIC CONTROL CIRCUIT COMPONENTS</b>		
I	General Principles of Motor Control - Symbols and Schematic Diagrams – Manual Starters, AC starters and DC starters (2 point 3 point) - overload relays - Relays, Contactors- Basic Control Circuits components and switches.	9
<b>BASIC CONTROL CIRCUITS</b>		
II	START - STOP Push Button Control - Multiple Push Button Stations – Forward - Reverse Control - Jogging and Inching - Timing Relays - Sequence Control	9
<b>STARTING AND BRAKING METHODS</b>		
III	DOL Starter - Automatic Auto Transformer Starter, Star/Delta Starter (Semi-Automatic and Automatic) Three Step Rotor Resistance Starter - Plugging - Dynamic Braking	9
<b>DC AND AC MOTORS</b>		
IV	DC shunt Motor, Dc series motor, Single phase Induction motor, Three phase Induction Motor, Construction and operation of synchronous motor, AC servomotor, Linear induction motor and stepper motors - Case Studies : Under water Motor Application	9
<b>POWER ELECTRONICS APPLICATIONS</b>		
V	Half bridge and Full bridge: Single phase and Three phase converter - Choppers types - Serial and Parallel Inverter - Single phase and Three phase cyclo converters – Applications - Induction heating, UPS.	9
<b>Total Instructional Hours</b>		<b>45</b>

- Course Outcome**
- CO1 Recognize the control circuit components used in electrical wiring
  - CO2 Apply the control circuits in industrial motor control
  - CO3 sketch the control circuits for Starting and Braking Methods
  - CO4 Understand the basic operation of Motors and can select special motors for different purpose.
  - CO5 Ability to choose the converters and inverters for real time applications

**TEXT BOOK:**

- T1 Stephen L. Herman, "Understanding Motor Controls" Third Edition. Cengage Learning, 2017.
- T2 M.H. Rashid, "Power Electronics: Circuits, Devices and Applications", Pearson Education, fourth Edition, New Delhi, 2014

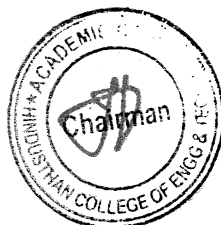
**REFERENCES:**

- R1 Stephen L. Herman, "Industrial Motor Control" Seventh Edition, Cengage Learning, 2013
- R2 Bhattacharya.S.K & Brijinder Singh, "Control of Electrical Machines", 2nd Edition. New Age International (P) Ltd., New Delhi, 2010.
- R3 M.D. Singh and K.B. Khanchandani, "Power Electronics," 2nd Edition Mc Graw Hill India, 2013.

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

*Reshmy*  
CHAIRMAN, BOARD OF STUDIES

**Chairman - BoS  
MCT - HiCET**



*[Signature]*  
DEAN ACADEMICS  
**Dean (Academics)  
HiCET**

Programme	Course code	Name of the course	L	T	P	C
B.E	22MT3202	SOLID AND FLUID MECHANICS	3	1	0	4

The student should be made

- Course Objective
- Describe the concepts of Forces, Equilibrium, Stress, Strain, Shear force, Bending moment and torsion.
  - Apply these concepts to simple problems in beams and Columns
  - Able to understand the fundamentals of fluid flow.
  - Able to understand the effects of fluid flow through pipes.
  - Able to understand the types of turbines and pumps.

Unit	Description	Instructional Hours
	<b>DEFORMATION OF SOLIDS AND BENDING OF BEAMS</b>	
	Concept of stress and strain – Normal and shear stresses – Simple and compound Stresses - Elasticity and elastic moduli – Poisson’s ratio – Types of loads, Supports & beams - Concept of Shear Force and Bending Moment – Shear force and Bending moment diagrams for simply supported and cantilever beams.	9+3
	<b>DEFLECTION OF BEAMS AND COLUMNS</b>	
	Double Integration method – Macaulay’s method for computation of slopes and deflections in beams - Short and long columns. Euler’s theory; Assumptions, Derivation for Euler’s Buckling load for different end conditions, Limitations of Euler’s theory. Rankine formula for columns.	9+3
	<b>FLUID PROPERTY AND FLOW CHARACTERISTICS</b>	
	Surface tension – Capillarity – Viscosity – Newton’s law – Fluid pressure and pressure head - Fluid velocity – Uniform and steady flow – Reynolds number - Classification as laminar and turbulent flow – Continuity equation.	9+
	<b>FLOW DYNAMICS AND MEASUREMENT IN PIPE NETWORKS</b>	
	Euler’s and Bernoulli’s Equations – Manometer, Venturi meter and orifice meter - Pressure losses along the flow – Categorisation into minor losses - Flow through circular pipes – Statement of Darcy – Weisbach equation – Friction factor – Pipes in series and parallel.	9+3
	<b>TURBINES AND PUMPS</b>	(9)
	Introduction and Classification of Turbines – Specific Speed – Turbine characteristics Speed Governance – Pumps - Centrifugal Pumps – Impeller Blade Profiles – Pump characteristics - Efficiency – Reciprocating Pumps – Classification.	9+3
	<b>Total Instructional Hours</b>	<b>60</b>
	CO1 Outline the fundamental concepts of deformation of solids and its effects on beams. (Apply)	
	CO2 Determine the effects of shear stresses on beams and effect of load on columns.	

Course (Apply)

- Outcome
- CO3 Explain the fundamental concepts of fluid property and basic equations. (Understand)
  - CO4 Describe the effects of fluid flow inside the pipes. (Understand)
  - CO5 Explain the types of turbines and pumps and calculating the efficiency (Apply)

**TEXT BOOK:**

- T1 R.K., Bansal, A text book on Fluid Mechanics & Hydraulic Mechanics,- M/s. Laxmi Publications (P) Ltd, 2010.
- T2 Er. R K Rajput, A Textbook of Strength of Materials (Mechanics of Solids) SI Units, S Chand Publishing,2018

**REFERENCES:**

- R1 Prof K. L. Kumar, 'Engineering Fluid Mechanics' SI units, S. Chand & Company Ltd, 2009.
- R2 Dr.R.K. Bansal, Strength of Materials, M/s. Laxmi Publications (P) Ltd, 2018.

PO& PSO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	1	2	3	3	1	1			1				1	
CO2	2	2	2	3	1								1	
CO3	2	2		2				1					1	
CO4	1	1		1				1					1	
CO5	1	2				1		2					1	
Avg	1.4	1.8	2.5	2.25	1	1		1.33	1				1	

CHAIRMAN, BOARD OF STUDIES

Chairman - BoS  
MCT - HiCET



DEAN ACADEMICS

Dean (Academics)  
HiCET

Programme	Course code	Name of the course	L	T	P	C
B.E	22MT3203	DIGITRONICS	3	1	0	4

The student should be made

- Course Objective**
- 1 To impart knowledge about the fundamentals of logic gates and boolean algebra
  - 2 To learn various combinational and sequential circuits
  - 3 To describe various flip-flops used in sequential circuits
  - 4 To familiarize the basics of synchronous and asynchronous circuits
  - 5 To introduce digital concepts in mechatronics applications

Unit	Description	Instructional Hours
	<b>LOGIC GATES AND MINIMIZATION TECHNIQUES</b>	
I	Minimization Techniques: Boolean Algebra - Simplification of Boolean Functions - Minterm - Maxterm - Sum of Product - Product of Sum - Karnaugh Map - Quine McClusky Method. Logic Gates: Logic Functions using Gates - NAND - NOR Implementations - Multi Level Gate Implementations - Multi Output Gate Implementations	9+3
	<b>COMBINATIONAL CIRCUITS</b>	
II	Half and Full Adders - Half and Full Subtractors - Code Converters - Encoder - Decoder - Multiplexer - Demultiplexer - Carry Look Ahead Adder - Magnitude Comparator.	9+3
	<b>SEQUENTIAL CIRCUITS</b>	
III	Latches - Flip-Flops SR, JK, D, T, and Master - Slave. Asynchronous & Synchronous Up/Down Counters. Design of Synchronous Counters: State Diagram - State Table - State Minimization - State Assignment - Excitation Table and Maps - Modulo-n Counter.	9+3
	<b>MEMORY DEVICES</b>	
IV	Classifications of Memories - ROM Organization - RAM Organization. Programmable Logic Devices - Programmable Logic Array (PLA) - Programmable Array Logic (PAL) - Field Programmable Gate Arrays (FPGA).	9+3
	<b>APPLICATIONS</b>	
V	Digital Electronics on Engine Management - FADEC. Industrial Automation - Process Monitoring and Control - Distributed Control Systems in Robotics - 3C - Communications, Command and Control - Automotive Industry - Electronic Control Unit.	9+3
	<b>Total Instructional Hours</b>	<b>60</b>

- Course Outcome**
- CO1 Design logic circuits and to evaluate its function realizations using gates
  - CO2 Develop combinational and sequential circuit systems using flip flops
  - CO3 Apply the minimization techniques in sequential circuits
  - CO4 Compare various programmable logic devices and its functions
  - CO5 Enumerate the applications of digital electronics in various fields

**TEXT BOOK:**

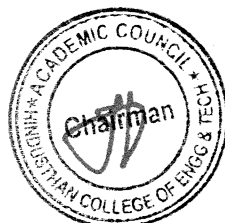
- T1 M. Morris Mano, Michel D. Ciletti, "Digital Design", 5<sup>th</sup> Edition, Pearson Education, New Delhi, 2012.  
T2 John.M Yarbrough, "Digital Logic Applications and Design", 1<sup>st</sup> Edition, Thomson Learning, 2002.

**REFERENCES:**

- R1 John F.Wakerly, "Digital Design", 4th Edition, PHI Learning Private Limited, New Delhi, 2006.  
R2 Thomas L. Floyd, "Digital Fundamentals", 8<sup>th</sup> Edition, PHI Learning Private Limited, New Delhi, 2003  
R3 Charles H.Roth. "Fundamentals of Logic Design", 7th Edition, Thomson Learning, 2003.

PO& PSO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	3	3	3		3			2	3		3	3	3
CO2	3	3	3	3		3			2	3		3	3	3
CO3	3	3	3	3		3			2	3		3	3	3
CO4	3	3	3	3		3			2	3		3	3	3
CO5	3	3	3	3	3	3	3	2	3	3	3	3	2	3
Avg	3	3	3	3	3	3	3	2	2.2	2.8	3	3	3	3

*P. Somay*  
**CHAIRMAN, BOARD OF STUDIES**  
**Chairman - BoS**  
**MCT - HiCET**



*[Signature]*  
**DEAN ACADEMICS**  
**Dean (Academics)**  
**HiCET**

Programme	Course code	Name of the course	L	T	P	C
B.E	22MT3251	MANUFACTURING PROCESS	2	0	2	3

**The student should be made**

- Course Objective**
- To develop the knowledge about the casting and molding process
  - To list the fundamentals and various methods of manufacturing process
  - To choose the suitable welding process for manufacturability
  - To identify the different forming operations
  - To identify the finishing and Machining Process

Unit	Description	Instructional Hours
<b>CASTING</b>		
I	Patterns - Cores - Moulding - Green Sand Moulding - Special Casting Process, Shell Mould Casting - Investment Casting - Centrifugal Casting - Casting Defects.	9
<b>MACHINING</b>		
II	Lathe Machine - Lathe Operations - Drilling Machines - Reaming and Tapping Operations - Shaper - Milling Machine. <b>Experimental Components: Lathe - Facing, Step Turning and Taper Turning</b>	6+4
<b>WELDING</b>		
III	Arc Welding - Gas Welding - Thermit Welding - Friction Welding - TIG & MIG Welding - Welding Defects. <b>Experimental Components: Lathe - Grooving, Thread Cutting and Knurling</b>	6+2
<b>FORMING</b>		
IV	Rolling Operations - Forging Operations - Extrusion and Types - Piercing - Punching - Trimming. <b>Experimental Components: Drilling, Tapping and Reaming</b>	6+2
<b>FINISHING OPERATIONS &amp; CASE STUDIES</b>		
V	Grinding - Lapping - Honing - Broaching - Case Study 1: Manufacturing the Agricultural Farm Equipments - Case Study 2: Erection of Boilers - Case Study 3: Manufacturing the Sports Equipments and Products. <b>Experimental Components: Surface Grinding and Slot Cutting</b>	6+4
<b>Total Instructional Hours</b>		<b>30+15</b>

Course Outcome	CO1	CO2	CO3	CO4	CO5
	Choose the suitable casting process based on the product requirements	Justify the most appropriate manufacturing process and material for a given product	Interpret the different welding processes used in manufacturing	Design the process parameters for rolling and sheet metal operations	Perform a variety of Unconventional Machining Operations on manufacturing products

**TEXT BOOK:**

- T1 Kalpak Jain, "Manufacturing Engineering and Technology", 4<sup>th</sup> Edition, Addison Wesley Congmen Pvt. Ltd., Singapore, 2013.
- T2 Jain.R.K, "Production Technology: Manufacturing Processes, Technology and Automation", 17<sup>th</sup> Edition, Khanna Publishers, New Delhi, 2011..

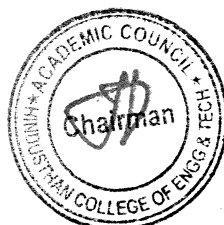
**REFERENCES:**

- R1 Hajra Choudhury, "Elements of Workshop Technology", Vol - I and II, 3<sup>rd</sup> Edition, Media Promoters and Publishers Pvt. Ltd., Mumbai, 2012
- R2 Sharma.P.C, "Production Technology: Manufacturing Processes", 7<sup>th</sup> Edition, S. Chand and Company Ltd., New Delhi, 2008
- R3 Chapman.W.A.J, "Workshop Technology Vol. I and II", 6<sup>th</sup> Edition, Arnold Publisher, New Delhi, 2006.

PO& PSO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	3	3	2	3	2	2	1	2	2		1	1	1
CO2	3	2	2	2	3	2	2	1	2	2	1	1	1	1
CO3	3	2	2	1	2	2	2	1	2	2		1		1
CO4	3	2	2	1	2	2	2		1			1	1	1
CO5	3	2	2	2	2	2	2		2	2	2	1	1	3
Avg	3	2.2	2.2	1.6	2.4	2	2	1	1.8	2	1.5	1	1	1.4

*Perthony*  
CHAIRMAN, BOARD OF STUDIES

Chairman - BoS  
MCT - HICET



*[Signature]*  
DEAN ACADEMICS

Dean (Academics)  
HICET

Programme Course code Name of the course L T P C  
 B.E 22MT3001 INDUSTRIAL MOTOR CONTROL LABORATORY 0 0 4 2

- The student should be made**
- Course Objective**
- 1 To provide hands-on training for starters of electrical motors
  - 2 To impart knowledge on control circuits for jogging and reversing operations
  - 3 To understand solid state devices by conducting experiments
  - 4 To impart knowledge to conduct load test on D.C Machines
  - 5 Exposed to the Load Test on Single and Three Phase Induction Motor

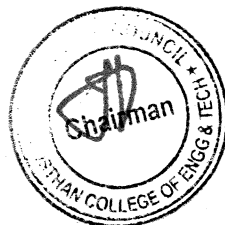
Unit	Description	Instructional Hours
1.	Starting and control of motor by DOL Starter method.	3
2	Wire and Test the Control Circuit for Semi-automatic and Automatic Star-Delta Starter	3
3	Wire and Test the Control Circuit for Jogging in Cage Motor and Single-Phase Preventer.	3
4	Study the effect of Forward and Reverse Operations control in cage motors.	3
5	Study of SCR characteristics	3
6	Study of MOSFET characteristics	3
7	Study of IGBT characteristics	3
8	Design and Implementation of Full Wave and Half Wave Rectifier using Diode	3
9	Load Test on D.C. Shunt Motor.	3
10	Load Test on D.C. Series Motor	3
11	Load Test on Single Phase Induction Motor.	3
12	Load Test on Three phase Induction Motor.	3
<b>Total Instructional Hours</b>		<b>45</b>

- Course Outcome**
- CO1 Explain the various types of starters using contactors and relays  
 CO2 Develop the control circuits for jogging and reversing operations  
 CO3 Analyse solid state switches  
 CO4 Validate suitable test to compute the characteristics of DC motors  
 CO5 Apply the principle and to conduct load test on Induction Motor

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

*P. Prasad*  
 CHAIRMAN, BOARD OF STUDIES

**Chairman - BoS  
 MCT - HiCET**



*[Signature]*  
 DEAN ACADEMICS  
 Dean (Academics)  
 HiCET

Programme	Course code	Name of the course	L	T	P	C
B.E	22MT3002	SOLID AND FLUID MECHANICS & MACHINERY LABORATORY	0	0	4	2

**The student should be made**

- Course Objective**
- 1 To demonstrate various performance tests on engineering materials
  - 2 To provide knowledge on deflection test on materials
  - 3 To impart knowledge of various flow meters and the concept of fluid mechanics
  - 4 To obtain knowledge on the performance characteristics of pump
  - 5 To impart knowledge of Kaplan turbine

Unit	Description	Instructional Hours
1	Tension test on a Mild Steel Rod	3
2	Torsion test on a Mild Steel Rod	3
3	Deflection test on Beams	3
4	Compression test on Helical Springs	3
5	Impact test on Mild Steel Rod (Izod )	3
6	Impact test on Mild Steel Rod (charpy)	3
7	Hardness test on Metals by Brinell	3
8	Hardness test on Metals by Rockwell Hardness	3
9	Determination of Coefficient of Discharge by Venturimeter	3
10	Experimental and Verification of Bernoulli's Equation.	3
11	Conducting the experiments and drawing the characteristic curves of Centrifugal Pump	3
12	Conducting the experiments and drawing the characteristic curves of Kaplan Turbine	3
<b>Total Instructional Hours</b>		<b>45</b>
<b>Course Outcome</b>		
CO1	Evaluate the different types of mechanical properties of engineering materials	
CO2	Calculate the different stresses and strain of engineering materials	
CO3	Apply the concepts of fluid energy in fluid flow applications	
CO4	Calculate the performance characteristics pump	
CO5	Apply the measurement equipment for flow in turbine	

PO& PSO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	1	2	3	2	1	1	2		1		1	1	1
CO2	2	3	3	2	2	2	1	1		1		1	2	1
CO3	2	3	2	2	2	3	1			1		1	1	1
CO4	2	3	3	3	2	2	1	1		1		1	1	2
CO5	3	1	1	1				1		1		1	1	
Avg	2.4	2.8	2.2	2.2	1.6	1.6	1	1		1		1	1.2	1

*P. S. Murthy*  
**CHAIRMAN, BOARD OF STUDIES**  
**Chairman - BoS**  
**MCT - HICET**



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

Programme	Course Code	Course Title	L	T	P	C
BE	22HE3071	Soft Skills and Aptitude - II	0	0	0	1

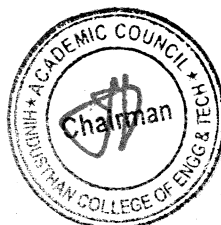
- Course Objectives:
1. Solve Logical Reasoning questions of easy to intermediate level
  2. Solve Quantitative Aptitude questions of easy to intermediate level
  3. Solve Verbal Ability questions of easy to intermediate level
  4. Display good writing skills while dealing with essays

Unit	Description	Instructional Hours
	<b>Logical Reasoning</b>	
I	Clocks - Calendars - Direction Sense - Cubes - Data Interpretation: Tables, Pie Chart, Bar Graph - Data Sufficiency	9
	<b>Quantitative Aptitude</b>	
II	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
	<b>Verbal Ability</b>	
III	Sentence Correction: Subject-Verb Agreement, Modifiers, Parallelism, Pronoun-Antecedent Agreement, Verb Time Sequences, Comparisons, Prepositions, Determiners - Sentence Completion and Para-jumbles: Pro-active thinking, Reactive thinking (signpost words, root words, prefix suffix, sentence structure clues), Fixed jumbles, Anchored jumbles.	7
IV	<b>Writing skills for placements</b> Essay writing: Idea generation for topics, Best practices, Practice and feedback	2
	<b>Total Instructional Hours</b>	30

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

*P. S. Sanyal*  
CHAIRMAN, BOARD OF STUDIES

**Chairman - BoS  
MCT - HICET**



*[Signature]*  
DEAN ACADEMICS

**Dean (Academics)  
HICET**



Programme	Course code	Name of the course	L	T	P	C
B.E	22MT3072	HOME AUTOMATION	0	0	4	2

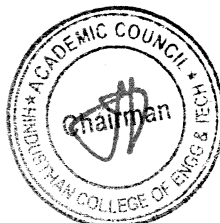
- The student should be made**
- Course Objective**
- 1 To familiarize the basic introduction of automation process
  - 2 To impart knowledge on basics communication system
  - 3 To study the basic programming knowledge in automation
  - 4 To impart knowledge on developing experimental model in automation
  - 5 To prepare the product ideas from the real time problems

Unit	Description	Instructional Hours
1	Study of different types of Sensors and Actuators	3
2	Study of various Controllers	3
3	Study of Data Acquisition System	3
4	Study of Communication Protocols	3
5	LED Blink Using Arduino	3
6	Arduino based Light control with LDR Sensor	3
7	FAN ON/OFF control using PIR sensor	3
8	Speed control of a FAN with a analog sensor	3
9	Security control with biometric sensor	3
10	Floor cleaning BOT	3
11	Gas Leakage Indication system	3
12	Tank Level control	3
<b>Total Instructional Hours</b>		<b>45</b>

- Course Outcome**
- CO1 To identify suitable automation process
- CO2 To use appropriate communication protocols
- CO3 To apply the programming knowledge in automation
- CO4 To developing experimental model in automation
- CO5 To use appropriate semiconductor devices for applications

PO& PSO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3				3	2		2	2	2	2	2	3	2
CO2	3	3	3	3	3	2		2	2	2	2	2	3	3
CO3	3	2	3	3	3	2		2	2	2	2	2	3	3
CO4	3	3	3	3	3	2		2	2	2	2	2	3	3
CO5	3	3	3	3	3	2		2	2	2	2	2	3	3
Avg	3	2.75	3	3	3	2		2	2	2	2	2	3	2.8

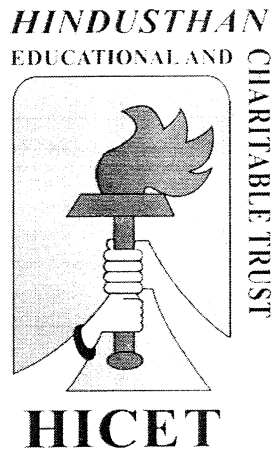
*Devi*  
 CHAIRMAN, BOARD OF STUDIES  
**Chairman - BoS**  
**MCT - HiCET**



*[Signature]*  
 DEAN ACADEMICS  
**Dean (Academics)**  
**HiCET**

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

**B.E. MECHATRONICS ENGINEERING**

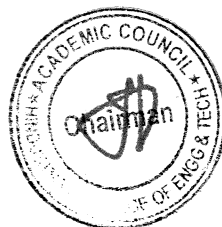


**CHOICE BASED CREDIT SYSTEM**

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

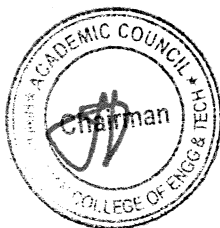
**Academic year 2023-24**

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



# **CURRICULUM**

## **R2019**



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

**CBCS PATTERN**

**UNDERGRADUATE PROGRAMMES**

**B.E. MECHATRONICS ENGINEERING(UG)**

**REGULATION-2019**

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

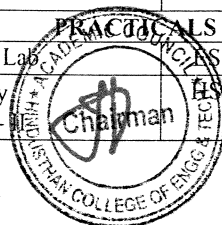
The course code 21 indicates that the students joined in the academic year 2021

**SEMESTER I**

S.No.	Course Code	Course Title	Type	L	T	P	C	CIA	ESE	TOTAL
<b>THEORY</b>										
1.	21HE1101	Technical English	HS	2	1	0	3	40	60	100
2.	21MA1102	Calculus and Linear Algebra	BS	3	1	0	4	40	60	100
<b>THEORY &amp; LAB COMPONENT</b>										
3.	21PH1151	Applied Physics	BS	2	0	2	3	50	50	100
4.	21CY1151	Chemistry for Engineers	BS	2	0	2	3	50	50	100
5.	21CS1151	Python Programming and Practices	ES	2	0	2	3	50	50	100
6.	21ME1152	Engineering Drawing	ES	1	0	4	3	50	50	100
7.	21HE1701	Language Competency Enhancement Course - I	HS	0	0	2	1	100	0	100
8.	21HE1072	Career Guidance – Level I Personality, Aptitude and Career Development	EEC	2	0	0	0	100	0	100
9.	21HE1073	Entrepreneurship & Innovation	EEC	1	0	0	0	100	0	100
<b>Total:</b>				<b>15</b>	<b>2</b>	<b>11</b>	<b>20</b>	<b>550</b>	<b>350</b>	<b>900</b>
As Per AICTE Norms 3 Weeks Induction Programme is Added in The First Semester as an Audit Course										

**SEMESTER II**

S.No.	Course Code	Course Title	Type	L	T	P	C	CIA	ESE	TOTAL
<b>THEORY</b>										
1.	21HE2101	Business English for Engineers	HS	2	1	0	3	40	60	100
2.	21MA2101	Differential Equations and Complex Variables	BS	3	1	0	4	40	60	100
3.	21ME2101	Engineering Mechanics	ES	3	0	0	3	40	60	100
<b>THEORY &amp; LAB COMPONENT</b>										
4.	21PH2151	Material Science	BS	2	0	2	3	50	50	100
5.	21CY2151	Environmental Studies	BS	2	0	2	3	50	50	100
6.	21MT2153	Basics of Mechatronics Engineering	ES	2	0	2	3	50	50	100
7.	21GE2001	Engineering Practices Lab	ES	0	0	4	2	60	40	100
8.	21HE2701	Language Competency Enhancement Course - II	HS	0	0	1	1	100	0	100



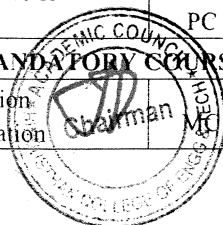
MANDATORY COURSES										
9.	21HE2072	Career Guidance Level – II Personality, Aptitude and Career Development	EEC	2	0	0	0	100	0	100
<b>Total:</b>				<b>16</b>	<b>2</b>	<b>11</b>	<b>22</b>	<b>475</b>	<b>425</b>	<b>900</b>

#### SEMESTER III

S.No	Course Code	Course Title	Type	L	T	P	C	CIA	ESE	TOTAL
<b>THEORY</b>										
1.	21MA3101	Fourier Series and Statistics	BS	3	1	0	4	40	60	100
2.	21MT3201	Mechanics of solids	PC	3	1	0	4	40	60	100
3.	21MT3202	Industrial Motor Control	PC	3	0	0	3	40	60	100
4.	21MT3203	Digital Electronics in Mechatronics Systems	PC	3	0	0	3	40	60	100
<b>THEORY AND LAB COMPONENT</b>										
5.	21MT3251	Production Technology	PC	2	0	2	3	50	50	100
<b>PRACTICALS</b>										
6.	21MT3001	Computer Aided Drafting Laboratory	PC	0	0	3	1.5	60	40	100
7.	21MT3002	Industrial Motor Control Laboratory	PC	0	0	3	1.5	60	40	100
<b>MANDATORY COURSES</b>										
8.	21MC3191	Indian Constitution	MC	2	0	0	0	100	0	100
9.	21HE3072	Career Guidance Level – III Personality, Aptitude and Career Development	EEC	2	0	0	0	100	0	100
10.	21HE3073	Leadership Management Skills	EEC	1	0	0	0	100	0	100
<b>Total</b>				<b>19</b>	<b>2</b>	<b>8</b>	<b>20</b>	<b>630</b>	<b>370</b>	<b>1000</b>

#### SEMESTER IV

S.No	Course Code	Course Title	Type	L	T	P	C	CIA	ESE	TOTAL
<b>THEORY</b>										
1.	21MA4101	Numerical Methods	BS	3	1	0	4	40	60	100
2.	21MT4201	Microcomputer Systems and Microcontroller	PC	3	0	0	3	40	60	100
3.	21MT4202	Thermodynamics and Fluid Engineering	PC	3	1	0	4	40	60	100
4.	21MT4203	Theory of Machines	PC	3	1	0	4	40	60	100
<b>THEORY AND LAB COMPONENT</b>										
4.	21MT4251	Sensors and Signal Conditioning	PC	2	0	2	3	50	50	100
<b>PRACTICALS</b>										
6.	21MT4001	Assembly Programming and Interfacing Laboratory	PC	0	0	3	1.5	60	40	100
7.	21MT4002	Solid and Fluid Mechanics & Machinery Laboratory	PC	0	0	3	1.5	60	40	100
<b>MANDATORY COURSES</b>										
8.	21MC4191	Essence of Indian tradition knowledge/Value Education	MC	2	0	0	0	100	0	100



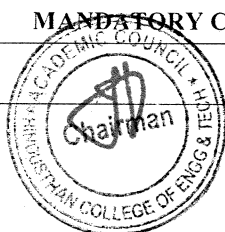
9.	21HE4072	Career Guidance Level – IV Personality, Aptitude and Career Development	EEC	2	0	0	0	100	0	100
10.	21HE4073	Ideation Skills	EEC	2	0	0	0	100	0	100
<b>Total</b>				<b>20</b>	<b>2</b>	<b>10</b>	<b>21</b>	<b>630</b>	<b>370</b>	<b>1000</b>

#### SEMESTER V

S. No	Course Code	Course Title	Category	L	T	P	C	CIA	ESE	Total
1.	21MT5201	Machine Design	PC	3	1	0	4	40	60	100
2.	21MT5202	Industrial Automation and Control	PC	3	0	0	3	40	60	100
3.	21MT5203	Control of Mechatronics Systems	PC	3	0	0	3	40	60	100
4.	21MT53XX	Professional Elective - I	PE	3	0	0	3	40	60	100
<b>THEORY WITH LAB COMPONENT</b>										
7.	21MT5251	Fluid Power Systems	PC	2	0	2	3	50	50	100
8.	21MT5252	Object Oriented Programming	PC	2	0	2	3	50	50	100
<b>PRACTICALS</b>										
9.	21MT5001	Computer Aided Machine Drawing Laboratory	PC	0	0	3	1.5	60	40	100
10.	21MT5002	Industrial Automation and Control Laboratory - I	PC	0	0	3	1.5	60	40	100
<b>MANDATORY COURSES</b>										
11.	21HE5071	Soft Skills - I	EEC	1	0	0	1	100	0	100
12.	21HE5072	Design Thinking	EEC	1	0	0	1	100	0	100
<b>TOTAL</b>				<b>18</b>	<b>1</b>	<b>10</b>	<b>24</b>	<b>580</b>	<b>420</b>	<b>1000</b>

#### SEMESTER VI

S. No	Course Code	Course Title	Category	L	T	P	C	CIA	ESE	Total
<b>THEORY</b>										
1.	21MT6181	Total Quality Management	HS	3	0	0	3	40	60	100
2.	21MT6201	Design of Mechatronics Systems	PC	3	0	0	3	40	60	100
3.	21MT6202	CNC Technology	PC	3	0	0	3	40	60	100
4.	21MT63XX	Professional Elective - II	PE	3	0	0	3	40	60	100
5.	21XX6401	Open Elective – I	OE	3	0	0	3	40	60	100
<b>THEORY WITH LAB COMPONENT</b>										
6.	21MT6251	Vetronics	PC	2	0	2	3	50	50	100
<b>PRACTICALS</b>										
7.	21MT6001	CNC Laboratory	PC	0	0	3	1.5	60	40	100
8.	21MT6002	Industrial Automation and Control Laboratory - II	PC	0	0	3	1.5	60	40	100
9.	21MT6701	Inplant Training / Internship *	EEC	0	0	0	1	60	40	100
<b>MANDATORY COURSES</b>										
10.	21HE6071	Soft Skill II	EEC	1	0	0	1	100	0	100



11.	21HE6072	Intellectual Property Rights (IPR)	EEC	1	0	0	1	100	0	100
			<b>TOTAL</b>	<b>16</b>	<b>0</b>	<b>8</b>	<b>24</b>	<b>630</b>	<b>470</b>	<b>1100</b>

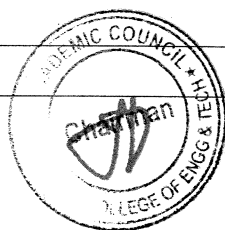
S.No.	Course Code	Course Title	Type	L	T	P	C	CIA	ESE	TOTAL
<b>PROFESSIONAL ELECTIVE I</b>										
1	21MT5301	Engineering Metrology and Measurements	PE	3	0	0	3	40	60	100
2	21MT5302	Non-Traditional Machining Techniques	PE	3	0	0	3	40	60	100
3	21MT5303	Automobile Systems	PE	3	0	0	3	40	60	100
4	21MT5304	Operational Research	PE	3	0	0	3	40	60	100
5	21MT5305	Materials Science and Applications	PE	3	0	0	3	40	60	100
<b>PROFESSIONAL ELECTIVE II</b>										
1	21MT6301	Embedded System	PE	3	0	0	3	40	60	100
2	21MT6302	Discrete Event System Simulation	PE	3	0	0	3	40	60	100
3	21MT6303	Product Design and Development	PE	3	0	0	3	40	60	100
4	21MT6304	Non-Destructive Testing Techniques	PE	3	0	0	3	40	60	100
5	21MT6305	Distinctive Electrical Machines	PE	3	0	0	3	40	60	100

#### OPEN ELECTIVE

S.No.	Course Code	Course Title	Type	L	T	P	C	CIA	ESE	TOTAL
1.	21MT6401	Industrial Safety and Environment	OE	3	0	0	3	40	60	100

#### SEMESTER VII

S. No	Course Code	Course Title	Category	L	T	P	C	CIA	ESE	Total
<b>THEORY</b>										
1.	21MT7201	Virtual Instrumentation and Human Machine Interface	PC	3	1	0	4	40	60	100
2.	21MT7202	Machine Vision Systems	PC	3	0	0	3	40	60	100
3.	21MT73XX	Professional Elective - III	PE	3	0	0	3	40	60	100
4.	21XX7401	Open Elective - II	OE	3	0	0	3	40	60	100
<b>THEORY WITH LAB COMPONENT</b>										
5.	21MT7251	Industrial Robotics	PC	2	0	3	3.5	50	50	100
<b>PRACTICALS</b>										
6.	21MT7001	CAE Laboratory	PC	0	0	3	1.5	60	40	100
<b>PROJECT WORK</b>										
7.	21MT7901	Project Phase - I	EEC	0	0	4	2	60	40	100
			<b>TOTAL</b>	<b>14</b>	<b>1</b>	<b>10</b>	<b>20</b>	<b>330</b>	<b>370</b>	<b>700</b>



**SEMESTER VIII**

S.No	Course Code	Course Title	Type	L	T	P	C	CIA	ESE	TOTAL
<b>THEORY</b>										
1.	21MT83XX	Professional Elective - IV	PE	3	0	0	3	40	60	100
2.	21MT83XX	Professional Elective - V	PE	3	0	0	3	40	60	100
<b>PRACTICAL</b>										
3.	21MT8901	Project Work -- Phase II	EEC	0	0	16	8	100	0	100
<b>TOTAL</b>				<b>6</b>	<b>0</b>	<b>16</b>	<b>14</b>	<b>180</b>	<b>120</b>	<b>300</b>

**PROFESSIONAL ELECTIVE III**

S.No.	Course Code	Course Title	Type	L	T	P	C	CIA	ESE	TOTAL
1.	21MT7301	Mobile Robotics	PE	3	0	0	3	40	60	100
2.	21MT7302	Textile Automation	PE	3	0	0	3	40	60	100
3.	21MT7303	Medical Mechatronics	PE	3	0	0	3	40	60	100
4.	21MT7304	Disaster Management	PE	3	0	0	3	40	60	100
5.	21MT7305	Factory Automation	PE	3	0	0	3	40	60	100

**PROFESSIONAL ELECTIVE IV**

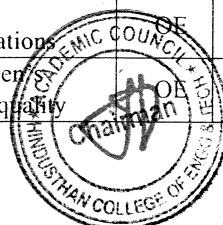
1.	21MT8301	Rapid Prototyping and Reverse Engineering	PE	3	0	0	3	40	60	100
2.	21MT8302	Industrial IoT	PE	3	0	0	3	40	60	100
3.	21MT8303	Artificial Intelligence for Mechatronics Engineering	PE	3	0	0	3	40	60	100
4.	21MT8304	MEMS and Nano Technology	PE	3	0	0	3	40	60	100
5.	21MT8305	Information System for Engineers	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.	21MT8306	Machineries in Agriculture	PE	3	0	0	3	40	60	100
2.	21MT8307	Industrial Diagnostics and Maintenance Techniques	PE	3	0	0	3	40	60	100
3.	21MT8308	Engineering Economics and Cost Analysis	PE	3	0	0	3	40	60	100
4.	21MT8181	Principles of Management	PE	3	0	0	3	40	60	100
5.	21MT8182	Professional Ethics in Engineering	PE	3	0	0	3	40	60	100

**LIST OF OPEN ELECTIVES – MECHATRONICS ENGINEERING**

S.No.	Course Code	Course Title	Type	L	T	P	C	CIA	ESE	TOTAL
1.	21MT6401	Industrial Safety and Environment	OE	3	0	0	3	40	60	100
<b>LIFE SKILL COURSES</b>										
1.	21LSZ401	General Studies for Competitive Examinations	OE	3	0	0	3	40	60	100
2.	21LSZ402	Human Rights, Women 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	CATE GORY	PERIODS PER WEEK			TOTAL CONTACT PERIODS	CREDITS
				L	T	P		
1.	21MT5601	Sem 5: Basics of Mechatronics System	MDC	3	0	0	3	3
2.	21MT6601	Sem 6: Sensors and Interfacing	MDC	3	0	0	3	3
3.	21MT6602	Sem6: Hydraulics and Pneumatics	MDC	3	0	0	3	3
4.	21MT7601	Sem 7: PLC and SCADA	MDC	3	0	0	3	3
5.	21MT7602	Sem 7: Industrial Robotics	MDC	3	0	0	3	3
6.	21MT8601	Sem 8: Design of Mechatronics System	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



### VERTICALS FOR HONOURS DEGREE

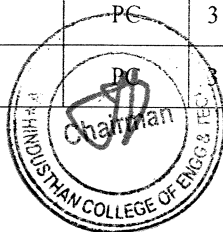
Vertical I Industrial Automation	Vertical II Medical Mechatronics	Vertical III Applied Robotics
21MT5204 Concepts of Machines and Mechanisms	21MT5205 Robotics in Medicine	21MT5206 Robots and Systems in Smart Manufacturing
21MT6203 Drives and Actuators for Automation	21MT6205 Brain Computer Interface and its Applications	21MT6207 Medical Robotics
21MT6204 Power Electronics	21MT6206 Digital Image Processing	21MT6208 Agricultural Robotics and Automation
21MT7203 Advanced PLC	21MT7205 Radiological Equipment	21MT7207 Collaborative Robotics
22MT7204 Distributed Control System	21MT7206 Biomaterials	21MT7208 Robot Operating Systems
22MT8201 HMI & SCADA	22MT8202 Bionics	22MT8203 Humanoid Robotics

### B Tech (Hons) Mechatronics Engineering Specialization in Industrial Automation

S.No.	Course Code	Course Title	Category	Periods per Week				TCP	CIA	ESE	Total
				L	T	P	C				
1	21MT5204	Sem 5: Concepts of Machines and Mechanisms	PC	3	0	0	3	3	40	60	100
2	21MT6203	Sem 6: Drives and Actuators for Automation	PC	3	0	0	3	3	40	60	100
3	21MT6204	Sem 6: Power Electronics	PC	3	0	0	3	3	40	60	100
4	21MT7203	Sem 7: Advanced PLC	PC	3	0	0	3	3	40	60	100
5	21MT7204	Sem 7: Distributed Control System	PC	3	0	0	3	3	40	60	100
6	21MT8201	Sem 8: HMI & SCADA	PC	3	0	0	3	3	40	60	100

### B Tech (Hons) Mechatronics Engineering Specialization in Medical Mechatronics

S.No.	Course Code	Course Title	Category	Periods per Week				TCP	CIA	ESE	Total
				L	T	P	C				
1.	21MT5205	Sem 5: Robotics in Medicine	PC	3	0	0	3	3	40	60	100
2.	21MT6205	Sem 6: Brain Computer Interface and its Applications	PC	3	0	0	3	3	40	60	100
3.	21MT6206	Sem 6: Digital Image Processing	PC	3	0	0	3	3	40	60	100
4.	21MT7205	Sem 7: Radiological Equipments	PC	3	0	0	3	3	40	60	100
5.	21MT7206	Sem 7: Biomaterials	PC	3	0	0	3	3	40	60	100
6.	21MT8202	Sem 8: Bionics	PC	3	0	0	3	3	40	60	100



**B Tech (Hons) Mechatronics Engineering with Specialization in Applied Robotics**

S.No.	Course Code	Course Title	Category	Periods per Week				TCP	CIA	ESE	Total
				L	T	P	C				
1.	21MT5206	Sem 5: Robots and Systems in Smart Manufacturing	PC	3	0	0	3	3	40	60	100
2.	21MT6207	Sem 6: Medical Robotics	PC	3	0	0	3	3	40	60	100
3.	21MT6208	Sem 6: Agricultural Robotics and Automation	PC	3	0	0	3	3	40	60	100
4.	21MT7207	Sem 7: Collaborative Robotics	PC	3	0	0	3	3	40	60	100
5.	21MT7208	Sem 7: Robot Operating Systems	PC	3	0	0	3	3	40	60	100
6.	21MT8203	Sem 8: Humanoid Robotics	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								
		I	II	III	IV	V	VI	VII	VIII	
1	HSC	4	4	-	-	-	3	-	-	11
2	BSC	10	10	4	4	-	-	-	-	28
3	ESC	3	8	-	-	-	-	-	-	11
4	PCC	-	-	16	17	19	12	12	-	76
5	PEC	-	-	-	-	3	3	3	6	15
6	OEC	-	-	-	-	-	3	3	-	6
7	EEC	3	-	-	-	2	3	2	8	18
8	MCC		✓	✓	✓					
Total		20	22	20	21	24	24	20	14	165

**CREDIT DISTRIBUTION R2019(BATCH 2021-2025)**

Semester	I	II	III	IV	V	VI	VII	VIII	Total
Credits	20	22	20	21	24	24	20	14	165

*P. Prasad*  
Chairman B0S  
**Chairman - B0S**  
**MCT - HiCET**



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

*[Signature]*  
Principal

Programme BE	Course Code 21MT5201	Name of the Course <b>MACHINE DESIGN</b> (Approved Design Data Book is Permitted)	L 3	T 1	P 0	C 4
-----------------	-------------------------	---	--------	--------	--------	--------

- Course Objective
1. To familiarize the fundamentals involved in design process
  2. To learn fundamental approaches to failure prevention for static and repeated loading
  3. To interpret the types of gears and principles of gear tooth action
  4. To learn the fundamentals of brakes and chain drives
  5. To impart the knowledge in selection of bearings and springs for different applications

Unit	Description	Instructional Hours
	<b>INTRODUCTION TO BEHAVIOR OF MATERIALS</b>	
I	Behavior of Materials - Optimum Design - Mechanical Properties of Materials - Types of Loads - Stresses - Static, Varying, Thermal, Impact and Residual - Factors of Safety - Theories of Failure - Stress Concentration Factors.	9+3
	<b>DESIGN OF SHAFTS AND WELDED JOINTS</b>	
II	Design of Solid and Hollow Shafts - Based on Strength, Rigidity and Deflection- Torsional Rigidity - Design of welding joints.	9+3
	<b>GEARS</b>	
III	Principles of Gear Tooth Action - Gear Correction - Gear Tooth Failure Modes - Stresses and Loads - Component Design of Spur, Helical and Bevel gears.	9+3
	<b>BRAKES AND CHAIN DRIVES</b>	
IV	Design of Brakes -Types - Band - Block - Chain Drives - Selection of Transmission Chains and Sprockets - Failure of Chain Drives-Design of Bolt - Design of Nuts.	9+3
	<b>BEARINGS AND SPRINGS</b>	
V	Design of Bearings - Sliding Contact - Rolling Contact - Design of Journal Bearings - Design of Springs - Types - Helical and Leaf.	9+3
		45+15=60

- Course Outcome
- On completion of the course the students will be able to
- CO1: Analyse the stress, strain and deflection in simple machine elements
  - CO2: Calculate safety factors of simple structures exposed to static and repeated loads
  - CO3: Determine the performance requirements in the selection of commercially available machine elements such as shaft, coupling, gears, bearings and springs etc.
  - CO4: Design and optimize the selection of brakes and clutches for automotive components and machine elements
  - CO5: Decide an appropriate failure model

#### TEXT BOOKS:

- T1- R.B.Patil, "Design of Machine Elements", 1<sup>st</sup> Edition, McMillan Publications, India, 2017.  
T2- S. Md. Jalaludeen, "Machine Design (Vol. I & II)", 4<sup>th</sup> Edition, Anuradha Publications, Chennai, 2014.

#### REFERENCE BOOKS:

- R1- V.B.Bhandari, "Design of Machine Elements", 3<sup>rd</sup> Edition, Tata McGraw Hill Publishing Company Limited, New Delhi, 2010.  
R2- PSG College of Technology, "Design Data Book of Engineers", Kalaikathir Achchagam, Coimbatore, 2018.  
R3- Maitra.G.M., and Prasad.LN., "Hand Book of Mechanical Design", 2<sup>nd</sup> Edition, Tata McGraw Hill Publishing Company Limited, New Delhi, 2005.  
R4- Sundararajamoorthy T. V. Shanmugam .N, "Machine Design", Anuradha Publications, Chennai, 2015.

CHAIRMAN, BOARD OF STUDIES

**Chairman - BoS**  
**MCT - HICET**



DEAN ACADEMICS  
**Dean (Academics)**  
**HICET**

Mapping of COs with POs and PSOs

CO/PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO-1	PSO-2
CO1	3	3	3	3	3	2	1	2				2	2	2
CO2	3	3	3	3	3	2	1	2				2	2	2
CO3	3	3	3	3	3	2	1	2				2	2	2
CO4	3	3	3	3	3	2	1	2				2	2	2
CO5	3	3	3	3	3	2	1	2				2	2	2
AVG	3	3	3	3	3	2	1	2	-	-	-	2	2	2

- 1-low, 2-medium, 3-high, '-'- no correlation
- Note: The average value of this course to be used for program articulation matrix.

*P. Prasad*

CHAIRMAN, BOARD OF STUDIES

**Chairman - BoS  
MCT - HiCET**



*[Handwritten Signature]*

DEAN ACADEMICS

**Dean (Academics)  
HiCET**

THEORY COURSES

Programme	Course Code	Name of the Course	L	T	P	C
BE	21MT5202	INDUSTRIAL AUTOMATION AND CONTROL	3	0	0	3

- Course Objective
1. To study the architecture. Hardware and Software wiring of programmable logiccontroller
  2. To read the fundamentals of PLC programming instructions
  3. To explain the PLC programs to perform specified discrete sequential control operations
  4. To develop the knowledge in real time application using PLC
  5. To learn basic knowledge on architecture of SCADA and HMI

Unit	Description	Instructional Hours
	<b>PROGRAMMABLE LOGIC CONTROLLERS</b>	
I	Architecture of PLC -Principles of Operations - PLC size and Application - PLC Discrete Modules - PLC Analog Modules- I/O Specifications-Memory Types - Scan Cycle - PLC Programming Language - Fundamentals of Logics.	9
	<b>PROGRAMMING INSTRUCTIONS</b>	
II	Programming EXAMINE ON and EXAMINE OFF Instructions -Logical Instructions - Control Instructions - Data Manipulating Instructions - Math Instructions -Immediate I/O Instructions - PLC Ladder Diagram.	9
	<b>TIMERS AND COUNTERS</b>	
III	ON DELAY Timer - OFF DELAY Timer - Retentive Timer - Timer Applications - UP Counter - DOWN Counter- UP/DOWN Counter - Counter Applications - Combining Timer and Counter Functions.	9
	<b>APPLICATIONS OF PLC</b>	
IV	Water Level Control - Material Handling Application - StampingSystem - Spray Painting System - Bottle Filling System - Lift Elevator Control - Traffic Light Control - - Automatic car washing machine - Automatic lubrication of supplier Conveyor belt .	9
	<b>SCADA SYSTEMS</b>	
V	Introduction and Definition of SCADA - Basic Architecture of SCADA - Human Machine Interface - Master Terminal Unit - Remote Terminal Unit - SCADA Data Transfer through PLC - Communication Technologies - Communication System Components.	9
	<b>Total Instructional Hours</b>	45

- Course Outcome
- On completion of the course the students will be able to
- CO1: Demonstrate knowledge and understanding of PLC interfacing and programming techniques
  - CO2: Design and describe the operation of a PLC program
  - CO3: Choose various Timers and Counters based on real time applications
  - CO4: Create PLC program to control typical industrial related processes
  - CO5: Infer and control the Industrial Process using SCADA systems

**TEXT BOOKS:**

- T1- Frank D. Petruzella, "*Programmable Logic Controllers*", 3<sup>rd</sup> Edition, Tata McGraw Hill Publishing Company Limited, New Delhi, 2010.
- T2- Ronald L.Kurtz, "*Securing SCADA System*", 1<sup>st</sup> Edition, John Wiley & Sons, 2015.

**REFERENCE BOOKS:**

- R1- John W. Webb and Ronald A. Reis, "*Programmable Logic Controllers-Principles and Applications*", 4<sup>th</sup> Edition, PHI Learning Private Limited, New Jersey, 2003.
- R2- Stenerson, "*Fundamentals of Programmable Logic Controllers, Sensors and Communication*", 3<sup>rd</sup> Edition, Pearson Education, Asia, 2005.
- R3- William T. Shaw, "*Cybersecurity for SCADA systems*". Penn Well Books, 2006
- R4- Gary Dunning, "*Introduction to Programmable Logic Controllers*", 3<sup>rd</sup> India edition, Cengage Learning, 2007

*R. Srinivas*  
**CHAIRMAN, BOARD OF STUDIES**  
**Chairman - BoS**  
**MCT - HICET**



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

Mapping of COs with POs and PSOs

CO/PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO-1	PSO-2
CO1	1		2						1	1	1	1	1	
CO2	1		3									1	2	
CO3			2		1								2	
CO4			3										3	
CO5	1		1									1	1	
AVG	0.6	-	2.2	-	0.2	-	-	-	0.2	0.2	0.2	0.6	1.8	-

• 1-low, 2-medium, 3-high, '-'- no correlation  
 • Note: The average value of this course to be used for program articulation matrix.

*P. S. Rao*  
CHAIRMAN, BOARD OF STUDIES

Chairman - BoS  
MCT - HICET



*[Signature]*  
DEAN ACADEMICS  
Dean (Academics)  
HiCET

THEORY COURSES

Programme	Course Code	Name of the Course	L	T	P	C
BE	21MT5203	CONTROL OF MECHATRONICS SYSTEMS	3	0	0	3

- Course Objective
- To solve the fundamental concepts of control systems and mathematical modeling of the system
  - To discuss the concept of time response of the system and error
  - To sketch the plot for frequency response of system and stability analysis
  - To develop and analysis state variable model
  - To select the controller for mechatronics applications

Unit	Description	Instructional Hours
	<b>SYSTEM REPRESENTATION AND MODELLING</b>	
I	Introduction and Need for Control Systems with Examples - Open Loop and Closed Loop Systems - Transfer Function Model - Mathematical Modeling of Mechanical, Electrical Systems - Block Diagram Reduction - Signal Flow Graph.	9+3
	<b>TIME RESPONSE ANALYSIS</b>	
II	Standard Test Signals - Time Response – First order and Second order systems- Time Domain Specifications- Error Coefficients – Generalized Error series – Steady State Error.	9+3
	<b>STABILITY ANALYSIS</b>	
III	Frequency Domain: Bode Plot - Polar Plot –Effects of Lag, Lead and Lag Lead compensation. Time Domain: Routh Hurwitz Criterion - Root Locus construction- Nyquist Stability Criterion	9+3
	<b>STATE SPACE ANALYSIS</b>	
IV	Concepts of State - State Variables and State Models - State Space Equations - Transfer Function - Transfer Model. State Space Representation of Dynamic Systems, State Transition Matrix - Decomposition of Transfer Function - Controllability and Observability.	9+3
	<b>BASIC CONTROLLERS</b>	
V	P, PI, PD and PID Controller –Feed Forward Control - Tuning of Controller - Ziegler Nicol Tuning - Distributed Control System - Case study: Controller design for flowcontrol process.	9+3
	<b>Total Instructional Hours</b>	45+15=60

- On completion of the course the students will be able to
- Course Outcome
- CO1: Interpret different physical, mechanical, electrical system to Construct equivalent models and its Transfer functions.
  - CO2: Describe the response of different order systems for and error series
  - CO3: Analyze the stability of the system using different plots
  - CO4: Solve system equations in state-variable form
  - CO5: Identify controller concepts used in industry

**TEXT BOOKS:**

- T1- A. Nagoorkani, "Control systems Engineering", 3<sup>rd</sup> Edition, RBA Publications, Chennai, 2017.
- T2- Curtis D. Johnson, "Process Control Instrumentation Technology", 8<sup>th</sup> Edition, PHI Learning Private Limited, New Delhi, 2005.

**REFERENCE BOOKS:**

- R1- Katsuhiko Ogata, "Modern Control Engineering", 5th Edition, PHI Learning Private Limited, New Delhi, 2010.
- R2- M Gopal, "Control Systems-Principles and Design", 4th Edition, McGraw Hill Education, New Delhi, 2012.
- R3- Norman S. Nise, "Control Systems Engineering", 6th Edition, John Wiley & Sons Inc., New York, 2010.
- R4- S.K.Bhattacharya, "Control System Engineering", 3rd Edition, Pearson, 2013.

**WEB REFERENCES:**

- <http://instrumentationtools.com/difference-between-dcs-plc-systems>

*Rehman*  
CHAIRMAN, BOARD OF STUDIES

**Chairman - BoS  
MCT - HiCET**



*[Signature]*  
DEAN ACADEMICS  
**Dean (Academics)  
HiCET**



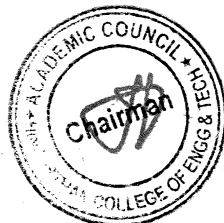
Mapping of COs with POs and PSOs

CO/PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO-1	PSO-2
CO1	1		2						1	1	1	1		1
CO2	1		3									1		2
CO3			2		1									2
CO4			3											3
CO5	1		1									1		1
AVG	0.6	-	2.2	-	0.2	-	-	-	0.2	0.2	0.2	0.6	-	1.8

• 1-low, 2-medium, 3-high, "-" no correlation  
 • Note: The average value of this course to be used for program articulation matrix.

*BoS*  
CHAIRMAN, BOARD OF STUDIES

**Chairman - BoS**  
**MCT - HICET**



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

THEORY CUM PRACTICAL COURSES

<b>Programme</b> BE	<b>Course Code</b> 21MT5251	<b>Name of the Course</b> <b>FLUID POWER SYSTEMS</b>	<b>L</b> 2	<b>T</b> 0	<b>P</b> 2	<b>C</b> 3
------------------------	--------------------------------	---	---------------	---------------	---------------	---------------

- Course Objective**
- To familiarize the fundamentals of fluid power Principles, characteristics of the fluid power system components
  - To learn the hydraulic system components for various applications
  - To develop fluid power circuits for various Mechatronics systems
  - To impart knowledge about pneumatic system components for various application circuits
  - To learn to develop applications based on fluid power system

<b>Unit</b>	<b>Description</b>	<b>Instructional Hours</b>
	<b>FLUID POWER SYSTEMS AND FUNDAMENTALS</b>	
I	Introduction to Fluid Power - Advantages of Fluid Power, Application of Fluid Power System. Types of Fluid Power Systems, Properties of Hydraulic Fluids - Types of Fluids - Fluid Power Symbols - Basics of Hydraulics-ANSI symbols	6
	<b>HYDRAULIC COMPONENTS AND ACTUATORS</b>	
II	Introduction to Pumps, Fluid Power Actuators: Linear Hydraulic Actuators - Types of Hydraulic Cylinders - Single Acting - Double Acting - Special Cylinders like Tandem - Rodless - Telescopic - Cushioning Mechanism.	6
	<b>DESIGN OF HYDRAULIC CIRCUITS</b>	
III	Construction of Control Components: Direction Control Valve - 3/2 Way Valve - 4/2 Way Valve - Shuttle Valve - Check Valve - Pressure Control Valve - Pressure Reducing Valve. Sequence Valve, Flow Control Valve - Accumulators and Intensifiers: Types of Accumulators - Accumulators Circuits, Intensifier Circuit.	6
	<b>PNEUMATIC SYSTEMS AND COMPONENTS</b>	
IV	Pneumatic Components: Properties of Air - Compressors - Filter, Regulator and Lubricator Unit - Fluid Power Circuit Design - Speed Control Circuits, Synchronizing Circuit. Sequential Circuit Design for Simple Applications using Cascade Method.	6
	<b>APPLICATION, MAINTENANCE AND TROUBLE SHOOTING</b>	
V	Development of Hydraulic / Pneumatic Circuits Applied to Machine Tools - Presses - Material Handling Systems - Automotive Systems - Maintenance and Trouble Shooting of Fluid Power Circuits - Safety Aspects.	6
<b>Total Instructional Hours</b>		<b>30</b>

**LABORATORY COURSES**  
**HYDRAULICS**

- |    |   |   |
|----|---|---|
| 1. | Design and Testing of the Following Hydraulic Circuits:<br>a. Pressure Control    b. Flow Control         | 2 |
| 2. | Design and Testing of Hydraulic Bi-Directional and Semi-Rotary Motor System.                              | 2 |
| 3. | Design and Testing of Hydraulic Cylinder Sequencing System using fluid power simulation software and PLC. | 2 |
| 4. | Design and Testing of a Double Acting Cylinder using Sensor Based Electro Hydraulic Control and PLC.      | 3 |

**PNEUMATICS**

- |    |  |   |
|----|--|---|
| 5. | Design and Testing of Single Acting Cylinder using of 3/2 Way Direction Control Valves.                      | 2 |
| 6. | Design and Testing of Single Acting Cylinder and also Speed Control using Flow Control Valves.               | 2 |
| 7. | Design and Testing Circuit of a Double Acting Cylinder using 3/2 and 5/2 Way Valves, AND, OR logic Elements. | 2 |

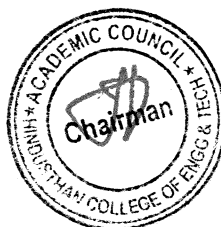
**Total Instructional Hours**

15+30=45

On completion of the course the students will be able to

- Course Outcome**
- CO1: Explain the fundamental concepts of fluid power system
  - CO2: Apply the hydraulic concepts into pumps and valves
  - CO3: Design hydraulic circuits for different applications
  - CO4: Apply the knowledge of pneumatic systems and its components
  - CO5: Manipulate the knowledge in fluid power system maintenance and troubleshooting techniques

*Devsingh*  
**CHAIRMAN, BOARD OF STUDIES**  
**Chairman - BoS**  
**MCT - HiCET**



*[Signature]*  
**DEAN ACADEMICS**  
**Dean (Academics)**  
**HiCET**

**TEXT BOOKS:**

- T1- Anthony *Esposito, Fluid Power with Applications*, 6<sup>th</sup> Edition, PHI Learning Private Limited, New Delhi, 2009  
 T2- R.Srinivasaan, *“Hydraulics and Pneumatics Control”*, 2<sup>nd</sup> Edition, Mcgraw Hill India Pvt. Ltd. 2008

**REFERENCE BOOKS:**

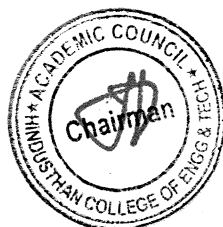
- R1- Andrew *Parr, “Hydraulics and Pneumatics”*, 7<sup>th</sup> Edition, Jaico Publishing House, 2008 R2- FESTO, *“Fundamentals of Pneumatics”*, Vol. I, II, III  
 R3- S.R.Majundar, *“Oil Hydraulic Systems- Principles and Maintenance”*, 2<sup>nd</sup> Edition, McgrawHill India Pvt. Ltd. 2008.  
 R4- S.R.Majundar, *“Pneumatic Systems- Principles and Maintenance”*, 2<sup>nd</sup> Edition, Mcgraw Hill India Pvt. Ltd. 2007.

Mapping of COs with POs and PSOs														
CO/PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO-1	PSO-2
CO1	3	2	2	2	2	1						2	2	3
CO2	3	2	2	3	3	1						2	2	3
CO3	3	2	3	3	3	1						2	2	3
CO4	3	2	2	3	3	1						2	2	3
CO5	3	2	2	3	3	1						2	2	3
AVG	3	2	2.2	2.8	2.8	1	-	-	-	-	-	2	2	3

- 1-low, 2-medium, 3-high, “-“ no correlation
- Note: The average value of this course to be used for program articulation matrix.

*P. Ramani*  
 CHAIRMAN, BOARD OF STUDIES

**Chairman - BoS  
 MCT - HiCET**



*[Signature]*  
 DEAN ACADEMICS

**Dean (Academics)  
 HiCET**

THEORY CUM PRACTICAL COURSES

Programme	Course Code	Name of the Course	L	T	P	C
BE	21ITS251	<b>OBJECT ORIENTED PROGRAMMING</b>	2	0	2	3

- Course Objective
- To learn the concepts of object oriented programming
  - To impart the fundamental concepts of core JAVA
  - To classify various types of inheritance
  - To develop the application programming based on exception handling
  - To develop the program using multithread

**THEORY**

Unit	Description	Instructional Hours
	<b>BASIC CONCEPTS OF OBJECT ORIENTED PROGRAMMING</b>	
I	Object Oriented Programming Concepts - Objects - Classes - Methods and Messages - Abstraction and Encapsulation - Inheritance - Polymorphism	6
	<b>OVERVIEW OF JAVA</b>	
II	Basics of Java Programming, Data Types, Variables and Arrays, Operators, Control Structures - Classes, Objects and Methods - Constructors – This keyword - Finalize Method.	6
	<b>PACKAGES AND INTERFACES</b>	
III	Inheritance - Method Overriding - Abstract Class - Final keyword - Java API Packages - Naming Conventions - Creating, Accessing, Using Packages - Interfaces: Defining, Extending, Implementing Interfaces.	6
	<b>EXCEPTION HANDLING</b>	
IV	Exception Types - Uncaught Exceptions - Using Try and Catch -Multiple Catch - Nested Try - Throws - Finally - Built in Exceptions - Throwing own exceptions - Chained Exceptions .	6
	<b>MULTITHREAD PROGRAMMING</b>	
V	Creating and Extending Thread - Stopping and Blocking Thread - Life Cycle -Using Thread - Thread priority - Synchronization - Runnable Interface - Inter Thread Communications.	6
	<b>Instructional Hours</b>	30

**PRACTICAL**

- |   |  |
|---|--|
| 1 | Create class and object using Java program to display first 100 prime numbers  |
| 2 | Java program to implement Method overloading and random number generation.   |
| 3 | Java program using to implement Inheritance i) single inheritance ii) multilevel inheritance iii) hierarchal inheritance using super keyword |
| 4 | Java program using to implement method overriding and dynamic dispatch   |
| 5 | Java program to print Odd and Even Numbers from an Array   |
| 6 | Java program to create a thread, multi thread program  |
| 7 | Java program for implement a Stack concept using Classes and Object  |
| 8 | Java program for producer consumer application   |

**Instructional Hours** 15  
**Total Hours** 45

Course Outcome

On completion of the course the students will be able to

CO1: Describe the concepts of objects, classes and inheritance

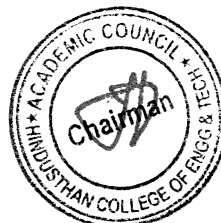
CO2: Apply the concepts of data, array and structures

CO3: Develop the program using function overloading, operator overloading, virtual functions and polymorphism.

CO4: Create an exception handling application using programs

CO5: Develop the program using the concepts of multithread

*P. S. Kumar*  
**CHAIRMAN, BOARD OF STUDIES**  
**Chairman - BoS**  
**MCT - HiCET**



*[Signature]*  
**DEAN ACADEMICS**  
**Dean (Academics)**  
**HiCET**

**TEXT BOOKS:**

T1: Herbert Schild, "*Java the Complete Reference*", 8<sup>th</sup> Edition, McGraw Hill Education, New Delhi, 2011.

T2: Ali Bahrami, "*Object Oriented Systems Development*", 1<sup>st</sup> Edition, Pearson Education, New Delhi, 2008.

**REFERENCE BOOKS:**

R1: E Balagurusamy, "*Programming with JAVA*", 5<sup>th</sup> Edition, McGraw Hill Education, New Delhi, 2015.

R2: Michael Blaha, James Rumbaugh, "*Object Oriented Modeling and Design With UML*", 2<sup>nd</sup> Edition, Pearson Education, New Jersey, 2008.

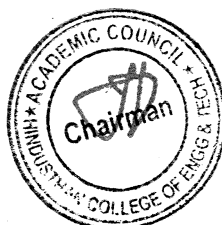
R3: Paul Deitel, Harvey Deitel, "*Java, How to Program*", 8<sup>th</sup> Edition, PHI Publications, 2010.

R4: Ken Arnold, James Gosling, David Holms, "*The java Programming Language*", Pearson Education, 2003.

Mapping of COs with POs and PSOs														
CO/PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO-1	PSO-2
CO1	3	2	3	2	3							2	2	1
CO2	3	2	3	2	3							2	2	1
CO3	3	2	3	2	3							2	2	1
CO4	3	2	3	2	3							2	2	1
CO5	3	2	3	2	3							2	2	1
AVG	3	2	3	2	3	-	-	-	-	-	-	2	2	1

- 1-low, 2-medium, 3-high, "-"- no correlation
- Note: The average value of this course to be used for program articulation matrix.

*P. Gowda*  
CHAIRMAN, BOARD OF STUDIES  
Chairman - BOS  
MCT - HICET



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

Programme	Course code	Name of the course	L	T	P	C
B.E	21MT5001	COMPUTER AIDED MACHINE DRAWING LABORATORY	0	0	3	1.5

**The student should be made**

**Course Objective**

- 1 To develop skills on 2D drafting and 3D modeling using CAD software systems
- 2 To apply constructional drawing techniques in Engineering field
- 3 To provide the importance of computer aided machine drawing in various applications
- 4 To assemble various components to achieve the desire mechanisms.
- 5 To expose students to gain knowledge in machine design elements

Unit	Description	Instructional Hours
1	Study of Welding Symbols and Riveted Joints	3
2	Study of Limits, Fits and Tolerances	3
3	Study of Screw Threads and Threaded Fasteners	3
4	Assembly Drawing of sleeve coupling	3
5	Assembly Drawing of Protected Flange Coupling	3
6	Assembly Drawing of Universal Coupling	3
7	Assembly Drawing of Knuckle Joint	3
8	Assembly Drawing of Screw Jack	3
9	Assembly Drawing of Stuffing Box	3
10	Assembly Drawing of Plummer Block	3
11	Assembly Drawing of Connecting Rod	3
12	Assembly Drawing of Machine Vice	3
<b>Total Instructional Hours</b>		<b>45</b>

**Course Outcome**

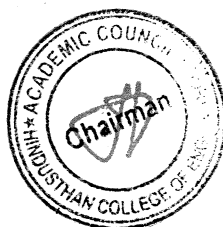
- CO1 Develop 2D, 3D models using modeling software
- CO2 Design and model the constructional features in Engineering field
- CO3 Apply the design skills in computer aided machine drawing
- CO4 Demonstrate the machine drawings in assembly operations
- CO5 Design and model the given machine elements

Mapping of COs with POs and PSOs														
CO/PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO-1	PSO-2
CO1	2	2	2	2	2	2	2	2	2	2	2	2	1	1
CO2	3	1	2	1	-	-	-	-	-	-	-	-	2	2
CO3	-	3	3	2	-	-	-	-	1	-	-	-	3	3
CO4	-	1	1	-	-	-	-	-	-	-	-	-	1	1
CO5	2	2	2	2	-	-	-	-	-	-	-	1	2	2
AVG	2.3	1.8	2	1.75	2	2	2	2	1.5	2	2	1.5	1.8	1.8

• 1-low, 2-medium, 3-high, - no correlation  
• Note: The average value of this course to be used for program articulation matrix.

*B. Srinivas*  
**CHAIRMAN, BOARD OF STUDIES**

**Chairman - BoS**  
**MCT - HICET**



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

Programme	Course code	Name of the course	L	T	P	C
B.E	21MT5001	INDUSTRIAL AUTOMATION AND CONTROL LABORATORY -I	0	0	3	1.5

**The student should be made**

- Course Objective**
- 1 To acquire knowledge on PLC hardware and software
  - 2 To impart the knowledge about the basic instruction set of PLC
  - 3 To explain the PLC wiring with field devices
  - 4 To create ladder logic diagrams for digital I/O's and interface with PLC for industrial applications
  - 5 To read the basics of SCADA

Unit	Description	Instructional Hours
1	Implementation of Logic Instruction using PLC Basic Operations.	3
2	Implementation of Math Instruction using PLC Basic Operations	3
3	Programming with PLC for the Lamp Circuit.	3
4	Programming with PLC for Actuating Single Acting Cylinder.	3
5	Programming with PLC for Water Level Control of Two Different Water Tanks.	3
6	Programming with PLC for Material Handling System.	3
7	Programming with PLC for Stamping System.	3
8	Programming with PLC for Spray Painting System.	3
9	Programming with PLC for Bottle Filling System.	3
10	Programming with PLC for Lift Elevator Control.	3
11	Programming with PLC for Traffic Light Control.	3
12	Study of SCADA System.	3
<b>Total Instructional Hours</b>		<b>45</b>

- Course Outcome**
- CO1 Demonstrate the working knowledge of PLC for a real time process
  - CO2 Develop the program in PLC Software and interface with different controlled applications
  - CO3 Develop hard wiring with PLC and field digital I/Os
  - CO4 Create the ladder logic for industrial applications
  - CO5 Explain the uses of SCADA

Mapping of COs with POs and PSOs														
CO/PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO-1	PSO-2
CO1			2										1	
CO2	1		1		2				1		3		2	
CO3	2		3		1				2		3		2	
CO4	1		3		3				3		2		3	
CO5			1										1	
AVG	0.8	-	2	-	1.2	-	-	-	1.2	-	1.6	-	1.8	-

• 1-low, 2-medium, 3-high, '-'- no correlation  
• Note: The average value of this course to be used for program articulation matrix.

*Deemys*  
**CHAIRMAN, BOARD OF STUDIES**  
**Chairman - BoS**  
**MCT - HICET**



*Deemys*  
**DEAN ACADEMICS**  
**Dean (Academics)**  
**HICET**

Programme	Course Code	Course Title	L	T	P	C
BE	21HE5071	SOFT SKILLS - I	1	0	0	1

**Course Objectives:**

- 1.To employ soft skills to enhance employability and ensure workplace and career success.
- 2.To enrich students' numerical ability of an individual and is available in technical flavor.
- 3.To interpret things objectively, to be able to perceive and interpret trends to make generalizations and be able to analyze assumptions behind an argument/statement.

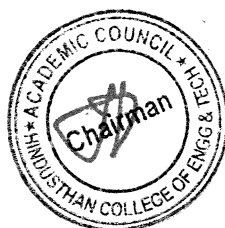
Unit	Description	Instructional Hours
I	<b>Introduction to Soft Skills:</b> Introduction- Objective -Hard vs Soft Skills - Measuring Soft Skills- Structure of the Soft Skills -Self Management-Critical Thinking-Reflective thinking and writing- p2p Interaction	3
II	<b>Art of Communication:</b> Verbal Communication - Effective Communication - Active listening -Paraphrasing - Feedback - Non-Verbal Communication -- Roles-Types- How nonverbal communication can go wrong- How to Improve nonverbal Communication - Importance of feelings in communication - dealing with feelings in communication.	4
III	<b>World of Teams:</b> Self Enhancement - importance of developing assertive skills- developing self-confidence – developing emotional intelligence - Importance of Team work – Team vs. Group - Attributes of a successful team – Barriers involved - Working with Groups – Dealing with People- Group Decision Making.	3
IV	<b>Quantitative Aptitude:</b> Averages - Profit and loss - Partnerships - Time and work - Time, Speed and Distance - Problems based on trains - Problems based on boats and streams	3
V	<b>Logical Reasoning:</b> Clocks - Calendars - Direction Sense - Data Interpretation: Tables, Pie Chart, Bar Graph - Data Sufficiency	2

**Course Outcome:**

- CO1: Students will have clarity on their career exploration process and to match their skills and interests with a chosen career path.
- CO2: Students will develop knowledge, skills, and judgment around human communication that facilitate their ability to work collaboratively with others
- CO3: Students will understand how teamwork can support leadership skills
- CO4: Students will be able to make sense of problems, develop strategies to find solutions, and persevere in solving them.
- CO5: Students will demonstrate an enhanced ability to draw logical conclusions and implications to solve logical problems.

*Reshma*  
CHAIRMAN, BOARD OF STUDIES

**Chairman - BoS  
MCT - HICET**



*[Signature]*  
DEAN ACADEMICS

**Dean (Academics)  
HICET**



# PROFESSIONAL ELECTIVES

*P. S. V. S.*  
CHAIRMAN, BOARD OF STUDIES  
**Chairman - BoS  
MCT - HICET**



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

Programme BE	Course Code 21MT5301	Name of the Course ENGINEERING METROLOGY AND MEASUREMENTS	L 3	T 0	P 0	C 3
-----------------	-------------------------	--	--------	--------	--------	--------

- Course Objective
1. To describe the principle of dimensional metrology
  2. To discuss various linear and angular measurements
  3. To identify the various types of errors using different instruments
  4. To familiarize the principles, techniques and devices used for quality control in modern Industrial environment
  5. To acquire knowledge on various metrological equipments

Unit	Description	Instructional Hours
	<b>BASICS OF MEASUREMENTS</b>	
I	General Concept of Measurement - Need for Measurement - Methods of Measurement - Units and Standards - Sensitivity - Stability - Range - Accuracy - Precision - Tolerance - Fits - Errors - Types of Errors - Interchangeability.	9
	<b>LINEAR AND ANGULAR METROLOGY</b>	
II	Linear Metrology: Vernier Caliper - Micrometer - Dial Indicator - Slip Gauges and Classification - Optical Flats - Limit Gauges - Comparators - Mechanical, Pneumatic and Electric Types. Angular Metrology: Sine Bar - Optical Bevel Protractor - Auto Collimator - Angle Decker - Taper Measurements.	9
	<b>FORM AND SURFACE MEASUREMENTS</b>	
III	Screw Thread Terminologies - Errors in Thread - Drunkenness - Measurement of Various Elements of Thread - Two and Three Wire Method, Gears Measurement: Gear Errors - Constant Chord and Base Tangent Method - Parkinson Gear Tester - Gleason Gear Testing Machine. Surface Finish Measurement: Elements of Surface Texture - Analysis of Surface Finish - Stylus Probe Instrument - Talysurf Method.	9
	<b>ADVANCED TECHNIQUES IN METROLOGY</b>	
IV	Coordinate Measuring Machine - Constructional Features - Types and Application, Machine Vision Systems, Profile Projector, Universal Measuring Machine, Laser principles - Laser Interferometer - Types - DC and AC Laser Interferometer.	9
	<b>APPLICATIONS OF MEASUREMENTS</b>	
V	Applications - Flow Measurements in Chemical Pipelines - Vehicle Tyre Pressure Measurement, Temperature Measurement in Furnace - Force Measurements in Brake Pedal and Torque Measurements in Motors.	9
	<b>Total Instructional Hours</b>	<b>45</b>

On completion of the course the students will be able to

- Course Outcome
- CO1: Analyze the uncertainties in dimensional metrology and use the measurement standards
  - CO2: Apply geometric tolerances in design of engineering components
  - CO3: Choose the proper method to find the errors in surface and screw threads
  - CO4: Measure the complex profile using advanced measurement techniques
  - CO5: Select the right measuring tool with decided accuracy for a given application

**TEXT BOOKS:**

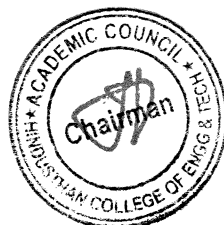
- T1- Ernest O Doebelin, "Measurement Systems - Applications and Design", 4<sup>th</sup> Edition, Tata McGraw Hill Publishing Company Limited, New Delhi, 2008.  
T2- R. K. Jain, "Engineering Metrology", 20<sup>th</sup> Edition, Khanna Publishers, New Delhi, 2013.

**REFERENCE BOOKS:**

- R1- Thomas G Beckwith, Lienhard, Roy D. Marangoni, John H. Lienhard V "Mechanical Measurements", 6th Edition Addison Wesley, 2009.  
R2- Anand K Bewoor, Vinay A Kulkarni, "Metrology and Measurement", 1st Edition. Tata McGraw Hill Publishing Company Limited, New Delhi, 2009.  
R3- Connie Dotson et.al, "Fundamentals of Dimensional Metrology", Thomas Asia, Singapore, 2003.  
R4- Groover.M.P, "Automation, Production system and computer integrated manufacturing", Prentice Hall Publishing, New Delhi, 2003.

*P. S. Srinivas*  
CHAIRMAN, BOARD OF STUDIES

**Chairman - BoS  
MCT - HICET**



*[Signature]*  
DEAN ACADEMICS

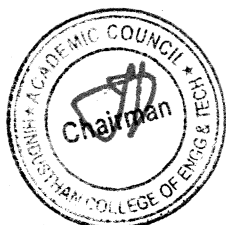
**Dean (Academics)  
HICET**

Mapping of COs with POs and PSOs

CO/PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO-1	PSO-2
CO1	3	2	2										3	2
CO2	3		2			2							3	2
CO3		1	2	2										3
CO4	3		2									2		3
CO5	1	3	3	3								2		3
AVG	2	1.2	2.2	1	-	0.4	-	-	-	-	-	0.8	1.2	2.6

- 1-low, 2-medium, 3-high, "-" no correlation
- Note: The average value of this course to be used for program articulation matrix.

*Perkins*  
 CHAIRMAN, BOARD OF STUDIES  
 HICET  
 Chairman, Board of Studies  
 MCT - HICET



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

Programme	Course Code	Name of the Course	L	T	P	C
BE	21MT5302	NON-TRADITIONAL MACHINING TECHNIQUES	3	0	0	3

- Course Objective
- To select the process parameters of different advanced manufacturing processes
  - To express their knowledge of electrical based manufacturing processes over conventional techniques
  - To list the chemicals used in the manufacturing process
  - To choose the suitable thermal techniques to achieve the high precision on the machining component
  - To examine the surface coating processes

Unit	Description	Instructional Hours
	<b>MECHANICAL ENERGY BASED PROCESSES</b>	
I	Introduction - Modern Machining Process - Need - Advantages & Applications - Abrasive Jet Machining (AJM) - Working Principles - Process Parameters - Applications - Water Jet Machining (WJT) - Working Principles - Process Parameters - Applications - Ultrasonic Machining (USM) - Working Principles - Process Parameters - Applications.	9
	<b>ELECTRICAL ENERGY BASED PROCESSES</b>	
II	Electric Discharge Machining (EDM) - Working Principles - Equipments - Process Parameters - Material Removal Rate - Tool - Dielectric - Flushing - Wire Cut EDM and its Applications - Electric Discharge Grinding - Working Principle - Equipment - Process Parameters - Applications.	9
	<b>CHEMICAL AND ELECTRO CHEMICAL ENERGY BASED PROCESSES</b>	
III	Chemical Machining (CHM) - Etchants - Maskant - Techniques of Applying Maskant - Process Parameters - Material Removal Rate - Applications - Electro Chemical Machining (ECM) - Principles of ECM - Equipments - Material Removal Rate - Process Parameters - Electro Chemical Grinding (ECG) and Electro Chemical Honing (ECH) - Applications.	9
	<b>THERMAL ENERGY BASED PROCESSES</b>	
IV	Laser Beam Machining (LBM) - Principles - Equipment - Applications - Plasma Arc Machining (PAM) - Principles - Equipment - Types - Beam Control Techniques - Applications - Electron Beam Machining (EBM) - Principles - Equipment - Types - Beam Control Techniques - Applications.	9
	<b>SURFACE COATING AND HARDENING PROCESS</b>	
V	Classification - Removal Processes - Conversion Coatings - Thermal Treatments - Metal Coatings - Physical Vapour Deposition (PVD) - Chemical Vapour Deposition (CVD) - Ion Plating - Galvanizing - Electroplating - Organic Coatings - Surface hardening - Laser hardening.	9
<b>Total Instructional Hours</b>		<b>45</b>

- Course Outcome
- On completion of the course the students will be able to
- CO1: List the process parameters of different manufacturing process
  - CO2: Operate the advanced electrical machining operation on the given component
  - CO3: Select the appropriate chemical process based on the product material
  - CO4: Interpret how a thermal techniques to be carried out
  - CO5: Analyse and improve manufacturing processes through surface coating

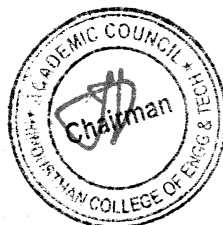
#### TEXT BOOKS:

- T1- Benedict. G.F, "Non Traditional Manufacturing Processes", 2<sup>nd</sup> Edition, Taylor. CRC Press, New York, 2021.  
T2- Kaushik kumar, J, Paulo Darim Divya Zindani, "Advanced Machining and Manufacturing Processes", 1st Edition, Springer Nature, 2018.

#### REFERENCE BOOKS:

- R1- V. K. Jain, "Advanced Machining Processes", 4th Edition, Allied Publishers, 2009. R2- E Weller, "Non Traditional Machining Process", 2nd Edition, 2006.  
R3- P.C.Pandey, "Modern Machining Process", Mcgraw Hill Education, 2017. R4- "Advance Analysis of Non Traditional Machining", Springer, DRC 2012.

*Chairman*  
**CHAIRMAN, BOARD OF STUDIES**  
**Chairman - BOS**  
**MCT - HiCET**



*Dean*  
**DEAN ACADEMICS**  
**Dean (Academics)**  
**HiCET**

Mapping of COs with POs and PSOs

CO/PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO-1	PSO-2
CO1	3	2	3	2	3		1					2	2	2
CO2	3	2	3	2	3		1					2	2	3
CO3	3	2	3	2	3		1					2	2	2
CO4	3	2	3	2	3		1					2	2	2
CO5	3	2	3	2	3		1					2	2	3
AVG	3	2	3	2	3	-	1	-	-	-	-	2	2	2.4

- 1-low, 2-medium, 3-high, "-" no correlation
- Note: The average value of this course to be used for program articulation matrix.

*P. S. M.*  
CHAIRMAN, BOARD OF STUDIES

**Chairman - BoS  
MCT - HiCET**



*[Signature]*  
DEAN ACADEMICS

**Dean (Academics)  
HiCET**

THEORY COURSES

Programme	Course Code	Name of the Course	L	T	P	C
BE	21MT5303	<b>AUTOMOBILE SYSTEMS</b>	3	0	0	3

- Course Objective
- To impart knowledge about various automobile components and subsystems
  - To define various transmission systems of automobiles and to have the practice for assembling and dismantling of engine parts
  - To describe the mechanisms involved in the steering systems and braking systems
  - To classify different suspension systems used in automobile
  - To learn about Electrical system and accessories used in automobiles

Unit	Description	Instructional Hours
	<b>ENGINE COMPONENTS</b>	
I	Principles of IC Engines - Engine Terminology - Types of Engines: Petrol & Diesel - Two Stroke and Four Stroke - Engine Components: Cylinder Block - Cylinder Head - Sump - Manifolds - Gaskets - Cylinder - Piston - Rings - Connecting Rod - Piston Pins - Crank Shaft - Bearings - Valves - Mufflers. Engine Cooling and Lubrication systems.	9
	<b>TRANSMISSION SYSTEMS</b>	
II	Clutch - Construction of Electromagnetic - Mechanical - Hydraulic - Vacuum clutches. Gear Boxes: Manual and Automatic - Over Drives - Transfer Box - Fluid Flywheel - Torque Converter - Propeller Shaft - Slip Joint - Universal Joints - Differential and Rear Axle - Case Study on Lightweight Chassis.	9
	<b>STEERING AND BRAKES</b>	
III	Constructional details of steering linkages. Different types of steering gear boxes. Steering linkages and layouts. Power and Power assisted steering. Wheels and Tyres - Wheel Alignment Parameters - Steering Geometry. Braking System: Classification of brakes, drum brake & disc brakes. Constructional details-Theory of braking. Mechanical hydraulic and Pneumatic brakes.	9
	<b>SUSPENSION SYSTEMS</b>	
IV	Basic Requirements - Functions - Types of Suspension Springs - Plastic, Air and Independent Suspension System - Shock Absorbers - Air suspension - Hydrolastic suspension - Trouble Shooting.	9
	<b>ELECTRICAL SYSTEM AND ACCESSORIES</b>	
V	Types of Batteries - Construction, Operation and Maintenance - Lighting - Wiring Circuit - Head Lights - Switches - Indicating Lights - Trouble Shooting - Direction Indicators - Windscreen Wiper - Horn - Speedometer - Heaters - Air conditioner.	9
	<b>Total Instructional Hours</b>	45

On completion of the course the students will be able to

- Course Outcome
- CO1: Explain various components in automobiles and also compare petrol and diesel engine
  - CO2: Describe the working of manual and automatic transmission
  - CO3: Apply the steering mechanism in developing a new vehicle
  - CO4: Design and develop a suspension vehicle system
  - CO5: Integrate various electrical systems and accessories with vehicle battery

**TEXT BOOKS:**

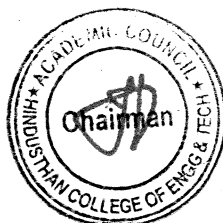
- T1- Kirpal Singh, "Automobile Engineering Vol. 1 and 2", 7<sup>th</sup> Edition, Standard Publishers, New Delhi, 2011.
- T2- H. M. Sethi, "Automobile Technology", 1<sup>st</sup> Edition, Tata McGraw Hill Publishing Company Limited, New Delhi, 2007.

**REFERENCE BOOKS:**

- R1- Jain K.K. and Asthana .R.B, "Automobile Engineering", 2<sup>nd</sup> Edition, Tata McGraw Hill Publishing Company Limited, New Delhi, 2002.
- R2- William H crouse, Donald T Anglin, "Automotive Mechanics", 10<sup>th</sup> Edition, Butterworth Publishers, 2017.
- R3- Joseph Heitner, "Automotive Mechanics," 2<sup>nd</sup> Edition, East-West Press, 2199.
- R4- Ganesan V, "Internal Combustion Engine", 3<sup>rd</sup> Edition, Tata McGraw Hill Publishing, New Delhi, 2012.

  
CHAIRMAN, BOARD OF STUDIES

**Chairman - BoS  
MCT - HICET**



  
DEAN ACADEMICS

**Dean (Academics)  
HICET**

Mapping of COs with POs and PSOs

CO/PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO-1	PSO-2
CO1	1		2						1	1	1	1	1	
CO2	1		3									1	2	
CO3			2		1								2	
CO4			3										3	
CO5	1		1									1	1	
AVG	0.6	-	2.2	-	0.2	-	-	-	0.2	0.2	0.2	0.6	1.8	-

- 1-low, 2-medium, 3-high, "-"- no correlation
- Note: The average value of this course to be used for program articulation matrix.

*[Signature]*  
CHAIRMAN, BOARD OF STUDIES

**Chairman - BoS  
MCT - HiCET**



*[Signature]*  
DEAN ACADEMICS

**Dean (Academics)  
HiCET**

THEORY COURSES

Programme	Course Code	Name of the Course	L	T	P	C
BE	21MT5304	<b>OPERATIONS RESEARCH</b>	3	0	0	3

Course Objective

1. To experience in modeling, solving and analyzing problems using linear programming
2. To expose variety of problems such as transportation and trans-shipment
3. To familiarize the students with assignment models
4. To learn basic inventory control techniques.
5. To introduce about maintenance and replacement schedule against failure

Unit	Description	Instructional Hours
	<b>LINEAR PROGRAMMING</b>	
I	Introduction - Origin of Operations Research(OR) - Characteristics of Operations Research - Models in Operations Research - Role of Operations Research in Decision Making. Methods of Solving OR Problems - Scope of OR. Steps of Formulating Linear Programming Problem (LPP) - Graphical Method - Special Cases in LP - Simplex Method - Minimization Case - Degeneracy in LP.	9+3
	<b>TRANSPORTATION PROBLEM</b>	
II	Formulation of General Transportation Problems - Types of Transportation Problems - Solving Transportation Problem - Loops in Transportation Method - Transportation Algorithm - Modified Distribution Method - Stepping Stone Method.	9+3
	<b>ASSIGNMENT PROBLEM</b>	
III	Mathematical Formulation of Assignment Problem (AP) - Solution Methods of AP - Enumeration Method - The Hungarian Method - Variations of the Assignment Problem - Multiple Optimal Solutions.	9+3
	<b>INVENTORY CONTROL</b>	
IV	Models of inventory-Operation of inventory-Quality discount-Implementation of purchase inventory model-Multiple item model with storage limitation-Determination of stock level- Empirical queuing model.	9+3
	<b>REPLACEMENT AND MAINTENANCE ANALYSIS</b>	
V	Types of Maintenance - Types of Replacement Problem - Determination of Economic Life of an Asset - Basics of Interest Formulae - Examples - Simple Probabilistic Model for Items which Completely Fail.	9+3
<b>Total Instructional Hours</b>		45+15=60

On completion of the course the students will be able to

Course Outcome

CO1: Formulate and solve linear programming problem for a physical situations like production, distribution of goods and economics.  
 CO2: Build and solve Transportation Models.  
 CO3: Perform model formulation for assignment problems.  
 CO4: Understand the inventory control plan and workout stock level.  
 CO5: Analyze the various replacement models and apply them for arriving at optimal decisions

**TEXT BOOKS:**

- T1- Nita H Shah, Ravi M.Gor and HardikSoni, "Operations Research". 1<sup>st</sup> Edition, PHI Learning Private Limited, New Delhi, 2007.
- T2- R.Panneerselvam, "Operations Research", 2<sup>nd</sup> Edition, PHI Learning Private Limited, New Delhi, 2010.

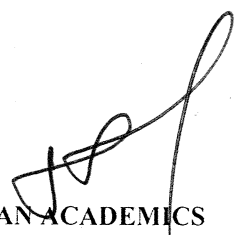
**REFERENCE BOOKS:**

- R1- Hamdy A Taha, "Operations Research", 8<sup>th</sup> Edition, Pearson Education, New Delhi, 2008.
- R2- S.Jaishankar, "Operations Research: Decision Models Approach", 1<sup>st</sup> Edition, Excel Books, New Delhi, 2010.
- R3- Taha.H A, "Operations Research", 6<sup>th</sup> Edition, PHI Learning Private Limited, New Delhi, 2003.
- R4- Bazara M J and Sherail H, "Linear programming and Network Flows", John Wiley, 2009.

  
 CHAIRMAN, BOARD OF STUDIES

**Chairman - BoS  
 MCT - HiCET**



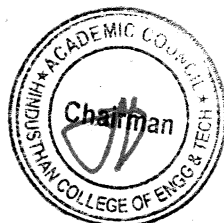
  
 DEAN ACADEMICS  
**Dean (Academics)  
 HiCET**



Mapping of COs with POs and PSOs														
CO/PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO1 0	PO1 1	PO1 2	PSO-1	PSO- 2
CO1	3	3	3	2	1	1					1	1	3	1
CO2	3	3	2	1	1	1					1	1	2	1
CO3	3	3	2	1	1	1					1	1	2	1
CO4	3	3	2	1	1	1					1	1	1	1
CO5	3	3	2	1	1	1					1	1	1	1
AVG	3	3	2.2	1.2	1	1	-	-	-	-	1	1	1.8	1

• 1-low, 2-medium, 3-high, '-'- no correlation  
 • Note: The average value of this course to be used for program articulation matrix.

*Prasanna*  
 CHAIRMAN, BOARD OF STUDIES  
**Chairman - BoS**  
**MCT - HICET**



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

THEORY COURSES

Programme	Course Code	Name of the Course	L	T	P	C
BE	21MT5305	<b>MATERIALS SCIENCE AND APPLICATIONS</b>	3	0	0	3

- Course Objective
1. To impart knowledge in mechanical properties of metals and non metals
  2. To provide knowledge on effect of alloys in engineering materials
  3. To identify the different types of heat treatment processes
  4. To impart knowledge in production of composites materials
  5. To learn the different field of applications of materials and composites

Unit	Description	Instructional Hours
	<b>MATERIALS AND ITS PROPERTIES</b>	
I	Introduction - Types of Materials - Metallic - Composite - Polymeric - Ceramic - Materials - Recent Advances in Materials. Mechanical Properties - Thermal Properties, Chemical Properties - Factors Affecting Mechanical Properties. Factors in Selection of Materials - Applications in Field of Automotive - Medical and Aero Space.	9
	<b>METALS AND NON METALS</b>	
II	Metallic Materials - Effect of Alloying Additions on Steel - Stainless and Tool Steels HSLA - Maraging Steels - Cast Iron - Grey and white - Copper and Copper Alloys - Aluminium and Aluminium Alloys - Brass - Bronze - Ni-based Super Alloys and Titanium Alloys. Non Metallic Materials - Polymers - Types of Polymer - Commodity and Engineering Polymers - Properties and Applications - Engineering Ceramics - Types of Ceramics - Properties and Applications.	9
	<b>PROCESSING AND HEAT TREATMENT OF MATERIALS</b>	
III	Processing of Ferrous and Non Ferrous Metals - Processing of Ceramics - Metals - Processing of Polymers - Introduction - Annealing, Stress Relief - Recrystallization and Spheroidising - Normalizing - Hardening, Case Hardening and Tempering of Steel - Chemical Vapor Deposition (CVD) - Physical Vapor Deposition (PVD).	9
	<b>COMPOSITE MATERIALS</b>	
IV	Introduction - Classification of Composite Materials - Particle Reinforced Composites - Fibre Reinforced Composites - Fibre Glass Reinforced Composites - Hybrid Composites - Structural Composites - Protective Coatings - Adhesives - Concrete Polymer Composites.	9
	<b>PROCESSING AND APPLICATIONS OF COMPOSITES</b>	
V	Manufacturing of Polymer Matrix Composites (PMCs) - Pultrusion, Resin Transfer Moulding (RTM) - Manufacturing of Metal Matrix Composites (MMCs) - Solid State - Liquid State - Vapour State Processing - Manufacturing of Ceramic Matrix Composites (CMCs) - Hot Pressing - Applications and Case Studies - Automotive - Aerospace - Commercial Applications.	9

**Total Instructional Hours**      45

- On completion of the course the students will be able to
- |                |      |   |
|----------------|------|---|
| Course Outcome | CO1: | Identify the properties of different ferrous and nonferrous metals                  |
|                | CO2: | Select appropriate materials based on the application                               |
|                | CO3: | Choose the suitable heat treatment process for changing the properties of materials |
|                | CO4: | Explain the properties composite materials  |
|                | CO5: | Identify the production process in different fields of application                  |

**TEXT BOOKS:**

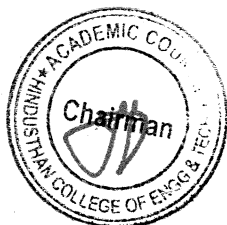
- T1- George P. Carney and Dieter Tillman, "Mechanical Metallurgy", 3<sup>rd</sup> Edition, McGraw Hill Education, New York, 2016.  
 T2- Sidney H. Avner, "Physical Metallurgy", 2<sup>nd</sup> Edition, Tata McGraw Hill Education, New York, 2012.

**REFERENCE BOOKS:**

- R1- Robert M. Jones, "Mechanics of Composite Materials", 1<sup>st</sup> Edition, 2<sup>nd</sup> Edition Taylor and Francis Group, 2006.  
 R2- Lawrence H. Van Vlack, "Elements of Material Science and Engineering" 6<sup>th</sup> Edition, Pearson Publication, Australia, 2013.  
 R3- Williams D Callister, "Material Science and Engineering" Revised Indian Edition, Wiley India Pvt. Ltd., New Delhi, 2007.  
 R4- O P kanna. "A Text Book of Material Science and Metallurgy", 5<sup>th</sup> Edition, Dhanpat Rai Publications, 2001.

*P. Srinivas*  
 CHAIRMAN, BOARD OF STUDIES

**Chairman - BoS  
 MCT - HICET**



*[Signature]*  
 DEAN ACADEMICS

**Dean (Academics)  
 HICET**

Mapping of COs with POs and PSOs														
CO/PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO1 0	PO1 1	PO1 2	PSO-1	PSO-2
CO1	3	3	2	2	2	-			1			2	2	1
CO2	3	3	2	2	2	-			1			2	2	1
CO3	3	3	2	2	2				1			2	2	1
CO4	3	3	2	2	2				1			2	2	1
CO5	3	3	2	2	2				1			2	2	1
AVG	3	3	2	2	2	-	-	-	1	-	-	2	2	1

- 1-low, 2-medium, 3-high, "-" no correlation
- Note: The average value of this course to be used for program articulation matrix.

*Revised*  
 CHAIRMAN, BOARD OF STUDIES  
**Chairman - BoS**  
**MCT - HICET**




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

# MINOR DEGREE SEM V



CHAIRMAN, BOARD OF STUDIES

**Chairman - BoS  
MCT - HiCET**



DEAN ACADEMICS

**Dean (Academics)  
HiCET**

Programme	Course code	Name of the course	L	T	P	C
B. E	21MT15231	BASICS OF MECHATRONICS SYSTEM	3	0	0	3

The student should be made

- |                         |   |  |
|-------------------------|---|--|
| <b>Course Objective</b> | 1 | To impart knowledge on basic measurements and its principles                             |
|                         | 2 | To apply the basic laws used in Electrical circuits and the different components         |
|                         | 3 | To impart knowledge on construction and working of DC                                    |
|                         | 4 | To provide knowledge on the fundamentals of semiconductor devices and their applications |
|                         | 5 | To familiarize the basic introduction of sensors & actuators                             |

Unit	Description	Instructional Hours
<b>SCIENCE OF MEASUREMENT</b>		
I	Units and Standards - Calibration Techniques - Errors in Measurement – Generalized Measurement System – Voltmeter - Ammeter - Multimeter - Meter Protection	9
<b>ELECTRICAL CIRCUITS</b>		
II	Current - Voltage - Power - Resistor - Pullup and Pull down resistor - Ohms Law – Series and Parallel Circuit - Kirchoff's Voltage Law - Kirchoff's Current Law - Nodal Analysis - Mesh Analysis.	9
<b>ELECTRICAL MACHINES</b>		
III	Principles of operation and characteristics of DC machines - Transformers (Single and Three phase) - Synchronous machines - Three phase and Single phase Induction motors – Brushless DC Motor - Stepper Motor - Servo Motor	9
<b>INTRODUCTION TO ELECTRONICS</b>		
IV	Characteristics of PN Junction Diode - Zener Effect - Zener Diode and its characteristics - Halfwave and Fullwave Rectifiers - Voltage Regulation - Study of Switching devices :SCR TRIAC & IGBT.	9
<b>SENSORS &amp; ACTUATORS</b>		
V	Principles – Classification of Transducers – Parameters – Criteria for Transducers selection – Resistive Transducer – Inductive Transducer – capacitive Transducer -Types of actuators – characteristics of actuators- Examples and applications	9
<b>Total Instructional Hours</b>		<b>30+15</b>

<b>Course Outcome</b>	CO1	Use appropriate devices for measurement.
	CO2	Apply the KVL and KCL in electrical circuits
	CO3	Explain the constructional features of AC and DC machines.
	CO4	Identify electronics components and use of the mode sign circuits
	CO5	Construct block diagram and explain about the sensors and actuators functions.

**TEXTBOOK:**

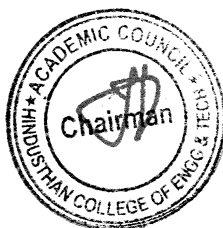
- T1 VN Mittle, Aravind Mittle, "Basic Electrical Engineering", Tata McGraw Hill Edition, Second edition, New Delhi, 2009.
- T2 AK Sawney, Puneet Sawney, "A Course in Electrical and Electronic Measurements and Instrumentation", 2nd Edition, Dhanpat Rai & Company, 2010.

**REFERENCES:**

- R1 Shanmugam G and Palanichamy MS, "Basic Civil and Mechanical Engineering", Tata McGraw Hill Publishing Co., New Delhi, 3<sup>rd</sup> Edition, 2010.
- R2 Muthu Subramanian R, Salivahanan S and Muraleedharan KA, "Basic Electrical, Electronics and Computer Engineering", Tata McGraw Hill, Second Edition, 2010
- R3 Musa Jouaneh and Christopher M Shott, "Fundamentals of Mechatronics", Global Engineering Publications, Second Edition, 2013.

*P. Srinivas*  
CHAIRMAN, BOARD OF STUDIES

**Chairman - BoS  
MCT - HiCET**



*[Signature]*  
DEAN ACADEMICS

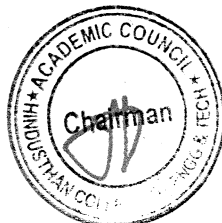
**Dean (Academics)  
HiCET**

Mapping of COs with POs and PSOs

CO/PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO-1	PSO-2
CO1	3	2	1	0	0	0	0	0	0	0	0	1	3	2
CO2	3	3	1	0	0	0	0	0	0	0	0	2	2	2
CO3	2	0	3	0	1	0	0	0	0	0	0	1	3	3
CO4	2	0	3	2	0	0	0	0	0	0	0	1	3	3
CO5	3	0	0	0	2	0	1	0	0	0	0	2	2	1
AVG	2.6	1	1.6	0.4	0.6	0	0.2	0	0	0	0	1.4	2.6	2.2

- 1-low, 2-medium, 3-high, 0-- no correlation
- Note: The average value of this course to be used for program articulation matrix.

*P. Prerna*  
 CHAIRMAN, BOARD OF STUDIES  
**Chairman - BoS**  
**MCT - HiCET**



*[Signature]*  
 DEAN ACADEMICS  
**Dean (Academics)**  
**HiCET**

Programme	Course Code	Name of the Course	L	T	P	C
B.E	21CS5602	FINANCIAL MANAGEMENT	3	0	0	3

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

	CO1: Acquire the knowledge of the decision areas in finance.
Course Outcome	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.

**TEXTBOOK:**

- T1 .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 Prasanna Chandra, Financial Management  
R3 Srivatsava. Mishra, Financial Management, Oxford University Press, 2011.

*P. Pandey*  
**CHAIRMAN, BOARD OF STUDIES**  
**Chairman - BoS**  
**MCT - HICET**



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

Programme	Course Code	Name of the course	L	T	P	C
BE	21BA5601	Foundations of Entrepreneurship	3	0	0	3

**Course Objective**

- CO1: To enable students gain insights on entrepreneurship.  
 CO2: To make students understand the sources of product & business ideas.  
 CO3: To provide knowledge on business opportunity identification.  
 CO4: To enable students to develop business plan  
 CO5: To enable students to prepare feasibility reports and understand trends in entrepreneurship.

Unit	Description	Instructional Hours
I	<b>Introduction to Entrepreneurship:</b> Entrepreneurial growth in India; sources of entrepreneurship in India. Entrepreneurship process; entrepreneurial mindset: concept and impact; Entrepreneurial growth strategies. Characteristics of an Entrepreneur – Qualities of an Entrepreneur. Entrepreneurial success and failure - reasons and remedies.	9
II	<b>Product Development:</b> Introduction and Meaning of a Product – Sources of Business or Product Ideas – Criteria for Selecting a Product – Barriers to the successful development of New Products – Why do new products fail. Technology - Considerations in selecting technology.	9
III	<b>Business Opportunity Identification:</b> Need and Importance - Steps in identification of Business Opportunity. Techniques of market Survey – Market Research Procedure.	9
IV	<b>Business Plan Development:</b> Business modelling: concept, types and functions: Innovation and Entrepreneurship: concept and challenges. The business plan as an entrepreneurial tool, Elements of business planning. Objectives, Market analysis, development of Product/idea. Marketing, Finance, Organization and management, Ownership, Critical risk contingencies of the proposal, Scheduling and milestones.	9
V	<b>Feasibility Report &amp; trends:</b> Contents of a feasibility report – Considerations while preparing a feasibility report – Proforma of a feasibility report. Technical, Financial, Marketing, Personnel, and management feasibility reports. Trends in entrepreneurship: Rural, Social and women entrepreneurship.	9
<b>Total Instructional Hours</b>		<b>45</b>

**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 BOOKS:**

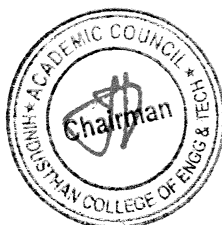
- T1- S.Anil Kumar, S.C.Poornima, Mini KAbraham, K.Jayashree “Entrepreneurship Development”, New Age International Publishers.  
 T2- Jasmer singh Sain, “Entrepreneurship and small Business” Deep and Deep publication  
 T3- Shankar Raj, “Entrepreneurship Theory and Practice” Vijay Nicole Imprints Pvt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

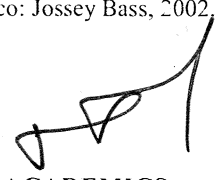
**REFERENCE BOOKS:**

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

  
 CHAIRMAN, BOARD OF STUDIES

**Chairman - BoS  
 MCT - HICET**



  
 DEAN ACADEMICS  
**Dean (Academics)  
 HICET**



Programme	Course Code	Name of the Course	L	T	P	C
B.E.	21CE5602	SUSTAINABLE INFRASTRUCTURE DEVELOPMENT	3	0	0	3

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

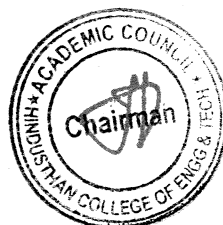
Unit	Description	Instructional Hours
	<b>INTRODUCTION TO SUSTAINABLE DEVELOPMENT</b>	
I	Definitions and principles of Sustainable Development - History and emergence of the concept of Sustainable Development - Environment and Development linkages- Globalization and environment – Millennium Development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

- Course Outcome**
- The students will be able to:
- 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.

**REFERENCE BOOKS:**


- 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.
- R6. Munier N, "Introduction to Sustainability", Springer2005

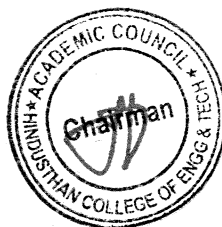
*Desai*  
**CHAIRMAN, BOARD OF STUDIES**  
**Chairman - BoS**  
**MCT - HICET**



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

# HONOURS DEGREE SEM 5

  
CHAIRMAN, BOARD OF STUDIES  
**Chairman - BoS**  
**MCT - HICET**



  
DEAN ACADEMICS  
**Dean (Academics)**  
**HICET**

Programme	Course code	Name of the course	L	T	P	C
B.E	21MT5204	CONCEPTS OF MACHINES AND MECHANISMS	3	0	0	3

**The student should be made**

- Course Objective**
- 1 Identify various links in popular mechanisms
  - 2 Evaluate the friction forces required to hold a system in static and dynamic condition.
  - 3 Understand the function of a flywheel and plot the various position of crank
  - 4 Discuss the Gyroscopic couple in different conditions
  - 5 Identify the governors of different applications

Unit	Description	Instructional Hours
	<b>KINEMATIC OF MECHANISMS</b>	
I	Terminology and definitions of Mechanism – Planar Mechanism – Spherical Mechanism - Spatial Mechanism –Redundant Parallel Mechanism - Velocity and Acceleration Polygons for four bar mechanism	9
	<b>FRICITION</b>	
II	Types of Friction - Law of Friction - Angle of Response - Minimum Force required to slide a body on a rough horizontal and inclined plane - Screw Friction and Screw Jack – Torque required to lift and lower the load by screw jack	9
	<b>TURNING MOMENT DIAGRAM &amp; FLYWHEELS</b>	
III	Turning Moment Diagram for Single Cylinder Double acting steam Engine, Four Stroke Cycle Internal Combustion Engine and Multi cylinder Engine – Fluctuation of Energy - Flywheels - Flywheels of Punching Press	9
	<b>GYROSCOPIC COUPLE</b>	
IV	Processional Angular Motion - Gyroscopic couple - Effect of Gyroscopic couple on Aeroplane - Effect of Gyroscopic Couple on Ship - Stability of Four Wheel Drive Moving in a Curved Path - Stability of Two Wheel Vehicle Taking a turn	9
	<b>GOVERNORS</b>	
V	Types of governors - Force Analysis of Porter and Hartnell Governors - Controlling Force - Stability – Sensitiveness – Isochronism - Effort and Power of Porter and Hartnell Governors.	9
	<b>Total Instructional Hours</b>	<b>45</b>

CO1 Interpret the working of different mechanism

CO2 Describe friction as a force that impedes motion.

**Course Outcome** CO3 Explain numerous factors to design an appropriate flywheel for the engine to minimize the crank speed variance during each cycle

CO4 To apply the knowledge of gyroscopic couple in engineering applications


CO5 To recognise the different types of governors and their applications

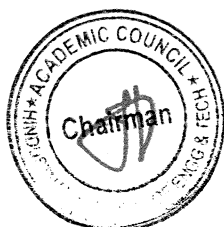
**TEXT BOOK:**

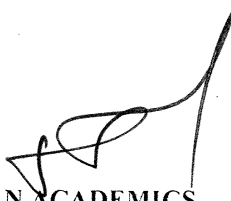
- T1 Uicker, J.J., Pennock G.R and Shigley, J.E., "Theory of Machines and Mechanisms"; Oxford University Press, 2017.
- T2 Ramamurthi. V, "Mechanics of Machines", Narosa Publishing House, 3rd edition 2019
- T3 R S khurmi., "Theory of Machines", 14h Edition, S Chand, 2020.

**REFERENCES:**

- R1 Bansal R.K., "Theory of Machines", Laxmi Publications Pvt Ltd., New Delhi, 20th edition 2009.
- R2 Rattan, S.S. "Theory of Machines", 4th Edition, Tata McGraw-Hill, 2014.
- R3 M.P.Groover, M.Weiss ,R.N. Nagal, N.G.Odrey, "Industrial Robotics - Technology, programming and Applications" Tata , McGraw-Hill Education Pvt Limited 2ndEdition, 2012.


  
**CHAIRMAN, BOARD OF STUDIES**  
 Chairman - B.E  
 MCT - HICET

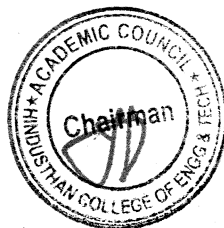


  
**DEAN ACADEMICS**  
 Dean (Academics)  
 HICET

Mapping of COs with POs and PSOs														
CO/PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO-1	PSO-2
CO1	3		3						1	1		1	2	
CO2	3	2	1							1			2	
CO3	1	3	2									1	1	
CO4	1	1	2									1	1	
CO5	3	1	1									1	1	
AVG	2.2	1.4	1.8	-	-	-	-	-	0.2	0.4	-	0.8	1.4	-

• 1-low, 2-medium, 3-high, "-"- no correlation  
 • Note: The average value of this course to be used for program articulation matrix.

  
 CHAIRMAN, BOARD OF STUDIES  
**Chairman - BoS**  
**MCT - HICET**



  
 DEAN ACADEMICS  
**Dean (Academics)**  
**HICET**

Programme	Course code	Name of the course	L	T	P	C
B.E	21MT5205	ROBOTICS IN MEDICINE	3	0	0	3

**The student should be made**

- Course Objective**
- 1 Identify and describe different types of medical robots and their potential applications.
  - 2 Know basic concepts in kinematics, Dynamics, and control relevant to Medical Robotics
  - 3 Develop the Analytical and Experimental skills necessary to Design and Implement robotic assistance for both minimally invasive surgery and Image guided interventions
  - 4 Be familiar with the state of the art in applied medical robotics and medical robotics research
  - 5 Understand the various roles that robotics can play in healthcare.

Unit	Description	Instructional Hours
	<b>INTRODUCTION</b>	
I	Types of medical robots - Navigation - Motion Replication - Imaging - Rehabilitation and Prosthetics – State of art of robotics in the field of healthcare - DICOM	9
	<b>LOCALIZATION AND TRACKING</b>	
II	Position sensors requirements - Tracking - Mechanical linkages - Optical – Sound based - Electromagnetic - Impedance-based - In-bore MRI tracking-Video matching - Fiber optic tracking systems - Hybrid systems	9
	<b>DESIGN OF MEDICAL ROBOTS</b>	
III	Characterization of gestures to the design of robots - Design methodologies - Technological choices - Security.	9
	<b>SURGICAL ROBOTICS</b>	
IV	Minimally invasive surgery and robotic integration - surgical robotic sub systems - synergistic control - Control Modes - Radio surgery – Orthopedic Surgery - Urologic Surgery and Robotic Imaging -Cardiac Surgery – Neurosurgery - case studies	9
	<b>ROBOTS IN REHABILITATION AND MEDICAL CARE</b>	
V	Rehabilitation for Limbs - Brain-Machine Interfaces - Steerable Needles - Assistive robots - Robots in Physiotherapy - case studies	9
	<b>Total Instructional Hours</b>	<b>45</b>
	CO1 Identify various medical robots and their potential applications	
	CO2 Recognize the position tracking and hybrid systems.	
<b>Course Outcome</b>	CO3 Apply Robotics and its concepts in Medical field	
	CO4 Simulate a MIS procedure and be aware of the state of art in surgical and oncology robotics.	
	CO5 Design a medical robotic system given the specific requirements for Rehabilitation and Medical care	

**TEXT BOOK:**

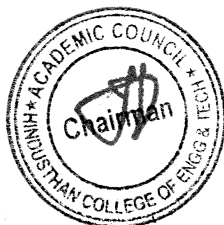
- T1 Achim Ernst FlorisSchweikard, "Medical Robotics", Springer, 2016.  
T2 Paula Gomes, "Medical robotics Minimally invasive surgery", Wood head, 2013

**REFERENCES:**

- R1 Jaydev P Desai, Rajni V Patel, Antoine Ferreira; Sunil Kumar Agrawal, "The Encyclopedia of Medical Robotics", World Scientific Publishing Co. Pvt. Ltd, 2019.  
R2 Jocelyne Troccaz , "Medical Robotics", John Wiley & Sons Incorporated, 2013.  
R3 VanjaBonzovic , "Medical Robotics", I-tech Education publishing, Austria, 2008.

*Reshma*  
CHAIRMAN, BOARD OF STUDIES

**Chairman - BoS**  
**MCT - HICET**



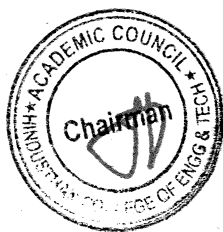
*[Signature]*  
DEAN ACADEMICS

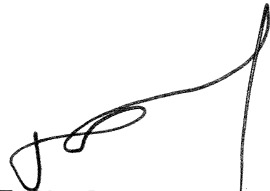
**Dean (Academics)**  
**HICET**

Mapping of COs with POs and PSOs														
CO/PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO-1	PSO-2
CO1	1		2						1	1	1	1		1
CO2	1		3									1		2
CO3			2		1									2
CO4			3											3
CO5	1		1									1		1
AVG	0.6	-	2.2	-	0.2	-	-	-	0.2	0.2	0.2	0.6	-	1.8

• 1-low, 2-medium, 3-high, "-"- no correlation  
 • Note: The average value of this course to be used for program articulation matrix.

*P. Srinivas*  
 CHAIRMAN, BOARD OF STUDIES  
 (Academics)  
 Chairman - BOS  
 MCT - HiCET



  
 DEAN ACADEMICS  
 Dean (Academics)  
 HiCET

Programme	Course code	Name of the course	L	T	P	C
B. E	21MT5206	ROBOTS AND SYSTEMS IN SMART MANUFACTURING	3	0	0	3

**The student should be made**

- Course Objective**
- 1 To get a knowledge of working on Industrial robots and their load handling capacity
  - 2 To enlist with an application of robots in various operation
  - 3 To familiar with a material handling system
  - 4 To impart the knowledge on robotic welding
  - 5 To obtain the knowledge on various type of robot welding operation

Unit	Description	Instructional Hours
	<b>INTRODUCTION</b>	
I	Types of industrial robots - Load handling capacity - general considerations in Robotic material handling-material transfer - machine loading and unloading - CNC machine tool loading – Robot centred cell	8
	<b>SELECTION OF ROBOTS AND OTHER APPLICATIONS</b>	
II	Factors influencing the choice of a robot - robot performance testing - economics of robotisation - Impact of robot on industry and society. Application of Robots in continuous arc welding - Spot welding - Spray painting -assembly operation - cleaning - robot for underwater applications.	9
	<b>MATERIAL HANDLING</b>	
III	Concepts of material handling - principles and considerations in material handling systems design - conventional material handling systems - industrial trucks - monorails - rail guided vehicles - conveyor systems -cranes and hoists - advanced material handling systems - automated guided vehicle systems - automated storage and retrieval systems(ASRS) – bar code technology - radio frequency identification technology	12
	<b>ROBOTIC WELDING</b>	
IV	Robotic welding system, Programmable and flexible control facility –Introduction-Types- Flex Pendant-Lead through programming, Operating mode of robot, Jogging-Types, programming for robotic welding, Welding simulation, Welding sequences, Profile welding	8
	<b>APPLICATIONS OF ROBOTS IN WELDING AND ALLIED PROCESSES</b>	
V	Application of robot in manufacturing: Exploration of practical application of robots in welding: Robots for car body's welding, robots for box fabrication, robots for microelectronic welding and soldering – Applications in nuclear, aerospace and ship building, case studies for simple and complex applications.	8
	<b>Total Instructional Hours</b>	<b>45</b>

**Course Outcome**

- CO1 To Recognize various concepts of Industrial Robot.  
 CO2 To Select the appropriate manufacturing procedure for Robots  
 CO3 To Apply various manufacturing process in Robot manufacturing.  
 CO4 To Learn about the Welding operation and also related to Programming  
 CO5 To Produce a manufacturing plan for developing a robot

**TEXTBOOK:**

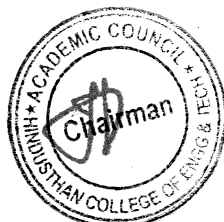
- T1 Richard D Klafter, Thom?s Achmielewski, Mickael Negin , "Robotic Engineering – An integrated Approach", Prentice Hall India, New Delhi, 2006.  
 T2 Mikell P Groover , "Automation, Production Systems, and Computer-Integrated Manufacturing", Pearson Education, New York, 2019.  
 T3 Pires J N, Loureiro A, Bolmsjo G, "Welding Robots: Technology, System Issues and Application", Springer. London, 2010.

**REFERENCES:**

- R1 Parmar R S , "Welding Processes and Technology", Khanna Publishers, New Delhi, 2<sup>nd</sup> Edition, 2013.  
 R2 John A. piotrowski, William T. Randolph , "Robotic welding: A Guide to Selection and Application, Welding Division, Robotics International of SME", Publications Development, Marketing Division, 1987.  
 R3 YoramKoren , "Robotics for Engineers", McGraw-Hill, 1987.  
 R4 Mikell P Groover, Mitchel Weiss, Roger N Nagel, N.G.Odrey, AshishDutta , "Industrial Robotics (SIE): Technology, Programming and Applications", 2nd Edition, McGraw Hill Education India Pvt Ltd, 2012.

*P. Suresh*  
 CHAIRMAN, BOARD OF STUDIES

**Chairman - BoS  
 MCT - HICET**

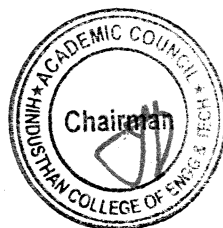


*[Signature]*  
 DEAN ACADEMICS  
**Dean (Academics)  
 HICET**

Mapping of COs with POs and PSOs														
CO/PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO-1	PSO-2
CO1	1		2						1	1	1	1		1
CO2	1		3									1		2
CO3			2		1									2
CO4			3											3
CO5	1		1									1		1
AVG	0.6	-	2.2	-	0.2	-	-	-	0.2	0.2	0.2	0.6	-	1.8
<ul style="list-style-type: none"> <li>• 1-low, 2-medium, 3-high, '-'- no correlation</li> <li>• Note: The average value of this course to be used for program articulation matrix.</li> </ul>														

*Prasanna*  
CHAIRMAN, BOARD OF STUDIES

**Chairman - BoS  
MCT - HICET**

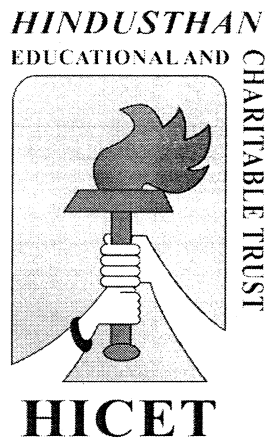


*[Signature]*  
DEAN ACADEMICS  
**Dean (Academics)  
HICET**



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

**B.E. MECHATRONICS ENGINEERING**



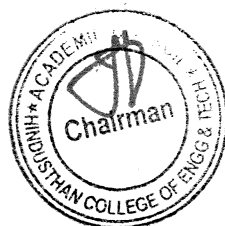
**CHOICE BASED CREDIT SYSTEM**

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



# **CURRICULUM**

## **R2019**





**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.E. MECHATRONICS ENGINEERING (UG)**

**REGULATION-2019**

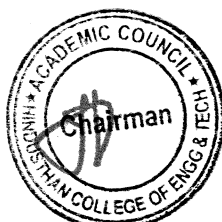
For the students admitted during the academic year 2020-2021 and onwards

**SEMESTER I**

S.No.	Course Code	Course Title	Type	L	T	P	C	CIA	ESE	TOTAL
<b>THEORY</b>										
1.	19HE1101	Technical English	HS	2	1	0	3	25	75	100
2.	19MA1102	Calculus and Linear Algebra	BS	3	1	0	4	25	75	100
<b>THEORY &amp; LAB COMPONENT</b>										
3.	19PH1151	Applied Physics	BS	2	0	2	3	50	50	100
4.	19CY1151	Chemistry for Engineers	BS	2	0	2	3	50	50	100
5.	19CS1151	Python Programming and Practices	ES	2	0	2	3	50	50	100
6.	19ME1152	Engineering Drawing	ES	1	0	4	3	50	50	100
<b>PRACTICAL</b>										
7.	19HE1071	Language Competency Enhancement Course-I	HS	0	0	2	1	100	0	100
<b>MANDATORY COURSES</b>										
8.	19HE1072	Career Guidance Level – I Personality, Aptitude and Career Development	EEC	2	0	0	0	100	0	100
9.	19HE1073	Entrepreneurship & Innovation	EEC	1	0	0	0	100	0	100
<b>Total:</b>				<b>15</b>	<b>2</b>	<b>11</b>	<b>20</b>	<b>550</b>	<b>350</b>	<b>900</b>
As Per AICTE Norms 3 Weeks Induction Programme is Added in The First Semester as an Audit Course										

**SEMESTER II**

S.No.	Course Code	Course Title	Type	L	T	P	C	CIA	ESE	TOTAL
<b>THEORY</b>										
1.	19HE2101	Business English for Engineers	HS	2	1	0	3	25	75	100
2.	19MA2101	Differential Equations and Complex Variables	BS	3	1	0	4	25	75	100
3.	19ME2101	Engineering Mechanics	ES	3	0	0	3	25	75	100
<b>THEORY &amp; LAB COMPONENT</b>										
4.	19PH2151	Material Science	BS	2	0	2	3	50	50	100
5.	19CY2151	Environmental Studies	BS	2	0	2	3	50	50	100



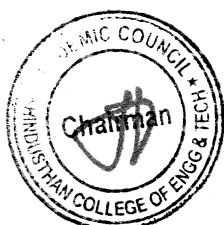
6.	19MT2153	Basics of Mechatronics Engineering	ES	2	0	2	3	50	50	100
<b>PRACTICALS</b>										
7.	19ME2001	Engineering Practices Laboratory	ES	0	0	4	2	50	50	100
8.	19HE2071	Language Competency Enhancement Course-II	HS	0	0	2	1	100	0	100
<b>MANDATORY COURSES</b>										
9.	19HE2072	Career Guidance Level – II Personality, Aptitude and Career Development	EEC	2	0	0	0	100	0	100
<b>Total:</b>				16	2	11	22	475	425	900

#### SEMESTER III

S.No	Course Code	Course Title	Type	L	T	P	C	CIA	ESE	TOTAL
<b>THEORY</b>										
1.	19MA3101	Fourier Series and Statistics	BS	3	1	0	4	25	75	100
2.	19MT3201	Mechanics of solids	PC	3	1	0	4	25	75	100
3.	19MT3202	Industrial Motor Control	PC	3	0	0	3	25	75	100
4.	19MT3203R	Digital Electronics in Mechatronics Systems	PC	3	0	0	3	25	75	100
<b>THEORY AND LAB COMPONENT</b>										
5.	19MT3251R	Production Technology	PC	2	0	2	3	50	50	100
<b>PRACTICALS</b>										
6.	19MT3001	Computer Aided Drafting Laboratory	PC	0	0	3	1.5	50	50	100
7.	19MT3002R	Industrial Motor Control Laboratory	PC	0	0	3	1.5	50	50	100
<b>MANDATORY COURSES</b>										
8.	19MC3191	Indian Constitution	MC	2	0	0	0	100	0	100
9.	19HE3072	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
<b>Total</b>				19	2	8	20	550	450	1000

#### SEMESTER IV

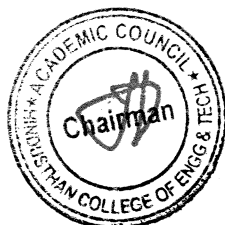
S.No	Course Code	Course Title	Type	L	T	P	C	CIA	ESE	TOTAL
<b>THEORY</b>										
1.	19MA4101	Numerical Methods	BS	3	1	0	4	25	75	100
2.	19MT4201R	Microcomputer Systems and Microcontroller	PC	3	0	0	3	25	75	100
3.	19MT4202	Thermodynamics and Fluid Engineering	PC	3	1	0	4	25	75	100
4.	19MT4203R	Theory of Machines	PC	3	1	0	4	25	75	100



THEORY AND LAB COMPONENT										
5.	19MT4251	Sensors and Signal Conditioning	PC	2	0	2	3	50	50	100
PRACTICALS										
6.	19MT4001R	Assembly Programming and Interfacing Laboratory	PC	0	0	3	1.5	50	50	100
7.	19MT4002	Solid and Fluid Mechanics & Machinery Laboratory	PC	0	0	3	1.5	50	50	100
MANDATORY COURSES										
8.	19MC4191	Essence of Indian tradition knowledge Value Education	MC	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
<b>Total</b>				<b>18</b>	<b>3</b>	<b>8</b>	<b>21</b>	<b>450</b>	<b>450</b>	<b>900</b>

#### SEMESTER V

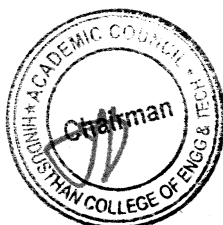
S. No	Course Code	Course Title	Category	L	T	P	C	CIA	ESE	Total
1.	19MT5201	Machine Design	PC	3	1	0	4	25	75	100
2.	19MT5202	Industrial Automation and Control	PC	3	0	0	3	25	75	100
3.	19MT5203	Control of Mechatronics Systems	PC	3	0	0	3	25	75	100
4.	19MT53XX	Professional Elective - I	PE	3	0	0	3	25	75	100
THEORY AND LAB COMPONENT										
5.	19MT5251	Fluid Power Systems	PC	2	0	2	3	50	50	100
6.	19MT5252	Object Oriented Programming	PC	2	0	2	3	50	50	100
PRACTICALS										
7.	19MT5001	Computer Aided Machine Drawing Laboratory	PC	0	0	3	1.5	50	50	100
8.	19MT5002	Industrial Automation and Control Laboratory - I	PC	0	0	3	1.5	50	50	100
MANDATORY COURSES										
9.	19HE5071	Soft Skills - I	EEC	1	0	0	1	25	75	100
10.	19HE5072	Design Thinking	EEC	1	0	0	1	25	75	100
<b>TOTAL</b>				<b>18</b>	<b>1</b>	<b>10</b>	<b>24</b>	<b>500</b>	<b>500</b>	<b>1000</b>



**SEMESTER VI**

S. No	Course Code	Course Title	Category	L	T	P	C	CIA	ESE	Total	
<b>THEORY</b>											
1.	19MT6181	Total Quality Management	IIS	3	0	0	3	25	75	100	
2.	19MT6201	Design of Mechatronics Systems	PC	3	0	0	3	25	75	100	
3.	19MT6202R	CNC Technology	PC	3	0	0	3	25	75	100	
4.	19MT63XX	Professional Elective - II	PE	3	0	0	3	25	75	100	
5.	19XX6401	Open Elective – I	OE	3	0	0	3	25	75	100	
<b>THEORY AND LAB COMPONENT</b>											
6.	19MT6251	Vetronics	PC	2	0	2	3	50	50	100	
<b>PRACTICALS</b>											
7.	19MT6001	CNC Laboratory	PC	0	0	3	1.5	50	50	100	
8.	19MT6002	Industrial Automation and Control Laboratory - II	PC	0	0	3	1.5	50	50	100	
9.	19MT6701	Inplant Training / Internship *	EEC	0	0	0	1	100	0	100	
<b>MANDATORY COURSES</b>											
10.	19HE6071	Soft Skills - II	EEC	1	0	0	1	25	75	100	
11.	19HE6072	Intellectual Property Rights(IPR)	EEC	1	0	0	1	25	75	100	
				<b>TOTAL</b>	<b>19</b>	<b>0</b>	<b>8</b>	<b>24</b>	<b>575</b>	<b>525</b>	<b>1100</b>

S.No.	Course Code	Course Title	Type	L	T	P	C	CIA	ESE	TOTAL
<b>PROFESSIONAL ELECTIVE I</b>										
1.	19MT5301	Engineering Metrology and Measurements	PE	3	0	0	3	25	75	100
2.	19MT5302	Non-Traditional Machining Techniques	PE	3	0	0	3	25	75	100
3.	19MT5303	Automobile Systems	PE	3	0	0	3	25	75	100
4.	19MT5304	Operational Research	PE	3	0	0	3	25	75	100
5.	19MT5305	Materials Science and Applications	PE	3	0	0	3	25	75	100
<b>PROFESSIONAL ELECTIVE II</b>										
1.	19MT6301	Embedded System	PE	3	0	0	3	25	75	100
2.	19MT6302	Discrete Event System Simulation	PE	3	0	0	3	25	75	100



3.	19MT6303	Product Design and Development	PE	3	0	0	3	25	75	100
4.	19MT6304	Non-Destructive Testing Techniques	PE	3	0	0	3	25	75	100
5.	19MT6305	Distinctive Electrical Machines	PE	3	0	0	3	25	75	100

#### OPEN ELECTIVE

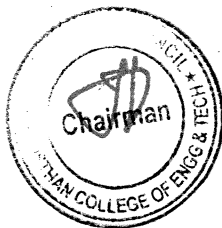
S.No.	Course Code	Course Title	Type	L	T	P	C	CIA	ESE	TOTAL
1.	19MT6401	Industrial Safety and Environment	OE	3	0	0	3	25	75	100

#### SEMESTER VII

S. No	Course Code	Course Title	Category	L	T	P	C	CIA	ESE	Total
<b>THEORY</b>										
1.	19MT7201	Virtual Instrumentation and Human Machine Interface	PC	3	1	0	4	25	75	100
2.	19MT7202	Machine Vision Systems	PC	3	0	0	3	25	75	100
3.	19MT73XX	Professional Elective - III	PE	3	0	0	3	25	75	100
4.	19XX7401	Open Elective – II	OE	3	0	0	3	25	75	100
<b>THEORY AND LAB COMPONENT</b>										
5.	19MT7251	Industrial Robotics	PC	2	0	3	3.5	50	50	100
<b>PRACTICALS</b>										
6.	19MT7001	CAE Laboratory	PC	0	0	3	1.5	50	50	100
<b>PROJECT WORK</b>										
7.	19MT7901	Project Phase – I	EEC	0	0	4	2	100	0	100
<b>TOTAL</b>				<b>14</b>	<b>1</b>	<b>10</b>	<b>20</b>	<b>300</b>	<b>400</b>	<b>700</b>

#### PROFESSIONAL ELECTIVE III

S.No.	Course Code	Course Title	Type	L	T	P	C	CIA	ESE	TOTAL
1.	19MT7301	Mobile Robotics	PE	3	0	0	3	25	75	100
2.	19MT7302	Textile Automation	PE	3	0	0	3	25	75	100
3.	19MT7303	Medical Mechatronics	PE	3	0	0	3	25	75	100
4.	19MT7304	Disaster Management	PE	3	0	0	3	25	75	100
5.	19MT7305	Factory Automation	PE	3	0	0	3	25	75	100



**OPEN ELECTIVE**

S.No.	Course Code	Course Title	Type	L	T	P	C	CIA	ESE	TOTAL
1.	19MT7401	Project Management	OE	3	0	0	3	25	75	100

**SEMESTER VIII**

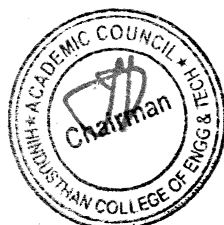
S.No	Course Code	Course Title	Type	L	T	P	C	CIA	ESE	TOTAL
<b>THEORY</b>										
1.	19MT83XX	Professional Elective - IV	PE	3	0	0	3	25	75	100
2.	19MT83XX	Professional Elective - V	PE	3	0	0	3	25	75	100
<b>PRACTICAL</b>										
3.	19MT8901	Project Phase – II	EEC	0	0	16	8	100	0	100
<b>Total</b>				<b>6</b>	<b>0</b>	<b>16</b>	<b>14</b>	<b>150</b>	<b>150</b>	<b>300</b>

**PROFESSIONAL ELECTIVE IV**

1.	19MT8301	Rapid Prototyping and Reverse Engineering	PE	3	0	0	3	25	75	100
2.	19MT8309	Introduction to Industry 4.0 and Industrial Internet of Things (NPTEL)	PE	3	0	0	3	25	75	100
3.	19MT8303	Artificial Intelligence for Mechatronics Engineering	PE	3	0	0	3	25	75	100
4.	19MT8304	MEMS and Nano Technology	PE	3	0	0	3	25	75	100
5.	19MT8305	Information System for Engineers	PE	3	0	0	3	25	75	100

**PROFESSIONAL ELECTIVE V**

S.No.	Course Code	Course Title	Type	L	T	P	C	CIA	ESE	TOTAL
1.	19MT8306	Machineries in Agriculture	PE	3	0	0	3	25	75	100
2.	19MT8307	Industrial Diagnostics and Maintenance Techniques	PE	3	0	0	3	25	75	100
3.	19MT8308	Engineering Economics and Cost Analysis	PE	3	0	0	3	25	75	100
4.	19MT8181	Principles of Management	PE	3	0	0	3	25	75	100
5.	19MT8182	Professional Ethics in Engineering	PE	3	0	0	3	25	75	100





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

#### SEMESTER-WISE CREDIT DISTRIBUTION

B.E. / B.TECH. PROGRAMMES										
S.No.	Course Area	Credits per Semester								
		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	-	-	-	-	-	-	14
4	PC	-	-	16	17	19	12	12		76
5	PE	-	-	-	-	03	03	03	06	15
6	OE	-	-	-	-	-	03	03	-	06
7	EEC	-	-	-	-	02	03	02	08	15
<b>Total</b>		<b>20</b>	<b>22</b>	<b>20</b>	<b>21</b>	<b>24</b>	<b>24</b>	<b>20</b>	<b>14</b>	<b>165</b>

#### CREDIT DISTRIBUTION R2019

Semester	I	II	III	IV	V	VI	VII	VIII	Total
Credits	20	22	20	19	24	24	20	14	165

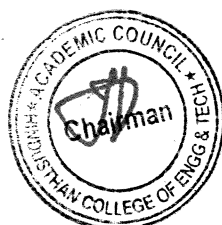
  
Chairman BoS

  
Dean Academics

  
Principal

**Chairman - BoS**  
**MCT - HICET**

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



Programme	Course Code	Name of the Course	L	T	P	C
BE	19MT7201	<b>VIRTUAL INSTRUMENTATION AND HUMAN MACHINE INTERFACE</b>	3	1	0	4

- Course Objective
1. Understand the basic components of virtual instrumentation system
  2. To develop a VI program using various techniques
  3. Identify elements of data acquisition for software and hardware installation
  4. To gain the knowledge about different types of common instrument interfaces
  5. To learn to develop applications based on virtual instrumentation system

Unit	Description	Instructional Hours
	<b>VIRTUAL INSTRUMENTATION</b>	
I	Conventional and Distributional Virtual Instrumentation(VI) - VI Vs Traditional Instruments - Block Diagram and Architecture of a Virtual Instrument - Hardware and Software in VI - Virtual instrumentation for Test, Control and Design - Virtual instrument in Engineering Process - Graphical Programming in Data Flow - HMI / SCADA Software.	9+3
	<b>VI PROGRAMMING TECHNIQUES</b>	
II	Controlling Programs through Structures: For loops and While loops - Case and Sequence Structures: Flat sequence and Stacked sequence - Shift Register - Feedback Nodes - Formula Nodes - Arrays - Clusters - Error Handling - Waveform Charts and Waveform Graphs - XY Graphs - Strings - File I/O.	9+3
	<b>DATA ACQUISITION BASICS</b>	
III	Concepts of Data Acquisition - Data Acquisition in LabVIEW - Hardware Installation and Configuration - Components of DAQ - DAQ Signal Accessory - DAQ Assistant - DAQ Hardware - DAQ Software.	9+3
	<b>INTERFACING</b>	
IV	Common Instrument Interfaces: RS 232 / RS485 - GPIB - VISA standard - Bus Interfaces: USB-PCI - PCI - X - PXI - PCMCIA - SCXI-VXI - LXI.	9+3
	<b>APPLICATIONS</b>	
V	Application of Virtual Instrumentation: Digital Stop Watch using Lab VIEW - BCD to Seven Segment Decoder - Cruise Control - PID Controller - Client Server Application in LABVIEW - Notifiers, Simple Read Only Server, Two Way Communication, Read Write Server.	9+3
	The students can design anyone of the following	
	1. Design a Simulator Barometer using LabVIEW.	
	2. Design a LabVIEW Program to Simulate Virtual Joystick.	
	<b>Total Instructional Hours</b>	45+15=60

- On completion of the course the students will be able to
- Course Outcome
- CO1: Demonstrate the basic concepts about virtual instrumentation
  - CO2: Develop programming through LabVIEW graphical programming environment
  - CO3: Experiment with data acquisition hardware and LabVIEW software
  - CO4: Apply the knowledge of common instrument interfaces and bus interfaces
  - CO5: Design and develop the industrial applications using LabVIEW

#### TEXT BOOKS:

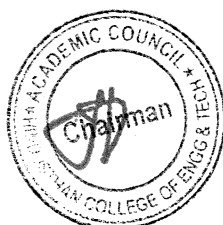
- T1- Jovitha Jerome, "Virtual Instrumentation using LabVIEW", PHI Learning Private Limited, 2012.  
T2- S.Sumathi&P.Surekha, "Virtual Instrumentation with LabVIEW", ACME Learning Private Limited, 2011.

#### REFERENCE BOOKS:

- R1- Sanjay Gupta & Joseph John, "Virtual Instrumentation using LabVIEW", McGraw Hill Education, New York, 2010.  
R2- Gary Johnson & Richard Jennings, "LabVIEW Graphical Programming", 4<sup>th</sup> Edition, McGraw Hill Education, New York, 2006.  
R3- Jeffrey Travis & Jim Kring, "Labview for Everyone", PHI Learning Private Limited, 3<sup>rd</sup> Edition, 2007.

*Prasanna*  
CHAIRMAN, BOARD OF STUDIES

**Chairman - BoS**  
**MCT - HICET**



*[Signature]*  
DEAN ACADEMICS

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

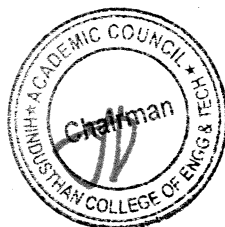
Mapping of COs with POs and PSOs

CO/PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO-1	PSO-2
CO1	3				1							1	3	2
CO2	3	3	3	2	1			3	2		2	2	2	2
CO3	3	3	3	2	2			2	3			2	2	2
CO4	3				2				2			2	1	2
CO5	3	3	3	2	2			1	2		2	2	2	2
AVG	3	1.8	1.8	1.2	1.6	-	-	1.2	1.8	-	0.8	1.8	2	2

- 1-low, 2-medium, 3-high, "-"- no correlation
- Note: The average value of this course to be used for program articulation matrix.

*Boomy*  
CHAIRMAN, BOARD OF STUDIES

**Chairman - BoS  
MCT - HiCET**



*[Signature]*  
DEAN ACADEMICS

**Dean (Academics)  
HiCET**

Programme	Course Code	Name of the Course	L	T	P	C
BE	19MT7202	MACHINE VISION SYSTEM	3	0	0	3

- Course Objective
1. To describe known basic principles of Machine Vision System
  2. To study the Image Acquisition and Lighting techniques
  3. To review Image processing techniques for Computer Vision
  4. To study Mathematical Transforms necessary for Image Processing.
  5. To study some applications of Machine Vision Algorithms

Unit	Description	Instructional Hours
I	<b>INTRODUCTION</b> Human vision – Machine vision and Computer vision – Benefits of Machine vision – Block diagram and Function of Machine Vision System Implementation of Industrial Machine Vision System.	9
II	<b>IMAGE ACQUISITION</b> Lighting Techniques – Types and Selection – Machine Vision Lenses and Optical Filters, Specifications and Selection– Imaging Sensors – CCD and CMOS, Specifications – Interface Architectures – Analog and Digital Cameras – Digital Camera Interfaces – Camera Computer Interfaces.	9
III	<b>IMAGE PROCESSING</b> Fundamentals of Digital Image – Spatial and Frequency Domain – image segmentation- Thresholding- Grayscale Stretching –Image Smoothing and Sharpening – Edge Detection – Binary Morphology.	9
IV	<b>IMAGE ANALYSIS</b> Feature Extraction – Region Features, Shape and Size Features – Texture Analysis – Template Matching and Classification – 3D Machine Vision Techniques – Decision Making.	9
V	<b>MACHINE VISION APPLICATIONS</b> Machine vision Applications in Manufacturing, Electronics, Printing, Pharmaceutical, Textile, Applications in Metrology and Gauging–Bio medical Field. Surveillance, Biometrics.	9
<b>Total Instructional Hours</b>		45

- Course Outcome
- On completion of the course the students will be able to
- CO1: Implement fundamental required for Machine Vision
  - CO2: Evaluate the techniques for Camera Lighting Interface.
  - CO3: Develop Image Processing techniques for Machine Vision System
  - CO4: Interpret Image Segmentation and Representation Techniques
  - CO5: Develop an applications using Machine Vision Techniques

#### TEXT BOOKS:

- T1- A. Alexander Hornberg, “*Handbook of Machine Vision*”, First Edition, 2006.
- T2- Milan Sonaka, Vaclav hlavac, Roger Boyle, *Image processing, analysis and machine vision*” First edition 2007.

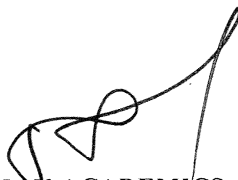
#### REFERENCE BOOKS:

- R1- E.R.Davies, “Machine Vision”, Third edition, 2006.
- R2- Rafael C.Gonzales, Richard.E.Woods. “*Digital Image Processing Publishers*”, Fourth Edition 2007.
- R3- Emanuel Trucco, Alessandro Verri. “Introductory Techniques for 3D computer vision”, 1<sup>st</sup> Edition, PHI Learning Private Limited, 2006.
- R4- Herbert Freeman, “Machine Vision Algorithms, Architecture and Systems”, Academic Press, Inc. 2012.

  
CHAIRMAN, BOARD OF STUDIES

**Chairman - BoS  
MCT - HiCET**



  
DEAN ACADEMICS  
**Dean (Academics)  
HiCET**

Mapping of COs with POs and PSOs														
CO/PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO-1	PSO-2
CO1	3		2		3				3	3	3	3	1	1
CO2	1		3						1	1	1	1	2	1
CO3	1		2		3				1	1	1	1	2	2
CO4	1		3										3	2
CO5	1		1									1	1	2
AVG	1.4	-	2.2	-	1.2	-	-	-	1	1	1	1.2	1.8	1.6

• 1-low, 2-medium, 3-high, "-"- no correlation  
 • Note: The average value of this course to be used for program articulation matrix.

*Perang*  
 CHAIRMAN, BOARD OF STUDIES

**Chairman - BoS  
 MCT - HiCET**



*[Signature]*  
 DEAN ACADEMICS

**Dean (Academics)  
 HiCET**

Programme	Course Code	Name of the Course	L	T	P	C
BE	19MT7251	INDUSTRIAL ROBOTICS	2	0	3	3.5

- Course Objective
1. To outline the evolution of robots and its anatomy
  2. To describe the various kinematics and inverse kinematics of robot motions
  3. To illustrate the principle of robot end effectors
  4. To acquire knowledge about basics of robot programming
  5. To discuss the applications of robots in industries

Unit	Description	Instructional Hours
	<b>FUNDAMENTALS OF ROBOTICS</b>	
I	Definition and History of Robotics - Classification of Robots - Robot Anatomy - Robot Coordinates - Workspace - Degrees of Freedom - Asimov's Laws of Robotics. Robot Actuators and Drives.	6
	<b>ROBOT KINEMATICS</b>	
II	Introduction to Robot kinematics - Homogeneous Transformations - Forward Kinematics - Denavit - Hartenberg (D-H) Representation - Inverse kinematics. Basics of Trajectory Planning.	6
	<b>ROBOT END EFFECTORS</b>	
III	Robot End effectors: Introduction - Types of End Effectors - Mechanical Gripper - Types of Gripper Mechanism - Other Types of Grippers - Special Purpose Grippers - Design Considerations - Tools as End Effector - Robot End Effector Interface.	6
	<b>ROBOT PROGRAMMING</b>	
IV	Robot Programming: Types – Lead through and Textual Programming – Robot Languages - Classification of Robot Language - Computer Control and Robot Software. Val system and languages	6
	<b>APPLICATIONS OF ROBOT</b>	
V	Machine Interface - Robots in Manufacturing and Non - Manufacturing Applications - Medical Applications - Automation and Mechatronics Applications	6
<b>Total Instructional Hours</b>		<b>30</b>

#### LABORATORY COURSES

- 1 Programming for Point-to-Point Operation and Continuous Path Operation.
- 2 Programming for Pick and Place Operation with and without delay.
- 3 Programming for Estimation of Accuracy of a Robot.
- 4 Programming for Estimation of Repeatability and Resolution of a Robot.
- 5 Programming for Estimation of work volume for different configuration of Robot.
- 6 Programming for Loading and Unloading Operations with Different Cycles.
- 7 Create a Model to Find the Force in Spring Damper at Static Equilibrium and Simulate using ADAMS Software.
- 8 Create Geometry of the Lift Mechanism and then Set the Constraints of the Model and Simulate using ADAMS Software

**Total Practical Hours 20**

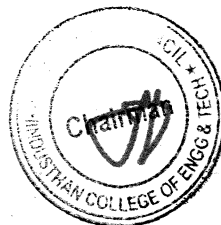
**Total Hours 50**

On completion of the course the students will be able to

- Course Outcome
- CO1: Explain the basic concepts and working of robot.
  - CO2: Analyze the kinematics of robot motions for a given problem
  - CO3: Evaluate and construct a robot end effector for specific applications
  - CO4: Write programs for the given applications
  - CO5: Design a robot for real world problems and applications

*P. S. V. M.*  
CHAIRMAN, BOARD OF STUDIES

**Chairman - BoS  
MCT - HiCET**



*[Signature]*  
DEAN ACADEMICS  
**Dean (Academics)  
HiCET**

**TEXT BOOKS:**

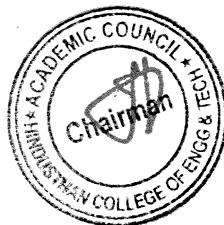
T1 - Mikell P. Groover, Mitchell Weiss, Roger N. Nagel Nicholas G. Odrey, "Industrial Robotics Technology, Programming and Applications ", 2nd Edition, Tata McGraw Hill Publishing Company Limited, New Delhi, 2012.  
 T2 - Saeed B. Niku "Introduction to Robotics: Analysis, Systems, Applications", 2nd Edition, John Wiley & Sons Ltd., New Delhi, 2012.

**REFERENCE BOOKS:**

R1- Deb. S.R., "Robotics Technology and Flexible Automation". 2nd Edition, Tata McGraw Hill Publishing Company Limited, New Delhi, 2010.  
 R2- Klafter R.D., Chimielewski T.A., Negin M., "Robotic Engineering - An integrated approach", PHI Learning Private Limited, New Delhi, 2003.  
 R3- Fu K.S. Gonzalez R.C. and Lee C.S.G., "Robotics Control Sensing, Vision and Intelligence". Tata McGraw Hill Publishing Company Limited, New Delhi, 2008.  
 R4- John.J. Craig, " Introduction to Robotics: Mechanics & control", Pearson Publication, Fourth edition, 2018.

Mapping of COs with POs and PSOs														
CO/PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO1 0	PO1 1	PO1 2	PSO-1	PSO-2
CO1	1		2						1	1	1	1		1
CO2	1		3									1		2
CO3			2		1									2
CO4			3											3
CO5	1		1									1		1
AVG	0.6	-	2.2	-	0.2	-	-	-	0.2	0.2	0.2	0.6	-	1.8
<ul style="list-style-type: none"> <li>• 1-low, 2-medium, 3-high, "-"- no correlation</li> <li>• Note: The average value of this course to be used for program articulation matrix.</li> </ul>														

*Permy*  
**CHAIRMAN, BOARD OF STUDIES**  
**Chairman - BoS**  
**MCT - HICET**



*[Signature]*  
**DEAN ACADEMICS,**  
**Dean (Academics)**  
**HICET**

Programme	Course code	Name of the course	L	T	P	C
B.E	19MT7001	COMPUTER AIDED ENGINEERING LABORATORY	0	0	3	1.5

**The student should be made**

- Course Objective**
- 1 To introduce fundamentals of the analysis software, its features and applications
  - 2 To learn the basics of Finite Element analysis.
  - 3 To study the various failure modes of engineering components
  - 4 To acquire knowledge on various loads and stresses acting on structures and components
  - 5 To expose the students to different applications of simulation and analysis tools.

Unit	Description	Instructional Hours
1	Stress analysis of a plate with a circular hole.	3
2	Stress analysis of rectangular L bracket	3
3	Stress analysis of an axi-symmetric component	3
4	Stress analysis of Cantilever beam	3
5	Stress analysis of Simply supported beam	3
6	Stress analysis of Fixed beam	3
7	Mode frequency analysis of a 2D component	3
8	Mode frequency analysis of Cantilever beam	3
9	Mode frequency analysis of Aircraft wing	3
10	Thermal stress analysis of a 2D component	3
11	Conductive heat transfer analysis of a 2D component	3
12	Convective heat transfer analysis of a 2D component	3
<b>Total Instructional Hours</b>		<b>45</b>

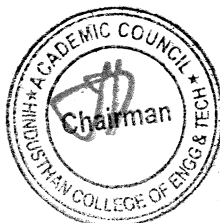
- Course Outcome**
- CO1 Execute stress calculations for various load conditions
  - CO2 Perform the stress and deformation analysis of different components
  - CO3 Analyze and simulate deformation plot for structural and thermal loads
  - CO4 Model and analyze the real world system
  - CO5 Evaluate the performance of real world system

Mapping of COs with POs and PSOs														
CO/PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO-1	PSO-2
CO1	2	2	2	2	2	2	2	2	2	2	2	2	1	1
CO2	3	1	2	1	-	-	-	-	-	-	-	-	2	2
CO3	-	3	3	2	-	-	-	-	1	-	-	-	3	3
CO4	-	1	1	-	-	-	-	-	-	-	-	-	1	1
CO5	2	2	2	2	-	-	-	-	-	-	-	1	2	2
AVG	2.3	1.8	2	1.75	2	2	2	2	1.5	2	2	1.5	1.8	1.8

• 1-low, 2-medium, 3-high, "-" no correlation  
 • Note: The average value of this course to be used for program articulation matrix.

*Resumes*  
 CHAIRMAN, BOARD OF STUDIES

**Chairman - BoS**  
**MCT - HICET**



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



LAB COURSES

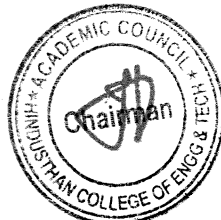
Programme	Course Code	Name of the Course	L	T	P	C
BE	19MT7901	PROJECT PHASE I	0	0	4	2
Course Objective		1. To develop the ability to solve a specific problem right from its identification and literature review till the successful solution of the same. 2. To train the students in preparing project reports and to face reviews and viva voce examination.				

The student in a group of 3 works on a topic approved by the head of the department under the guidance of a faculty member and prepares a comprehensive project report after completing the work to the satisfaction of the supervisor. The progress of the project is evaluated based on a minimum of three reviews. The review committee may be constituted by the Head of the Department. A project report is required at the end of the semester. The project work is evaluated based on oral presentation and the project report jointly by external and internal examiners constituted by the COE / Head of the Department.

Course Outcome On completion of the course the students will be able to in a position to take up any challenging practical problems and find solution by formulating proper methodology

*Renuka*  
CHAIRMAN, BOARD OF STUDIES

CHAIRMAN, BOARD OF STUDIES  
SMT HICET



*[Signature]*  
DEAN ACADEMICS

Dean (Academic)  
HICET

Programme	Course Code	Name of the Course	L	T	P	C
BE	19MT7301	MOBILE ROBOTICS	3	0	0	3

- Course Objective
1. Design and Kinematic modeling of Mobile robots
  2. Develop the Path and Trajectory for the Robot
  3. Identify the Robot performance characteristics through Sensors
  4. Locate the Robot and Mapping
  5. Write algorithms in Path Planning and Navigation

Unit	Description	Instructional Hours
	<b>MOBILE ROBOT</b>	
I	Introduction - Locomotion, Classification - Legged, Wheeled, Aerial. Key Issues in Locomotion. Mobile Robot Kinematics - Kinematic Model - Forward Kinematic Model, Representing Position, Wheel Kinematic Constraints and Robot Kinematic Constraints.	9
	<b>ROBOT MANEUVERABILITY AND WORKSPACE</b>	
II	Degree of Mobility - Degree of Steerability - Robot Maneuverability - Degrees of Freedom - Holonomic Robots - Path and Trajectory Considerations - Motion Control - Open Loop Control and Feedback Control.	9
	<b>PERCEPTION</b>	
III	Sensors for Mobile Robots - Classification, Performance, Uncertainty in Sensors, Wheel Sensor - Heading Sensor- Accelerometers - Inertial Measurement - Motion Sensor - Range Sensors - Vision Sensor - Basics of Computer Vision, Image Processing Techniques, Feature Extraction - Image, Range Data Location Recognition.	9
	<b>LOCALIZATION</b>	
IV	Major Challenges, Localization Based Navigation. Belief Representation, Map Representation, Probabilistic Map - Examples of Localization Systems - Autonomous Map Building.	9
	<b>PLANNING AND NAVIGATION</b>	
V	Planning and Reaction - Path Planning - Graph search, Potential field - Obstacle Avoidance - Bug Algorithm, Histogram, Curvature Velocity Techniques - Navigation Architecture - Case Studies on Rock Climbing.	9
	<b>Total Instructional Hours</b>	45

On completion of the course the students will be able to

Course Outcome

- CO1: Design and Modeling of Mobile Robots
- CO2: Model the Trajectory Path of the Robot
- CO3: Interpret various Sensors used for Perception
- CO4: Prepare Localizing and Mapping the Robot
- CO5: Develop the Navigation Path of the Robot

**TEXT BOOKS:**

- T1- Siegwart, Nourbakhsh, "Introduction to Autonomous Mobile Robots", 2<sup>nd</sup> Edition, MIT Press, 2011.
- T2- Siciliano. et.al, "Robotics: Modelling, Planning and Control", 4th Edition, Springer, 2013.

**REFERENCE BOOKS:**

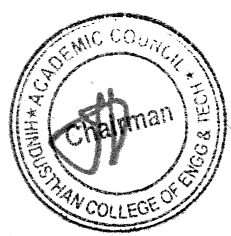
- R1- Choset Et. al, "Principles of Robot Motion: Theory, Algorithm & Implementations", 3<sup>rd</sup> Edition, MIT Press, 2011.
- R2- Siciliano, Khatib, Eds., "Handbook of Robotics", 4<sup>th</sup> Edition, Springer, 2008.
- R3- Thrun, Burgard, Fox, "Probabilistic Robotics", 1<sup>st</sup> Edition, MIT Press, 2010.
- R4- Roland Siewart et al, "Introduction to Autonomous Mobile Robotics", 2<sup>nd</sup> Edition, PHI Learning Pvt Ltd, 2011.

**WEB REFERENCES:**

- 1. <http://www.intechopen.com/books/mobile-robots-current-trends>
- 2. <http://www.telegraph.co.uk/lifestyle/pets/10200202/Official-studies-strengthen-case-for-electric-collar-ban-says-dog-group.html>
- 3. <http://cw.routledge.com/textbooks/eresources/9780750651868/casestudies-12.doc>

*Peemal*  
CHAIRMAN, BOARD OF STUDIES

**Chairman - BoS  
MCT - HICET**



*[Signature]*  
DEAN ACADEMICS

**Dean (Academics)  
HICET**

Mapping of COs with POs and PSOs														
CO/PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO-1	PSO-2
CO1	1		2						1	1	1	1		1
CO2	1		3									1		2
CO3			2		1									2
CO4			3											3
CO5	1		1									1		1
AVG	0.6	-	2.2	-	0.2	-	-	-	0.2	0.2	0.2	0.6	-	1.8

• 1-low, 2-medium, 3-high, "-"- no correlation  
 • Note: The average value of this course to be used for program articulation matrix.

*Prasanna*  
CHAIRMAN, BOARD OF STUDIES

**Chairman - BoS  
MCT - HICET**



*[Signature]*  
DEAN ACADEMICS  
**Dean (Academic)  
HICET**

Programme BE	Course Code 19MT7302	Name of the Course TEXTILE AUTOMATION	L 3	T 0	P 0	C 3
-----------------	-------------------------	--	--------	--------	--------	--------

- Course Objective
1. To summarize the Basic concepts and list the Basic processing of the Textile Technology
  2. To familiarize with the Basics of Spinning
  3. To interpret the Basics of Weaving Process and its Variables
  4. To operate the Automated Spinning Machines
  5. To impart the knowledge about the Basics of Waving Machines

Unit	Description	Instructional Hours
	<b>BASICS OF PROCESSING</b>	
I	History of Textile Technology and its Advancements - Introduction to Textile Fibers - Overview of Textile Manufacturing - Introduction to Automation in Textile Industries - Objectives and Process Variables in Processing Machines - Singeing - Desizing - Scouring - Bleaching - Mercerizing - Dyeing - Printing - Finishing - Robotics in Textile Industries.	9
	<b>BASICS OF SPINNING</b>	
II	Spinning Process Flow Chart - Objectives and Process Variables of Textile Spinning Machineries - Mixing - Blow Room - Carding - Draw Frame - Combing - Speed Frame - Ring Frame - Rotor Spinning.	9
	<b>BASICS OF WEAVING</b>	
III	Weaving Process Flowchart - Objectives and Process Variables in Weaving - Preparatory Winding, Warping, Sizing and Beaming - Objectives and Process Variables in Weaving - Drawing In, Knotting, Denting and Weaving.	9
	<b>AUTOMATION IN SPINNING MACHINERY</b>	
IV	Machinery Material Flow and its Variation Controls - Feeders & Stop Motions - Auto Levelers - Safety Switches - Production and Quality Monitors - Full Doff and Preset Length Monitors - Data Acquisition System for Spinning Preparatory - Ring Spinning - Rotor Spinning - CAD / CAM / CIM in Spinning.	9
	<b>AUTOMATION IN WEAVING MACHINERY</b>	
V	Yarn Cleaner Controls - Knotter / Splicer Carriage Controls - Warping Machine Monitors and Controls - Sizing Machine Monitors and Controls - Auto Reaching / Drawing In and Knotting Machine Monitors and Controls - Data Acquisition System in Weaving Preparatory and Weaving - Humidification Systems - Weaving, Dyeing, Printing, Apparel Production.	9
<b>Total Instructional Hours</b>		<b>45</b>

- Course Outcome
- On completion of the course the students will be able to
- CO1: Evaluate Textile Technology and Manufacturing with Textile Fibers
  - CO2: Describe various process involved in Spinning
  - CO3: List out the various process involved in Weaving
  - CO4: Explain various stages of Automation scopes in Spinning Machinery
  - CO5: Outline the role of computers in Automated Weaving Machinery

#### TEXT BOOKS:

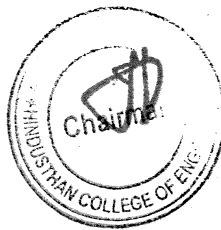
- T1- Ashok Kumar.L, Senthil Kumar., "Automation in Textile Machinery: Instrumentation and Control System Design Principles". 1<sup>st</sup> Edition, CRC Press, USA, 2018.
- T2- J Chattopadhyay R, "Advances in Technology of Yarn Production", 1<sup>st</sup> Edition, NCUTE, IIT Delhi, 2002..

#### REFERENCE BOOKS:

- R1- Krishna Kant, "Computer Based Industrial Control", 2<sup>nd</sup> Edition, PHI Learning Private Limited, New Delhi, 2011.
- R2- Oxtoby E, "Spun Yarn Technology", New Edition, Butter Worth's, London, 2012.
- R3- R Shishoo, "The Global Textile and Clothing Industries", 1<sup>st</sup> Edition, Woodhead Publications, 2012.
- R4- P V Vidhyasagar, "Encyclopedia of Textiles" Mittal Publications, New Delhi, 2000.

  
CHAIRMAN, BOARD OF STUDIES

**Chairman - BoS**  
**MCT - HICET**



  
DEAN ACADEMICS

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

Mapping of COs with POs and PSOs

CO/PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO1 0	PO1 1	PO1 2	PSO-1	PSO-2
CO1	1		2						1	1	1	1	1	
CO2	1		3									1	2	
CO3			2		1								2	
CO4			3										3	
CO5	1		1									1	1	
AVG	0.6	-	2.2	-	0.2	-	-	-	0.2	0.2	0.2	0.6	1.8	-

• 1-low, 2-medium, 3-high, "-" no correlation  
 • Note: The average value of this course to be used for program articulation matrix.

*P. Aslam*  
CHAIRMAN, BOARD OF STUDIES

**Chairman - BoS**  
**MCT - HiCET**



*[Signature]*  
DEAN ACADEMICS  
**Dean (Academics)**  
**HiCET**

Programme	Course Code	Name of the Course	L	T	P	C
BE	19MT7303	MEDICAL MECHATRONICS	3	0	0	3

- Course Objective
1. To familiarize the Role of Instrumentation in Medical Applications
  2. To introduce the various Sensing and Measurement devices
  3. To learn different types of Amplifiers and Filters
  4. To discuss the need and technique of Electrical Safety in Hospitals
  5. To learn the advanced equipments in Medicine

Unit	Description	Instructional Hours
	<b>MEDICAL EQUIPMENTS</b>	
I	Cell Structure - Electrode - Electrolyte Interface, Electrode Potential, Resting and Action Potential - Electrodes for their Measurement, ECG, EEG, EMG, Machine Description - Methods of Measurement.	9
	<b>SENSORS AND TRANSDUCERS IN BIO-MEDICAL APPLICATIONS</b>	
II	Basic Transducer Principles - Types - Resistive, Inductive, Capacitive, Fiber - Optic, Photoelectric, Chemical, Active and Passive Transducers and their Description and Feature Applicable for Biomedical Instrumentation - Bio, Nano Sensors and Application.	9
	<b>CONDITIONING, RECORDING AND DISPLAY OF BIOSIGNALS</b>	
III	Input Isolation, DC Amplifier, Charge Amplifier, Power Amplifier and Differential Amplifier - Feedback, Operational Amplifier - Electrometer Amplifier, Carrier Amplifier - Instrument Power Supply. Basis of Signal Conversion and Digital Filtering.	9
	<b>MEDICAL SUPPORT</b>	
IV	Blood Pressure Measurement: by Ultrasonic Method - Plethysmography - Blood Flow Measurement by Electromagnetic Flow Meter Cardiac Output Measurement by Dilution Method - Vector Cardiography. Heart Lung Machine - Artificial Ventilator - Anesthetic Machine - Cardiac Pacemaker - DC - Defibrillator- Patient Safety - Electrical Shock Hazards.	9
	<b>MEDICAL CASE STUDIES IN MECHATRONICS</b>	
V	Smart Probe for Detecting Kidney Stones, Smart Probe for Breast Cancer, Ankle Sprain, Active Prosthetic Knee, Smart System for Cardiovascular Plaque Detection.	9
	<b>Total Instructional Hours</b>	45

Course Outcome

On completion of the course the students will be able to


CO1: Select modern engineering and Information Technology tools for Engineering Practice  
CO2: Select different sensors and transducers for Biomedical Instrumentation  
CO3: Describe the signal conditioning circuits used in Biomedical Engineering  
CO4: Identify different measurement techniques used in physiological parameters measurement  
CO5: Analyze the problems in various fields of Medical Practices.

#### TEXT BOOKS:

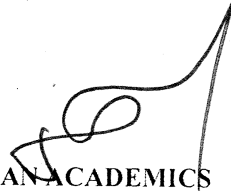
- T1- Khandpur, R.S., "Handbook of Biomedical Instrumentation", 3<sup>rd</sup> Edition, Tata McGraw Hill Publishing Company Limited, New Delhi, 2014.
- T2- Siamak Najarian, Javad Darghai, Goldis Darbemamieh, Siamak H. Farkoush, "Mechatronics in Medicine - A Biomedical Engineering Approach", 1<sup>st</sup> Edition, Tata McGraw Hill Publishing Company Limited, New Delhi, 2012.

#### REFERENCE BOOKS:

- R1- Tompkins W.J., "Biomedical Digital Signal Processing", 1<sup>st</sup> Edition, PHI Learning Private Limited, New Delhi, 2000.
- R2- Cromwell, Weibell and Pfeiffer, "Biomedical Instrumentation and Measurements", 2<sup>nd</sup> Edition, PHI Learning Private Limited, New Delhi, 2010.
- R3- Arumugam, "Bio Medical Instrumentation", Anuradha Agencies Publications, 2002.
- R4- Geddes L.A., and Baker, L.E., "Principles of Applied Bio-medical Instrumentation", 3<sup>rd</sup> Edition, John Wiley and Sons, 2010

  
CHAIRMAN, BOARD OF STUDIES  
**Chairman - BoS**  
**MCT - HICET**

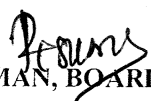


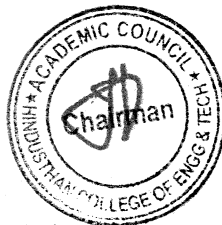
  
DEAN ACADEMICS  
**Dean (Academics)**  
**HICET**

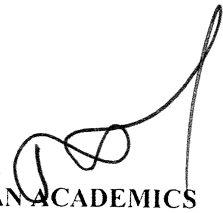
Mapping of COs with POs and PSOs

CO/PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO1 0	PO1 1	PO1 2	PSO-1	PSO-2
CO1	3	1	2	2					1			2	2	2
CO2	2	3	2	2	2							1	2	1
CO3	3	2	2	2	1							3	3	3
CO4	2	2	2	1	1				1	1		2	3	2
CO5	2	2	3	2	1				1	2	3	2	3	3
AVG	2.4	2	2.2	1.8	1	-	-	-	0.6	0.6	0.6	2	2.6	2.2

- 1-low, 2-medium, 3-high, "--" no correlation
- Note: The average value of this course to be used for program articulation matrix.

  
 CHAIRMAN, BOARD OF STUDIES  
**Chairman - BoS**  
**MCT - HiCET**



  
 DEAN ACADEMICS  
**Dean (Academics)**  
**HiCET**

Programme	Course Code	Name of the Course	L	T	P	C
BE	19MT7304	DISASTER MANAGEMENT	3	0	0	3

- Course Objective
- To provide students an exposure to disasters, their significance and types.
  - To understand the relationship between vulnerability, disaster prevention & risk reduction
  - To explain approaches of psychological impact of disasters
  - To enhance the risk management with respect to India
  - To understand the technological disaster

Unit	Description	Instructional Hours
	<b>INTRODUCTION TO DISASTERS</b>	
I	Definition: Disaster, Hazard, Vulnerability, Resilience, Risks - Disasters: Types of disasters - Earthquake, Landslide, Flood, Drought, Fire - Classification, Causes, Impacts including social, economic, political, environmental, health, psychosocial, etc.- Differential impacts- in terms of caste, class, gender, age, location, disability - Global trends in disasters: urban disasters, pandemics, complex emergencies, Climate change- Dos and Don'ts during various types of Disaster.	9
	<b>APPROACHES TO DISASTER RISK REDUCTION (DRR)</b>	
II	Disaster cycle - Phases, Culture of safety, prevention, mitigation and preparedness community based DRR, Structural- non-structural measures, Roles and responsibilities of- community, Panchayati Raj Institutions/Urban Local Bodies (PRIs/ULBs), States, Centre, and other stake - holders- Institutional Process and Framework at State and Central Level- State Disaster Management Authority(SDMA) - Early Warning System - Advisories from Appropriate Agencies.	9
	<b>PSYCHOLOGICAL IMPACT OF DISASTERS</b>	
III	Introduction – Approaches and Diagnostic Issues –Principles of psychosocial Intervention - Special Intervention techniques – Stress Reduction Techniques.	9
	<b>DISASTER RISK MANAGEMENT IN INDIA</b>	
IV	Hazard and Vulnerability profile of India, Components of Disaster Relief: Water, Food, Sanitation, Shelter, Health, and Waste Management, Institutional arrangements Mitigation, Response and Preparedness, Disaster Management Act and Policy - Other related policies, plans, programmes and legislation - Role of GIS and Information Technology Components , Risk Assessment, Response and Recovery Phases of Disaster - Disaster Damage Assessment	9
	<b>TECHNOLOGICAL DISASTER AND CASE STUDIES</b>	
V	Technological disaster - Industrial hazards -Fire hazards - Role of remote sensing -Application of GIS Technology- Accidental Disaster, Case Studies, Space Based Inputs for Disaster Mitigation and Management and field works related to disaster management.	9
<b>Total Instructional Hour</b>		<b>45</b>

- Course Outcome
- On completion of the course the students will be able to
- CO1: Differentiate the types of disasters, causes and their impact on environment and society.
- CO2: Assess vulnerability and various methods of risk reduction measures as well as mitigation.
- CO3: Interpret the psychological impact and its reduction techniques.
- CO4: Express the knowledge disaster management with respect to India
- CO5: Understand the industrial hazard and its management.

**TEXT BOOKS:**

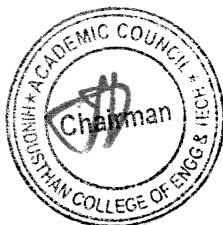
- T1- Singhal J.P. "Disaster Management", Laxmi Publications, 2010. ISBN-10: 9380386427 ISBN- 13: 978-9380386423
- T2- Tushar Bhattacharya, "Disaster Science and Management", McGraw Hill India Education Pvt. Ltd., 2012. ISBN-10: 1259007367, ISBN-13: 978-1259007361]
- T3- Kapur Anu Vulnerable India: A Geographical Study of Disasters. IIAS and Sage Publishers, New Delhi. 2010.

**REFERENCE BOOKS:**

- R1- Gupta Anil K, Sreeja S. Nair. Environmental Knowledge for Disaster Risk Management, NIDM, New Delhi, 2011
- R2- Govt. of India: Disaster Management Act , Government of India, New Delhi, 2005
- R3- Government of India, National Disaster Management Policy, 2009.
- R4- R Subramanian,, "Disaster Management", Vikas Publishers, New Delhi, 2018.

*Person*  
CHAIRMAN, BOARD OF STUDIES

**Chairman - BoS  
MCT - HICET**



*J.P.*  
DEAN ACADEMICS


**Dean (Academics)  
HICET**

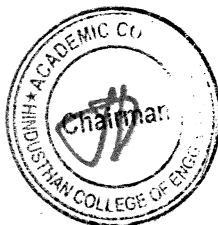



Mapping of COs with POs and PSOs

CO/PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO1 0	PO1 1	PO1 2	PSO-1	PSO-2
CO1	3	3	2.2	1.2	1	1	-	-	-	-	1	1	1.8	1
CO2	3	3	2.2	1.2	1	1	-	-	-	-	1	1	1.8	1
CO3	3	3	2.2	1.2	1	1	-	-	-	-	1	1	1.8	1
CO4	3	3	2.2	1.2	1	1	-	-	-	-	1	1	1.8	1
CO5	3	3	2.2	1.2	1	1	-	-	-	-	1	1	1.8	1
AVG	3	3	2.2	1.2	1	1	-	-	-	-	1	1	1.8	1

• 1-low, 2-medium, 3-high. --- no correlation  
 • Note: The average value of this course to be used for program articulation matrix.

  
 CHAIRMAN, BOARD OF STUDIES  
**Chairman - BoS**  
**MCT - HICET**



  
 DEAN ACADEMICS  
**Dean (Academics)**  
**HICET**

Programme	Course Code	Name of the Course	L	T	P	C
BE	19MT7305	FACTORY AUTOMATION	3	0	0	3

Course Objective	
1.	To impart knowledge of automation in manufacturing industries
2.	To classify material handling system and AGVs
3.	To study various storage methods and its equipments
4.	To learn about manufacturing cells and automated assembly lines
5.	To list out different assembly methods in industries

Unit	Description	Instructional Hours
	<b>OVERVIEW OF AUTOMATION</b>	
I	Automation in Production Systems - Automation Principles and Strategies - Elements of an Automated System - Advanced Automation Function - Levels of Automation - Hardware Components for Automation and Process Control.	9
	<b>MATERIAL TRANSPORT SYSTEM</b>	
II	Introduction - Material Handling equipment - Design considerations in Material Handling - Industrial trucks - Automated guided vehicles - Monorails and other Rail Guided Vehicles - Conveyors - Cranes and Hoists - Analysis of Vehicle Based System - Conveyor Analysis.	9
	<b>STORAGE SYSTEM</b>	
III	Introduction - Performance - Strategies - Conventional Storage Methods and Equipment - Automated Storage System - Carousel Storage System - Engineering Analysis of Storage System.	9
	<b>MANUFACTURING SYSTEMS</b>	
IV	Components of Manufacturing System - Single Station Manufacturing Cells, Manual Assembly Lines - Automated Production Lines - Automated Assembly Systems.	9
	<b>ASSEMBLY SYSTEMS</b>	
V	Robotic Assembly Automation - Parts Presentation Methods - Assembly Operations - Compliance and Remote Centre Compliance (RCC) Device - Adaptable Programmable Assembly System.	9
	<b>Total Instructional Hours</b>	<b>45</b>

Course Outcome	
	On completion of the course the students will be able to
	CO1: Apply the automation principles in manufacturing systems
	CO2: Develop different material handing mechanisms for industries
	CO3: Propose the benefits of automated storage systems
	CO4: Compare manual assembly lines and automated assembly lines
	CO5: Enumerate different assembly operations in industries

#### TEXT BOOKS:

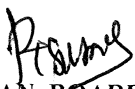
- T1- Groover, M.P. "Automation, Production Systems, and Computer - Integrated Manufacturing", 3<sup>rd</sup> Edition, Pearson Education, 2008.  
T2- C.Ray Asfahl, "Robtos and Manufacturing automation", 2<sup>nd</sup> Edition, John Wiley and Sons Ltd., New Delhi, 2011.

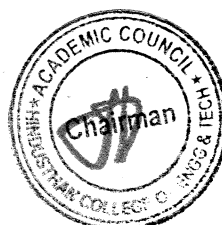
#### REFERENCE BOOKS:

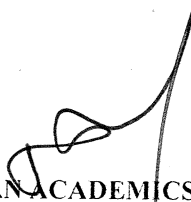
- R1- Groover, M.P. and Simmers, E.W. "Computer Aided Design and Manufacturing", Pearson Education, New Delhi, 2009.  
R2- Nand K. Jha. "Handbook of Flexible Manufacturing Systems", Academic Press, Orlando, 2006.  
R3- Groover, M.P., "Fundamentals of Modern Manufacturing", Pearson Education, New Delhi. 2004.  
R4- Daniel E Kandray P E, "Programmable Automation", Industrial Press Publications, New Delhi, 2008.

#### WEB REFERENCES:

1. [http://een.iust.ac.ir/profs/Shamaghdari/Mechatronics/Resources/3Shetly\\_Mechatronics%20System%20Design](http://een.iust.ac.ir/profs/Shamaghdari/Mechatronics/Resources/3Shetly_Mechatronics%20System%20Design).  
2. <http://mte401.weebly.com/uploads/1/4/0/7/14075053/2hr15sep14.pdf>

  
CHAIRMAN, BOARD OF STUDIES  
**Chairman - BoS**  
**MCT - HICET**



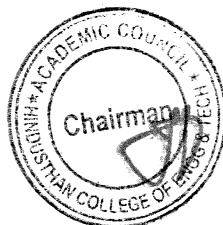
  
DEAN ACADEMICS  
**Dean (Academics)**  
**HICET**

Mapping of COs with POs and PSOs

CO/PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO-1	PSO-2
CO1	3	3	2	2	3	-			-	2	1	3	2	2
CO2	3	3	2	2	3	-			-	2	1	3	2	2
CO3	3	3	2	2	3	-			-	2	1	3	2	2
CO4	3	3	2	2	3	-			-	2	1	3	2	2
CO5	3	3	2	2	3	-			-	2	1	3	2	2
AVG	3	3	2	2	3	-	-	-	-	2	1	3	2	2

- 1-low, 2-medium, 3-high. "-"- no correlation
- Note: The average value of this course to be used for program articulation matrix.

*Reem*  
 CHAIRMAN, BOARD OF STUDIES  
**Chairman - BoS**  
**MCT - HICET**



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

Programme	Course Code	Name of the Course	L	T	P	C
BE	19MT7401	PROJECT MANAGEMENT	3	0	0	3

Course Objective	Description
1.	To observe how to plan and manage the projects at each stage of the Software Development Life cycles
2.	To learn the successful projects that support organization's Strategic Goals
3.	To acquire the knowledge about the activities necessary to successfully complete and close the Software Projects
4.	To discuss the various categories of risk involved in Project Development
5.	To develop the knowledge about Organizational Behavior and Team Works

Unit	Description	Instructional Hours
	<b>SOFTWARE PROJECT MANAGEMENT</b>	
I	Introduction - Need for Software Project Management - Activities by Software Project Management - Software Project versus Other Projects - Categories of Software Projects	9
	<b>PROJECT EVALUATION AND PROGRAMME MANAGEMENT</b>	
II	Project Evaluation: Introduction - Project Portfolio Management -Evaluation of Individual Projects - Cost Benefit Analysis and Evaluation Techniques. Programme Management: Managing the Allocation of Resources - Strategic Programme Management - Creating a Programme - Aids to Programme Management - Benefits Management.	9
	<b>ACTIVITY PLANNING</b>	
III	Objectives of Activity Planning - Project Schedules, Projects and Activities, Sequencing and Scheduling Activities, Network Planning Modes - Formulating Network Models, Identifying Critical Path, Identifying Critical Activities.	9
	<b>RISK MANAGEMENT</b>	
IV	Introduction - Risk and categories of risk - Framework for Dealing with Risk - Risk Identification - Risk Assessment - Risk Planning - Evaluating Risks to the Schedule - Applying the PERT Technique - Monte Carlo Simulation.	9
	<b>PEOPLE MANAGEMENT AND TEAM ORGANIZATION</b>	
V	Managing People: Understanding Behavior, Organizational Behavior - Selecting the Right Person for the Job - Instruction in the Best Method - Motivation based on Taylorist model - Stress - Health and Safety. Team Organization: Becoming a Team - Decision Making - Organization and Team Structures.	9
	<b>Total Instructional Hours</b>	<b>45</b>

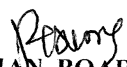
Course Outcome	Description
	On completion of the course the students will be able to
	CO1: Integrate organizational needs to the most effective Software Development Model
	CO2: Plan and manage projects at each stage of the Software Development Life Cycle
	CO3: Analyze between planning modules that address Real World Management Challenges
	CO4: Describe various types of Risk, Risk Identifications and planning involved in Project Management
	CO5: Applying skill of working as a team and as a decision maker in an Organization

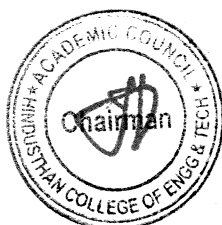
#### TEXT BOOKS:

- T1- Bob Hughes, Mike Cotterel, Rajib Mall, "Software Project Management", 6<sup>th</sup> Edition, Tata McGraw Hill Publishing Company Limited, New Delhi, 2017.  
T2- Gopaldaswamy Ramesh, "Managing Global Software Projects", 1<sup>st</sup> Edition, Tata McGraw Hill Publishing Company Limited, New Delhi, 2005.

#### REFERENCE BOOKS:

- R1- Dick Billows, "Essentials of Software Project Management", 1st Edition, Hampton Group Inc., 2004.  
R2- Donald J.Reifer, "Software Management", 7th Edition, John Wiley & Sons Ltd., New Delhi, 2006.  
R3- Robert K. Wysocki "Effective Software Project Management" - Wiley Publication, 2011.  
R4- Walker Royce: "Software Project Management"- Addison-Wesley. 1998.

  
CHAIRMAN, BOARD OF STUDIES  
**Chairman - BoS**  
**MCT - HiCET**



  
DEAN ACADEMICS  
**Dean (Academics)**  
**HiCET**