HINDUSTHAN EDUCATIONAL AND CHARITABLE TRUST

HICET

HINDUSTHAN

COLLEGE OF ENGINEERING AND TECHNOLOGY

(An Autonomous Institution)

Coimbatore – 641032

DEPARTMENT OF MECHANICAL ENGINEERING

Curriculum and ODD Semesters Syllabus for the Batch

2024 – 2028 (R2022)

2023 – 2027 (R2022)

2022 – 2026 (R2022)

2021 – 2025 (R2019 with Amendments)

(Board of Studies held on 20.05.2024)

(Academic Council Meeting held on 21.06.2024)

S.No.	Particulars	Page Number(s)/ (From - To)
1.	Curriculum under R2022 (for the batch admitted during 2024 – 2025)	**3**
2.	First Semester Syllabus (for the batch admitted during 2024 – 2025)	**18**
3.	Curriculum under R2022 (for the batch admitted during 2023 – 2024)	**40**
4.	Third Semester Syllabus (for the batch admitted during 2023 – 2024)	**55**
5.	Curriculum under R2022 (for the batch admitted during 2022 – 2023)	**74**
6.	Fifth Semester Syllabus (for the batch admitted during 2022 – 2023)	**90**
7.	Fifth Semester Minor Curriculum - (for the batch admitted during 2022 – 2023)	**106**
8.	Fifth Semester Minor Syllabus (for the batch admitted during 2022 – 2023)	**108**
9.	Fifth Semester Hons Curriculum - (for the batch admitted during 2022 – 2023)	**111**
10.	Fifth Semester Hons Syllabus (for the batch admitted during 2022 – 2023)	**113**
11.	Curriculum under R2019 with Amendments (for the batch admitted during 2021 – 2022)	**122**
12.	Seventh Semester Syllabus (for the batch admitted during 2021 – 2022)	**136**
13.	Details of Course Revisions & New Courses Introduced	**164**

HINDUSTHAN COLLEGE OF ENGINEERING AND TECHNOLOGY
An Autonomous Institution
Approved by AICTE, New Delhi, Affiliated to Anna University, Chennai
Accredited by NBA (AERO, AUTO, CIVIL, CSE, ECE, EEE, IT, MECH & MCT)
Accredited with 'A++' Grade by NAAC.
Coimbatore - 641 032

B E. MECHANICAL ENGINEERING

HINDUSTHAN
EDUCATIONAL AND CHARITABLE TRUST
HICET

CHOICE BASED CREDIT SYSTEM

Revised Curriculum and Syllabus for the even semester

Academic year 2024-25

Batch 2024-2028

CURRICULUM R2022

HINDUSTHAN EDUCATIONAL AND CHARITABLE TRUST
HICET

HINDUSTHAN COLLEGE OF ENGINEERING AND TECHNOLOGY

An Autonomous Institution
Approved by AICTE, New Delhi, Affiliated to Anna University, Chennai
Accredited by NBA (AERO, AUTO, CIVIL, CSE, ECE, EEE, IT, MECH & MCT)
Accredited with 'A++' Grade by NAAC.
Coimbatore - 641 032

TÜVRheinland CERTIFIED

DETAILS OF CHANGES CARRIED OUT IN CURRICULUM & SYLLABUS
CBCS PATTERN
UNDERGRADUATE PROGRAMMES
B.E. MECHANICAL ENGINEERING REGULATION-2022
(For the students admitted during the academic year 2022-2023 and onwards)

Programme: Mechanical Engineering **Branch: Mechanical**

SEMESTER I											
S No	Course Code	Course Title	Category	L	T	P	C	TCP	CIA	ESE	Total
THEORY											
1	22MA1101	Matrices and Calculus	BSC	3	1	0	4	4	40	60	100
2	22ME1101	Engineering Drawing	ESC	1	2	0	3	5	40	60	100
THEORY WITH LAB COMPONENT											
3	22HE1151	English for Engineers	HSC	2	0	2	3	4	50	50	100
4	22PH1153	Physical Properties of Materials	BSC	2	0	2	3	4	50	50	100
5	22IT1151	Python Programming and practices	ESC	2	0	2	3	4	50	50	100
EEC COURSES (SE/AE)											
6	22HE1072	Entrepreneurship & Innovation	AEC	1	0	0	1	1	100	0	100
7	22HE1073	Introduction to soft skills	SEC	2	0	0	0	1	100	0	100
MANDATORY COURSES											
8	22MC1093/ 22MC1094	தமிழர்மரபு / HERITAGE OF TAMIL	MC	2	0	0	1	2	40	60	100
9	22MC1095	UNIVERSAL HUMAN VALUES (Common to all branches)	MC	2	0	0	0	2	100	0	100
		TOTAL		**15**	**1**	**10**	**18**	**27**			

SEMESTER II											
S No	**Course Code**	**Course Title**	**Category**	**L**	**T**	**P**	**C**	**TCP**	**CIA**	**ESE**	**Total**
THEORY											
1	22MA2101	Differential Equations and Complex Analysis.	BSC	3	1	0	4	4	40	60	100
2	22CY2101	Environmental Studies	ESC	2	0	0	2	2	40	60	100
3	22PH2101	Basics of Material Science	BSC	2	0	0	2	2	40	60	100
4	22ME2101	Engineering Mechanics	ESC	3	0	0	3	3	40	60	100
THEORY WITH LAB COMPONENT											
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
PRACTICAL											
6	22ME2001	Engineering Practices	ESC	0	0	4	2	4	60	40	100
EEC COURSES (SE/AE)											
7	22HE2071	Design Thinking	AEC	2	0	0	2	2	100	0	100
8	22HE2072	Soft Skills and aptitude	SEC	1	0	0	1	1	100	0	100
MANDATORY COURSES											
9	22MC2094 /22MC2095	தமிழரும்தொழில்நுட்பமும்/ Tamils and Technology	MC	2	0	0	1	2	40	60	100
10	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 100 hours							
TOTAL				**19**	**1**	**8**	**23**	**28**			

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	22ME3201	Engineering Thermodynamics	PCC	3	0	0	3	3	40	60	100
3	22ME3202	Engineering Materials and Metallurgy	PCC	3	0	0	3	3	40	60	100
4	22ME3203	Electrical Drives and Control	PCC	3	0	0	3	3	40	60	100
5	22ME3204	Manufacturing Technology-I	PCC	3	0	0	3	3	40	60	100
THEORY WITH LAB COMPONENT											
6	22ME3251	Fluid Mechanics and Machinery	PCC	3	0	2	4	5	50	50	100
PRACTICAL											
7	22ME3001	Manufacturing Technology Laboratory-I	PCC	0	0	4	2	4	60	40	100
8	22ME3002	Computer Aided Modeling Lab	AEC	0	0	4	2	4	60	40	100
EEC COURSES (SE/AE)											
9	22HE3071	Soft Skills -2	SEC	1	0	0	1	1	100	0	100
MANDATORY COURSES											
10	22MC3091	Essence of Indian Traditional Knowledge	MC	2	0	0	0	2	0	0	0
		TOTAL		**15**	**3**	**14**	**25**	**32**			

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	0	100	100
2	22ME4201	Kinematics of Machinery	PCC	3	0	0	3	3	40	60	100
3	22ME4202	Hydraulic and Pneumatic Systems	PCC	3	0	0	3	3	40	60	100
4	22ME4203	Manufacturing Technology – II	PCC	3	0	0	3	3	40	60	100
5	22ME4204	Thermal Engineering	PCC	3	1	0	3	4	40	60	100
THEORY WITH LAB COMPONENT											
6	22ME4251	Strength of Materials	PCC	2	0	2	3	4	50	50	100
PRACTICAL											
7	22ME4001	Manufacturing Technology Laboratory-II	PCC	0	0	4	2	4	60	40	100
8	22ME4002	Thermal Engineering Lab	PCC	0	0	4	2	4	60	40	100

9	22ME4003	Mini Project	PCC	0	0	2	1	2	60	40	100
EEC COURSES (SE/AE)											
10	22HE4071	Soft Skills -3	SEC	1	0	0	1	1	100	0	100
		TOTAL		**16**	**1**	**12**	**23**	**29**			

SEMESTER V											
S No	**Course Code**	**Course Title**	**Category**	**L**	**T**	**P**	**C**	**TCP**	**CIA**	**ESE**	**Total**
THEORY											
1	22ME5201	Design of Machine Elements	PCC	3	1	0	3	4	40	60	100
2	22ME5202	Heat and Mass Transfer	PCC	3	0	0	3	3	40	60	100
3	22ME53XX	Professional Elective-1	PEC	3	0	0	3	3	40	60	100
4	22ME53XX	Professional Elective-2	PEC	3	0	0	3	3	40	60	100
5	22ME53XX	Professional Elective-3	PEC	3	0	0	3	3	40	60	100
THEORY WITH LAB COMPONENT											
7	22ME5251	Dynamics of Machines	PCC	2	0	2	3	4	50	50	100
PRACTICAL											
8	22ME5001	Heat Transfer Lab	PCC	0	0	4	1.5	4	60	40	100
9	22ME5072	Machine Drawing	ESC	0	0	4	1.5	4	60	40	100
EEC COURSES (SE/AE)											
10	22HE5071	Soft Skills -4/Foreign languages	SEC	1	0	0	1	1	100	0	100
		TOTAL		**18**	**1**	**6**	**22**	**25**			

SEMESTER VI											
S No	**Course Code**	**Course Title**	**Category**	**L**	**T**	**P**	**C**	**TCP**	**CIA**	**ESE**	**Total**
THEORY											
1	22HE6101	Professional Ethics	HSC	3	0	0	3	3	40	60	100
2	22ME6201	Design of Transmission systems	PCC	3	0	0	3	3	40	60	100
3	22ME63XX	Professional Elective-4	PEC	3	0	0	3	3	40	60	100
4	22ME63XX	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
THEORY WITH LAB COMPONENT											
7	22ME6251	Metrology and Quality control	PCC	2	0	2	3	4	50	50	100
PRACTICAL											
8	22ME6001	CAD/CAM Lab	PCC	0	0	4	1	4	60	40	100
EEC COURSES (SE/AE)											
9	**22HE6071**	Soft Skills - 5	SEC	2	0	0	2	2	100	0	100
		TOTAL		**20**	**0**	**8**	**24**	**28**			

SEMESTER VII											
S No	**Course Code**	**Course Title**	**Category**	**L**	**T**	**P**	**C**	**TCP**	**CIA**	**ESE**	**Total**
THEORY											
1	22ME7201	Engineering Economics and Finance Management	PCC	3	0	0	3	3	40	60	100
2	22ME7202	Artificial Intelligence for Mechanical Engineering	PCC	3	1	0	3	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
THEORY WITH LAB COMPONENT											
6	22ME7251	Finite Element Analysis	PCC	2	0	2	3	4	50	50	100
EEC COURSES (SE/AE)											
7	22ME7701	Internship	SEC	0	0	0	2	2	100	0	100
		TOTAL		**15**	**1**	**4**	**20**	**22**			
*** - 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**
EEC COURSES (SE/AE)											
1	22ME8901	Project Work/Granted Patent	SEC	0	0	20	10	20	100	100	200
		TOTAL		**0**	**0**	**20**	**10**	**20**			

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 theStudents who are going to be admitted in the Academic Year 2022 – 23.

SEMESTER WISE CREDIT DISTRIBUTION

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

OPEN ELECTIVE I AND II
(EMERGINGTECHNOLOGIES)

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

SL. NO.	COURSE CODE	COURSE TITLE	CATEGORY	PERIODS PERWEEK			TOTALCONTACTPERIODS	CREDITS
				L	T	P		
1	22AI6401	Artificial Intelligence and Machine Learning Fundamentals	OEC	2	0	2	4	3
2	22CS6401	Blockchain Technology	OEC	2	0	2	4	3
3	22EC6401	Cyber security	OEC	2	0	2	4	3
4	22EC6402	IoT Concepts and Applications	OEC	2	0	2	4	3
5	22IT6401	Data Science and Analytics	OEC	2	0	2	4	3
6	22BM6401	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

SL. NO.	COURSE CODE	COURSE TITLE	CATEGORY	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)

SL. NO.	COURSE CODE	COURSETITLE	CATEGORY	PERIODS PER WEEK			TOTAL CONTACT PERIODS	CREDITS
				L	T	P		
1	22ME7402	Hybrid and Electric Vehicle Technology	OEC	3	0	0	3	3
2	22MT7401	Project Management (Must in the list)	OEC	3	0	0	3	3
3	22ME7401	Total Quality Management (Must in the list)	OEC	3	0	0	3	3

OPEN ELECTIVE IV

SL. NO.	COURSE CODE	COURSETITLE	CATE GORY	PERIODS PERWEEK			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

Service Paper (Chemical Engineering)

SL. NO.	COURSE CODE	COURSETITLE	CATE GORY	PERIODS PERWEEK			TOTAL CONTACT PERIODS	CREDITS
				L	T	P		
1	22ME3231	Basic Mechanical Engineering	PCC	3	0	0	3	3

PROFESSIONAL ELECTIVE COURSES: VERTICALS

Note: Students are permitted to choose all professional electives from any of the verticals.

Vertical I General	**Vertical II Modern Mobility Systems**	**Vertical III Product and Process Development**	**Vertical IV Robotics and Automation**	**Vertical V Computational Engineering**	**Vertical VI Logistics and Supply Chain Management**
22ME5301 Automobile Engineering	**22ME5304** Automotive Materials, Components, Design& Testing	**22ME5307** Value Engineering	**22ME5310** Sensors and Instrumentation	**22ME5313** Computational Solid Mechanics	**22ME5316** Automation in Manufacturing
22ME5302 Internet of Things for Mechanical Engineers	**22ME5305** Conventional and Futuristic Vehicle Technology	**22ME5308** Quality and Reliability Engineering	**22ME5311** Electrical Drives and Actuators	**22ME5314** Computational Fluid Dynamics and Heat transfer	**22ME5317** Warehousing Automation
22ME5303 Additive Manufacturing systems	**22ME5306** Renewable Powered Off Highway Vehicles and Emission Control Technology	**22ME5309** Production and Operations Management	**22ME5312** Embedded Systems and Programming	**22ME5315** Computational Bio Mechanics	**22ME5318** Material Handling Equipment, Repair and Maintenance
22ME6301 Principles of Management	**22ME6303** Vehicle Health Monitoring, Maintenance and Safety	**22ME6305** Ergonomics in Design	**22ME6307** Robotics	**22ME6309** Theory on Computation and Visualization	**22ME6311** Container Logistics
22ME6302 CAD/CAM	**22ME6304** CAE and CFD Approach in Future Mobility	**22ME6306** New Product Development	**22ME6308** Smart Mobility and Intelligent Vehicles	**22ME6310** Advanced Statistics and Data Analytics	**22ME6312** Robotics in Logistics
22ME7301 Entrepreneurship Development and Business Concepts	**22ME7302** Thermal Management of Batteries and Fuel Cells	**22ME7303** Product Life Cycle Management	**22ME7304** Haptics and Immersive Technologies	**22ME7305** Machine Learning for Intelligent Systems	**22ME7306** Data Science

Vertical I
General Core

S No	Course Code	Course Title	Category	Periods Per week			Total Contact Periods	Credits
				L	T	P		
1	22ME5301	Automobile Engineering	PEC	3	0	0	3	3
2	22ME5302	Internet of Things for Mechanical Engineers	PEC	3	0	0	3	3
3	22ME5303	Additive Manufacturing systems	PEC	3	0	0	3	3
4	22ME6301	Design of Transmission systems	PEC	3	0	0	3	3
5	22ME6302	CAD/CAM	PEC	3	0	0	3	3
6	22ME7301	Entrepreneurship Development and Business Concepts	PEC	3	0	0	3	3

Vertical II
Modern Mobility Systems

S No	Course Code	Course Title	Category	Periods Per week			Total Contact Periods	Credits
				L	T	P		
1	22ME5304	Automotive Materials, Components, Design & Testing	PEC	3	0	0	3	3
2	22ME5305	Conventional and Futuristic Vehicle Technology	PEC	3	0	0	3	3
3	22ME5306	Renewable Powered Off Highway Vehicles and Emission Control Technology	PEC	3	0	0	3	3
4	22ME6303	Vehicle Health Monitoring, Maintenance and Safety	PEC	3	0	0	3	3
5	22ME6304	CAE and CFD Approach in Future Mobility	PEC	3	0	0	3	3
6	22ME7302	Thermal Management of Batteries and Fuel Cells	PEC	3	0	0	3	3

Vertical III
Product and Process Development

S No	Course Code	Course Title	Category	Periods Per week			Total Contact Periods	Credits
				L	T	P		
1	22ME5307	Value Engineering	PEC	3	0	0	3	3
2	22ME5308	Quality and Reliability Engineering	PEC	3	0	0	3	3
3	22ME5309	Production and Operations Management	PEC	3	0	0	3	3
4	22ME6305	Ergonomics in Design	PEC	3	0	0	3	3
5	22ME6306	New Product Development	PEC	3	0	0	3	3
6	22ME7303	Product Life Cycle Management	PEC	3	0	0	3	3

Vertical IV

Robotics and Automation

S No	Course Code	Course Title	Category	Periods Per week			Total Contact Periods	Credits
				L	T	P		
1	22ME5310	Sensors and Instrumentation	PEC	3	0	0	3	3
2	22ME5311	Electrical Drives and Actuators	PEC	3	0	0	3	3
3	22ME5312	Embedded Systems and Programming	PEC	3	0	0	3	3
4	22ME6307	Robotics	PEC	3	0	0	3	3
5	22ME6308	Smart Mobility and Intelligent Vehicles	PEC	3	0	0	3	3
6	22ME7304	Haptics and Immersive Technologies	PEC	3	0	0	3	3

Vertical V

Computational Engineering

S No	Course Code	Course Title	Category	Periods Per week			Total Contact Periods	Credits
				L	T	P		
1	22ME5313	Computational Solid Mechanics	PEC	3	0	0	3	3
2	22ME5314	Computational Fluid Dynamics and Heat transfer	PEC	3	0	0	3	3
3	22ME5315	Computational Bio Mechanics	PEC	3	0	0	3	3
4	22ME6309	Theory on Computation and Visualization	PEC	3	0	0	3	3
5	22ME6310	Advanced Statistics and Data Analytics	PEC	3	0	0	3	3
6	22ME7305	Machine Learning for Intelligent Systems	PEC	3	0	0	3	3

Vertical VI

Logistics and Supply Chain Management

S No	Course Code	Course Title	Category	Periods Per week			Total Contact Periods	Credits
				L	T	P		
1	22ME5316	Automation in Manufacturing	PEC	3	0	0	3	3
2	22ME5317	Warehousing Automation	PEC	3	0	0	3	3
3	22ME5318	Material Handling Equipment, Repair and Maintenance	PEC	3	0	0	3	3
4	22ME6311	Container Logistics	PEC	3	0	0	3	3
5	22ME6312	Robotics in Logistics	PEC	3	0	0	3	3
6	22ME7306	Data Science	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 theaward of B.E. / B. Tech. (Honors) or Minor Degree.For B.E. / B. Tech. (Honors), 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 Vonwards. All these courses have to be in a particular vertical from any one of the other programmes.

Clause 4.10of Regulation 2022 is applicable for the Enrolmentof 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.

MECHANICAL ENGINEERING OFFERING MINOR DEGREE PROGRAM IN ELECTRIC VEHICLES

S No	Course Code	Course Title	Category	Periods Per week			Total Contact Periods	Credits
				L	T	P		
1	22ME5601	Sem 5: EV and Sub Systems.	MDC	3	0	0	3	3
2	22ME6601	Sem 6: E vehicle Dynamics	MDC	3	0	0	3	3
3	22ME6602	Sem6: Cell and battery management system	MDC	3	0	0	3	3
4	22ME7601	Sem 7: Electric Motor and control system	MDC	3	0	0	3	3
5	22ME7602	Sem 7: EV sensors and actuators	MDC	3	0	0	3	3
6	22ME8601	Sem 8: EV charging station	MDC	3	0	0	3	3

*MDC – Minor Degree Course

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

Vertical I
Fintech and Block Chain

S No	Course Code	Course Title	Category	Periods Per week			Total Contact Periods	Credits
				L	T	P		
1	22MB5231	Financial Management	MDC	3	0	0	3	3
2	22MB6231	Fundamentals of Investment	MDC	3	0	0	3	3
3	22MB6232	Banking, Financial Services andInsurance	MDC	3	0	0	3	3
4	22MB7231	Introduction to Blockchain and its Applications	MDC	3	0	0	3	3
5	22MB7232	Fintech Personal Finance and Payments	MDC	3	0	0	3	3
6	22MB8231	Introduction to Fintech	MDC	3	0	0	3	3

Vertical II
Entrepreneurship

S No	Course Code	Course Title	Category	Periods Per week			Total Contact Periods	Credits
				L	T	P		
1	22MB5232	Foundations of Entrepreneurship	MDC	3	0	0	3	3
2	22MB6233	Team Building & Leadership Management for Business	MDC	3	0	0	3	3
3	22MB6234	Creativity & Innovation in Entrepreneurship	MDC	3	0	0	3	3
4	22MB7233	Principles of Marketing Management For Business	MDC	3	0	0	3	3
5	22MB72334	Human Resource Management for Entrepreneurs	MDC	3	0	0	3	3
6	22MB8232	Financing New Business Ventures	MDC	3	0	0	3	3

Vertical III
Environment and Sustainability

S No	Course Code	Course Title	Category	Periods Per week			Total Contact Periods	Credits
				L	T	P		
1	22CE5232	Sustainable infrastructure Development	MDC	3	0	0	3	3
2	22AG6233	Sustainable Agriculture and Environmental Management	MDC	3	0	0	3	3
3	22BM6233	Sustainable Bio Materials	MDC	3	0	0	3	3
4	22ME7233	Materials for Energy Sustainability	MDC	3	0	0	3	3
5	22CE7233	Green Technology	MDC	3	0	0	3	3
6	22CE8232	Environmental Quality Monitoring and Analysis	MDC	3	0	0	3	3

B E (HONS) MECHANICAL ENGINEERING
DIGITAL AND GREEN MANUFACTURING

S No	Course Code	Course Title	Category	Periods Per week			Total Contact Periods	Credits
				L	T	P		
1	22ME5203	Sem 5: Digital Manufacturing and IoT	MDC	3	0	0	3	3
2	22ME6202	Sem 6: Lean Manufacturing	MDC	3	0	0	3	3
3	22ME6203	Sem 6: Modern Robotics	MDC	3	0	0	3	3
4	22ME7203	Sem 7: Green Manufacturing Design and Practices	MDC	3	0	0	3	3
5	22ME7204	Sem 7: Environment Sustainability and Impact Assessment	MDC	3	0	0	3	3
6	22ME8201	Sem 8: Green Supply Chain Management	MDC	3	0	0	3	3

ENERGY TECHNOLOGY

S No	Course Code	Course Title	Category	Periods Per week			Total Contact Periods	Credits
				L	T	P		
1	22ME5204	Sem 5: Bioenergy Conversion Technologies	MDC	3	0	0	3	3
2	22ME6204	Sem 6: Energy Conservation in Industries	MDC	3	0	0	3	3
3	22ME6205	Sem 6: Energy Storage Devices	MDC	3	0	0	3	3
4	22ME7205	Sem 7: Solar Energy Technology	MDC	3	0	0	3	3
5	22ME7206	Sem 7: Renewable Energy Technologies	MDC	3	0	0	3	3
6	22ME8202	Sem 8: New and Renewable Sources of Energy	MDC	3	0	0	3	3

PRODUCT AND PROCESS DEVELOPMENT

S No	Course Code	Course Title	Category	Periods Per week			Total Contact Periods	Credits
				L	T	P		
1	22ME5205	Sem 5: New Product Development	MDC	3	0	0	3	3
2	22ME6206	Sem 6: Ergonomics in Design	MDC	3	0	0	3	3
3	22ME6207	Sem 6: Advances in Composite Materials	MDC	3	0	0	3	3
4	22ME7207	Sem 7: Logistics and Supply Chain Management	MDC	3	0	0	3	3
5	22ME7208	Sem 7: EV Technologies	MDC	3	0	0	3	3
6	22ME8203	Sem 8: Heating, Ventilation and Air Conditioning Systems	MDC	3	0	0	3	3

Chairman, BoS

Chairman - BoS
MECH - HiCET

Dean Academics

Dean (Academics)
HiCET

Principal

PRINCIPAL
Hindusthan College Of Engineering & Technology
COIMBATORE - 641 032.

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

Course Objective

The learner should be able to

1. Construct the characteristic polynomial of a matrix and use it to identify Eigen values and Eigenvectors
2. Impart the knowledge of single variate calculus.
3. Familiarize the student with functions of several variables.
4. Acquaint the student with mathematical tools needed in evaluating multiple integrals and their applications.
5. Make a vector differential operator for vector function and theorems to solve engineering problems

Unit	Description	Instructional Hours
I	**Matrices** 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	**Single Variate Calculus** Rolle's Theorem – Lagrange's Mean Value Theorem - Maxima and Minima – Taylor's and Maclaurin's Series.	12
III	**Functions of Several Variables** Partial derivatives - Total derivative - Jacobians – Maxima and minima of functions of two variables and Lagrange's method of undetermined multipliers.	12
IV	**Integral Calculus** 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	**Vector Calculus** Gradient, divergence and curl vectors - Green's theorem - Stoke's and Gauss divergence theorem (statement only) for cubes only.	12
	Total Instructional Hours	60

Course Outcome

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: Able to use differential calculus ideas on several variable functions.
CO4: Apply multiple integral ideas in solving areas, volumes and other practical problems.
CO5: Apply the concept of vector calculus in two and three-dimensional spaces.

TEXT BOOKS:

T1 - Erwin Kreyszig, "Advanced Engineering Mathematics", John Wiley & Sons, 10th edition, 2019.
T2 - 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-Strauss M. J, G. L Bradley and K. J .Smith, "Multivariable calculus", 6th edition, Prentice Hall, 2011.
R2 - Veerarajan T, "Engineering Mathematics", 5th edition, Mc Graw Hill Education(India) Pvt Ltd, New Delhi, 2016.
R3 - G. B. Thomas and R. L. Finney, "Calculus and Analytical Geometry", 9th Edition, Addison Wesley Publishing Company, 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	2	2		
CO2	3	3	3	3	2	2	2	-	-	1	2	2		
CO3	3	3	3	3	2	2	2	-	-	1	2	2		
CO4	3	3	3	3	2	2	2	-	-	1	2	2		
CO5	3	3	3	3	2	2	2	-	-	1	2	2		
AVG	3	3	3	3	2.2	2	2			1	2	2		

Chairman, Board of Studies

Chairman - BoS
MECH - HiCET

ACADEMIC COUNCIL * MEENAKSHI COLLEGE OF ENGG & TECH * Chairman

Dean – Academics

Dean (Academics)
HiCET

Programme	Course Code	Name of the Course	L	T	P	C
B.E./ B.Tech	22ME1201	**ENGINEERING DRAWING** (AGRI, AERO, AUTO, CIVIL,MECH, MECT & FT)	1	2	0	3

Course Objective

The learner should be able

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

Unit	Description	Instructional Hours
I	**PLANE CURVES** 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, parabola and hyperbola by eccentricity method. Construction of cycloids and involutes of square and circle – Drawing of tangents and normal to the above curves.	12
II	**PROJECTIONS OF POINTS, LINES AND PLANE SURFACES** 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
III	**PROJECTIONS OF SOLIDS** Projection of simple solids like prisms, pyramids, cylinder, cone when the axis is perpendicular, and inclined to one plane by rotating object method.	12
IV	**SECTION OF SOLIDS AND DEVELOPMENT OF SURFACES** 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
V	**ISOMETRIC AND ORTHOGRAPHIC PROJECTIONS** 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
	Total Instructional Hours	**60**

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", 5thedition New Age International
Publishers, New Delhi 2016.
T2. K.V.Natarajan, "A textbook of Engineering Graphics", Dhanlaksmi 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.

PO & PSO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	2	3	2	0	1	0	1	0	0	1	1	1
CO2	3	3	2	1	1	0	1	0	0	1	1	1
CO3	3	3	3	0	1	1	1	0	0	1	1	0
CO4	3	3	3	1	1	2	1	0	0	1	1	1
CO5	3	3	3	1	1	3	1	0	0	1	1	1
AVG	2.8	3	2.6	1	1	2	1	0	0	1	1	1

Chairman, Board of Studies

Chairman - B
MECH - HiC

Dean – Academics

Dean (Academics)
HiCET

Programme/ Semester	Course Code	Name of the Course	L	T	P	C
B.E./B.Tech/ I	22HE1151	ENGLISH FOR ENGINEERS (Common to all Branches)	2	0	2	3

Course Objective

The student should be able

1. To help the students of engineering and technology develop a strong base in the use of English.
2. To help learners use language effectively in professional writing.
3. To impart basic English grammar and essentials of important language skills
4. To impart knowledge about the importance of vocabulary and grammar
5. To develop the communication skills of the students in both formal and informal situations

Unit	Description	Instructional Hours
I	**Language Proficiency:** Parts of Speech, Degrees of Comparison, Abbreviation& Acronyms **Writing**: Process Description, Instructions. **Vocabulary** – Words on Environment. **Practical Component: Listening-** Watching Short Videos and answer the questions, **Speaking-** Self introduction , Narrating personal experiences / events; Interviewing a celebrity; Reporting / and summarizing of documentaries / podcasts / interviews **Reading-** Purpose of Reading - Churning & Assimilation, Interpreting Ideas - Interpreting Graphs in Technical Writing.	7+2
II	**Language Proficiency**: Types of Sentences, Framing Question, One Word Substitution **Writing:** Writing Checklist. Reading Comprehension. **Vocabulary–** Words on Entertainment. **Practical Component: Listening-**Comprehensions based on TED talks **Speaking-** Story Telling **Reading** - Skimming – Scanning – Reading: Scientific Texts	7+2
III	**Language Proficiency:** Tenses, Conditional Clause ('If' clause), Active and Passive voices, **Writing:** Formal letter (invitation, acceptance, decline, Congratulation) Cloze test. **Vocabulary** – Words on Tools. **Practical Component: Listening-**Listening pre-recorded English language learning programme **Speaking** - Just a minute **Reading-** Reading feature articles (from newspapers and magazines) -Reading to identify point of view and perspective (opinion pieces, editorials etc.)	5+4
IV	**Language Proficiency:** Subject Verb Concord, Articles, The Use of Prefixes and Suffixes **Writing:** Preparing Agenda &Minutes, Writing Recommendations. **Vocabulary–** Words on Engineering process. **Practical Component: Listening-**An interview with someone who works for recruitment personnel. **Speaking-**Presentation on a general topic. **Reading-** Reading Comprehension - Literary Texts.	5+4
V	**Language Proficiency:** Prepositions, Phrasal Verbs, Modal Auxiliaries, **Writing:** Letter to the Editor, Sequencing of Sentences **Vocabulary** –Words on Engineering material **Practical Component: Listening-** Listening- Comprehensions based on Nat Geo/Discovery channel videos **Speaking-** Preparing posters and presenting as a team. **Reading-** Biographies, Travelogues, Technical blogs.	6+3
	Total Instructional Hours	45

Course Outcome

After completion of the course the learner will be able

CO1: Understand English and converse effectively.
CO2: Enable the students to write coherently and cohesively.
CO3: Enable the development of basic grammar to enhance language for a better communication
CO4: Use suitable vocabulary and grammar with confidence and express their ideas both in speech and writing.
CO5: Follow the etiquettes in formal and informal communication.

TEXT BOOKS:

T1- Raymond Murphy, "English Grammar in Use"-5thedition CambridgeUniversityPress, 2019.
T2-Norman Whitby, "Business Benchmark-Pre-intermediate to Intermediate", Cambridge University Press, 2016.

REFERENCE BOOKS:

R1- Kapoor A.N., Business Letters for Different Occasions, New Delhi: S. Chand & Co. Pvt. Ltd., 2012.
R2-RaymondMurphy, " English Grammar For ESL Learners - Premium Fourth Edition.
R3- McCarthy, Michael et.al (2011) English Vocabulary in Use – advanced, Cambridge University Press.

PO & PSO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO 10	PO 11	PO 12	PSO 1	PSO 2
CO1	-	-	-	-	-	-	-	2	-	3	2	1		
CO2	-	-	-	-	2	3	2	3	1	3	1	-		
CO3	-	-	-	3		2	-	2	2	3	2	2		
CO4	-	-	-	-	-	2	-	2	1	3	1	1		
CO5	-	-	-	2	-	-	-	2	3	3	3	1		
AV G	-	-	-	2.5	2	2.3	2	2.2	1.8	3	1.8	1.3		

Chairman, Board of Studies

Chairman - BoS
MECH - HiCE

ACADEMIC COUNCIL * HICET * HINDUSTHAN COLLEGE OF ENGG. & TECH.
Chairman

Dean – Academics

Dean (Academics)
HiCET

Programme/ Semester	Course Code	Name of the Course	L	T	P	C
B.E./B.Tech/I	22PH1153	**PHYSICAL PROPERTIES OF MATERIALS (AERO,AUTO, MECH & MECHATS)**	2	0	2	3

Course Objective

The learner should be able to :

1. Have knowledge on the various phase diagrams of different materials and their applications
2. Acquire knowledge on various crystal structures.
3. Enhance the fundamental knowledge in mechanical properties of materials
4. Gain knowledge about thermal energy and their applications
5. Gain the knowledge on laser fundamentals and their applications

Unit	Description	Instructional Hours
I	**PHASE DIAGRAMS** Solid solutions - Hume Rothery's rules - the phase rule – single component system – binaryphase diagrams - isomorphous systems - the tie-line rule -the lever rule - application to isomorphous system – eutecticphase diagram - peritectic phase diagram.	6
II	**CONDENSED MATTER PHYSICS** Crystalline and Amorphous materials – single crystals: unit cell, crystal systems, Bravais lattices, characteristics of unit cell – number of atoms per unit cell, coordination number, atomic radius and Packing factor for SC, BCC, FCC and HCP structures – Miller indices and interplanar spacing.	6
III	**MECHANICAL PROPERTIES OF MATERIALS** Elasticity – Hooke's law –stress-strain diagram – bending moment – depression of a cantilever – derivation of young's modulus of the material of the beam by uniform bending - theory and experiment. Twisting couple - Torsion pendulum: theory and experiment. **Determination of Young's modulus by uniform bending method** **Determination of Rigidity modulus – Torsion pendulum**	12
IV	**THERMAL PHYSICS** Transfer of heat energy – thermal conduction, convection and radiation–Thermal expansion - expansion joints - bimetallic strips – thermal conductivity of a bad conductor: Lee's disc method to determine the thermal conductivity of bad conductor. Conduction through compound media (series and parallel) – applications: refrigerator and solar water heater. **Determination of thermal conductivity of a bad conductor – Lee's disc method** **V –Lab - https://vlab.amrita.edu/?sub=1&brch=194&sim=353&cnt=1**	9
V	**PHOTONICS** Spontaneous emission and stimulated emission – Population inversion – Pumping methods – Type of lasers – Nd:YAG laser and CO_2laser. Laser Applications - Industrial applications of laser.Interference - Conditions for sustained Interference – air wedge and it's applications. **Determination of Wavelength and particle size using Laser** **Determination of thickness of a thin wire – Air wedge method** **V-Lab- https://vlab.amrita.edu/?sub=1&brch=189&sim=342&cnt=1**	12
	Total Instructional Hours	**45**

Course Outcome

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

CO1: Develop the various phase diagrams of different materials
CO2: Relate the basics of crystals and their structures
CO3: Illustrate the mechanical properties of materials
CO4: Relate the thermal properties of materials and applications
CO5:Familiarize the concepts of optics in the field of Engineering

TEXT BOOKS:

T1- Raghavan, V. "Materials Science and Engineering : A First course". PHI Learning, 2015.
T2 - Gaur R.K. and Gupta S.L., Engineering Physics, 8th edition, Dhanpat Rai Publications (P) Ltd., New Delhi, 2015.

REFERENCE BOOKS:

R1- Askeland, D. "Materials Science and Engineering". Brooks/Cole, 2010.
R2 - William D.Callister Jr, David G. Rethwisch "Materials Science and Engineering - An Introduction", Wiley India (P) Ltd., 8th Edition, 2018.

WEB REFERENCES

1.https://nptel.ac.in/courses/112108150/
2.https://en.wikipedia.org/wiki/Aircraft/
3. https://en.wikipedia.org/wiki/Aerospace_materials/
4. https://nptel.ac.in/courses/112106227/
5. https://nptel.ac.in/courses/104104085/

PO & PSO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	2	3	3	1	1	1	1	-	1	-	2	1		
CO2	2	2	2	2	1	1	1	-	1	-	1	2		
CO3	2	3	2	1	2	1	1	-	2	-	2	3		
CO4	2	2	2	1	1	1	1	-	2	-	2	2		
CO5	2	3	3	2	2	1	1	-	1	-	2	2		
AVG	2	2.6	2.4	1.4	1.4	1	1	-	1.4	-	1.8	2.4		

Chairman, Board of Studies

Chairman - BoS
MECH - HiCET

ACADEMIC COUNCIL * HINDUSTHAN COLLEGE OF ENGG & TECH * Chairman

Dean – Academics

Dean (Academics)
HiCET

Programme	Course Code	Name of the Course	L	T	P	C
B.E./B.Tech	22IT1151R	PYTHON PROGRAMMING AND PRACTICES (AERO, AIML, CHEM, CIVIL,MECH,ECE,BME,MTS)	2	0	2	3

Course Objectives

The learner should be made:

1. To understand and be aware of algorithmic problem solving
2. To read, understand and write simple Python programs
3. To develop Python functions/programs with conditionals and loops
4. To use Python data structures — lists, tuples, dictionaries
5. To do input and output with files in Python

Unit	Description	Instructional Hours
I	**ALGORITHMIC PROBLEM SOLVING** Algorithms, building blocks of algorithms (statements, state, control flow, functions), notation (pseudocode, flow chart, programming language), algorithmic problem solving, simple strategies for developing algorithms (iteration, recursion) **Illustrative problems: Finding LCM/GCD, Fahrenheit to Celsius conversion, Performing Matrix addition.**	6
II	**DATA, STATEMENTS and CONTROL FLOW** Data Types, Operators and precedence of operators, expressions, statements, comments; Conditionals: Boolean values and operators, conditional (if), alternative (if -else), chained conditional (if –elif-else); Iteration: state, while, for, break, continue, pass. **Illustrative problems: Area of the polygon, check the given year is Leap year or not, Factorial of a Number, Fibonacci series generation**	6
III	**FUNCTIONS and STRINGS** Functions, parameters and arguments; Fruitful functions: return values, local and global scope, function composition, recursive functions. Strings: string slices, immutability, string functions and methods, string module. **Illustrative programs: Perform Linear Search, Selection sort, Sum of all elements in a List, Pattern Programs**	6
IV	**LISTS, TUPLES and DICTIONARIES** Lists: list operations, list slices, list methods, list loop, mutability, aliasing, cloning lists, list parameters; Tuples: tuple assignment, tuple as return value; Dictionaries: operations and methods; advanced list processing - list comprehension. **Illustrative programs: List and Dictionary manipulation,** **Finding Maximum/minimum/average in a List, String processing.**	6
V	**FILES, MODULES and PACKAGES** Files and exception: text files, reading and writing files, errors and exceptions, handling exceptions, modules, packages **Illustrative programs: Creating/Reading/writing in a file, word count, Handling Exceptions scenarios with simple examples**	6
	Total Instructional Hours (Theory)	**30**
	Total Instructional Hours (Practicals)	**30**
	Total Instructional Hours	**30 + 30**

Laboratory (Practical) Exercises **30 hours**

(The examples suggested in each experiment are only indicative. The lab instructor is expected to design other problems on similar lines. The Examination shall not be restricted to the sample experiments listed here.)

PO/ PSO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3
CO1	2	3	3	2	1	-	-	-	-	2	-	2	3	1	2
CO2	1	1	3	1	1	-	-	-	-	2	-	2	2	1	1
CO3	2	2	3	1	2	-	-	-	-	2	-	2	2	-	1
CO4	2	2	3	1	3	-	-	-	-	2	1	2	2	-	1
CO5	2	2	3	1	3	-	-	-	-	2	1	2	2	-	1
AVG	1.8	2	3	1.2	2	-	-	-	-	2	1	2	2.2	1	1.2

Chairman, Board of Studies

Chairman - BoS
MECH - HiCET

ACADEMIC COUNCIL * HINDUSTHAN COLLEGE OF ENGG & TECH * Chairman

Dean – Academics

Dean (Academics)
HiCET

1. Identification and solving of simple real life or scientific or technical problems, and developing flow charts for the same. (Electricity Billing, Retail shop billing, Sin series, weight of a motorbike, Weight of a steel bar, compute Electrical Current in Three Phase AC Circuit, etc.)
2. Python programming using simple statements and expressions (exchange the values of two variables, circulate the values of *n* variables, distance between two points).
3. Scientific problems using Conditionals and Iterative loops. (Number series, Number Patterns, pyramid pattern)
4. Implementing real-time/technical applications using Lists, Tuples. (Items present in a library/Components of a car/ Materials required for construction of a building –operations of list & tuples)
5. Implementing real-time/technical applications using Sets, Dictionaries. (Language, components of an automobile, Elements of a civil structure, etc.- operations of Sets & Dictionaries)
6. Implementing programs using Functions. (Factorial, largest number in a list, area of shape)
7. Implementing programs using Strings. (reverse, palindrome, character count, replacing characters)
8. Implementing programs using written modules and Python Standard Libraries (pandas, numpy, Matplotlib, scipy)
9. Implementing real-time/technical applications using File handling. (copy from one file to another, word count, longest word)
10. Implementing real-time/technical applications using Exception handling. (divide by zero error,voter's age validity, student mark range validation)
11. Exploring Pygame tool.
12. Developing a game activity using Pygame like bouncing ball, car race etc

Course Outcomes

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

CO1: Design effective algorithms to solve computational problems by utilizing building blocks like statements, control flow, functions, and employing problem-solving techniques with iteration and recursion.

CO2: Develop fundamental Python programs that utilize data types, operators, control flow with conditionals and iteration, while incorporating comments for readability.

CO3: Construct Python functions that process and manipulate strings using parameters, return values, and understand its scope.

CO4: Utilize Python's built-in data structures like lists, tuples, and dictionaries to effectively store, manipulate, and access data.

CO5: Create robust Python programs that interact with the file system by reading and writing text files.

TEXT BOOKS:

T1: Guido van Rossum and Fred L. Drake Jr, - An Introduction to Python (Revised and updated for Python 3.6.2), Schroff Publishers, First edition, 2017.

T2: S. Annadurai, S.Shankar, I.Jasmine, M.Revathi, - Fundamentals of Python Programming, Mc-Graw Hill Education (India) Private Ltd, 2019.

REFERENCE BOOKS:

R1:M.Sabrigiriraj, K.Manoharan – Programming Prowess: Conquering 110 coding challenges illustrated with Python code, Publisher: Hindusthan Educational Institutions, 2024

R2: Charles Dierbach —Introduction to Computer Science using Python: A Computational Problem Solving Focus, Wiley India Edition, 2013.

R3:Robert Sedgewick, Kevin Wayne, Robert Dondero —Introduction to Programming in Python: An Inter-disciplinary Approach, Pearson India Education Services Pvt. Ltd., 2016

Web Links for Programming Practice:

1. **https://www.hackerrank.com/domains/python**
2. **https://leetcode.com/problemset/**

Programme/ Semester	Course Code	Name of the Course	L	T	P	C
B.E./B.Tech/I	22HE1072	ENTREPRENEURESHIP AND INNOVATION (Common to all Branches)	1	0	0	1

Course Objectives

The student should be made

1. To acquire the knowledge and skills needed to manage the development of innovation.
2. To recognize and evaluate potential opportunities to monetize these innovations.
3. To plan specific and detailed method to exploit these opportunities.
4. To acquire the resources necessary to implement these plans.
5. To make students understand organizational performance and its importance.

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

TEXT BOOKS

T1:Arya Kumar"Entrepreneurship–CreatingandleadinganEntrepreneurialOrganization",Pearson,SecondEdition(2012).
T2: EmrahYayici"DesignThinkingMethodology", Artbiztech, FirstEdition(2016).

REFERENCE BOOKS

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

WEB RESOURCES

W1:https://blof.forgeforward.in/tagged/startup-lessons
W2:https://blof.forgeforward.in/tagged/entrepreurship
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

CO PO	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
MECH - HiCET

ACADEMIC COUNCIL ★ HICET ★ Chairman ★ KINGSTON COLLEGE OF

Dean – Academics

Dean (Academics)
HiCET

Programme/ Semester	Course Code	Course Title	L	T	P	C
B.E./B.Tech/I	22HE1073	INTRODUCTION TO SOFT SKILLS	2	0	0	0

Course Objectives:

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

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

Course Outcome

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

Chairman, Board of Studies

Chairman - BoS
MECH - HiCET

Dean – Academics

Dean (Academics)
HiCET

Programme/ sem	Course Code	Name of the Course	L	T	P	C
B.E/B.Tech	22MC1093	தமிழர்மரபு	2	0	0	1

Unit	Description	Instructional Hours
I	**அலகு I மொழி மற்றும் இலக்கியம்:** 3 இந்திய மொழிக் குடும்பங்கள் – திராவிட மொழிகள் – தமிழ் ஒரு செம்மொழி – தமிழ் செவ்விலக்கியங்கள் - சங்க இலக்கியத்தின் சமயச் சார்பற்ற தன்மை – சங்க இலக்கியத்தில் பகிர்தல் அறம் – திருக்குறளில் மேலாண்மைக் கருத்துக்கள் – தமிழ்க் காப்பியங்கள், தமிழகத்தில் சமண பௌத்த சமயங்களின் தாக்கம் - பக்தி இலக்கியம், ஆழ்வார்கள் மற்றும் நாயன்மார்கள் – சிற்றிலக்கியங்கள் – தமிழில் நவீன இலக்கியத்தின் வளர்ச்சி – தமிழ் இலக்கிய வளர்ச்சியில் பாரதியார் மற்றும் பாரதிதாசன் ஆகியோரின் பங்களிப்பு.	3
II	**அலகு II மரபு – பாறை ஓவியங்கள் முதல் நவீன ஓவியங்கள் வரை – சிற்பக் கலை:** 3 நடுகல் முதல் நவீன சிற்பங்கள் வரை – ஐம்பொன் சிலைகள்– பழங்குடியினர் மற்றும் அவர்கள் தயாரிக்கும் கைவினைப் பொருட்கள், பொம்மைகள் – தேர் செய்யும் கலை – சுடுமண் சிற்பங்கள் – நாட்டுப்புறத் தெய்வங்கள் – குமரிமுனையில் திருவள்ளுவர் சிலை – இசைக் கருவிகள் – மிருதங்கம், பறை, வீணை, யாழ், நாதஸ்வரம் – தமிழர்களின் சமூக பொருளாதார வாழ்வில் கோவில்களின் பங்கு.	3
III	**அலகு III நாட்டுப்புறக் கலைகள் மற்றும் வீர விளையாட்டுகள்:** 3 தெருக்கூத்து, கரகாட்டம், வில்லுப்பாட்டு, கணியான் கூத்து, ஒயிலாட்டம், தோல்பாவைக் கூத்து, சிலம்பாட்டம், வளரி, புலியாட்டம், தமிழர்களின் விளையாட்டுகள்.	3
IV	**அலகு IV தமிழர்களின் திணைக் 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.	3
V	**அலகு V இந்திய தேசிய இயக்கம் மற்றும் இந்திய பண்பாட்டிற்குத் தமிழர்களின் பங்களிப்பு:** 3 இந்திய விடுதலைப்போரில் தமிழர்களின் பங்கு – இந்தியாவின் பிறப்பகுதிகளில் தமிழ்ப் பண்பாட்டின் தாக்கம் – சுயமரியாதை இயக்கம் – இந்திய மருத்துவத்தில், சித்த மருத்துவத்தின் பங்கு – கல்வெட்டுகள், கையெழுத்துப்படிகள் - தமிழ்ப் புத்தகங்களின் அச்சு வரலாறு.	3
	Total Instructional Hours	15

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 (தொல்லியல் துறை வெளியீடு)
4. பொருநை – ஆற்றங்கரை நாகரிகம். (தொல்லியல் துறை வெளியீடு)
5. Social Life of Tamils (Dr.K.K.Pillay) A joint publication of TNTB & ESC and RMRL – (in print)
6. Social Life of the Tamils - The Classical Period (Dr.S.Singaravelu) (Published by: International Institute of Tamil Studies.
7. Historical Heritage of the Tamils (Dr.S.V.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 ofArchaeology & Tamil Nadu Text Book and Educational Services Corporation, Tamil Nadu)

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

Chairman, Board of Studies

Chairman - BoS
MECH - HiCET

ACADEMIC COUNCIL * Chairman *

Dean – Academics

Dean (Academics)
HiCET

Programme/ Semester	Course Code	Name of the Course	L	T	P	C
B.E./B.Tech/I	22MC1094	**HERITAGE OF TAMIL (Common to all Branches)**	2	0	0	1

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	**Language and Literature** 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	**Heritage _ Rock Art Paintings to Modern Art – Sculpture** 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	**Folk and Martial Arts** Therukoothu, Karagattem, Villupattu, Kaniyankoothu, Oyilattam, Leather puppertry, Silambattam., Valari Tiger dance – Sports and Games of Tamils.	6
IV	**Thinai Concept of Tamils** 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 – Exporot and Import during Sangam age – Overseas conquest of Cholas.	6
V	**Contribution of Tamils to Indian National Movement and Indian Culture** Contribution of Tamils to Indian freedom struggle – The cultural influence of Tamils over the other parts of India – Self respect movement – Role of Siddha Medicine in indigenous systems of Medicine – Inscriptions & Manuscripts – Print History of Tamil books.	6
	Total Instructional Hours	**30**

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.
CO3Appreciate 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

TEXT BOOKS:

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).

REFERENCE BOOKS:

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 TextBookand Educational Services Corporation, Tamil Nadu)
R3-Journey of Civilization Indus to Vaigai (R.Balakrishnan) (Published by: RMRL)

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

Chairman, Board of Studies

Chairman - BoS
MECH - HiCET

ACADEMIC COUNCIL * Chairman * KUMARAGURU COLLEGE OF ENGG & TECH

Dean – Academics

Dean (Academics)
HiCET

Programme/ Semester	Course Code	Name of the Course	L	T	P	C
B.E./B.Tech /I	**22MC1095**	**UNIVERSAL HUMAN VALUES (COMMON TO ALL BRANCHES)**	2	0	0	0

Course Objectives

The student should be made

1. To help the students appreciate the essential complementarily between 'VALUES' and 'SKILLS' to ensure sustained happiness and prosperity which are the core aspirations of all human beings.
2. Tofacilitatethedevelopmentofa Holisticperspectiveamongstudentstowardslifeandprofession as well as towards happiness and prosperity based on a correct understanding of the Human reality and the rest of existence. Such a holistic perspective forms the basis of Universal Human Values and movement towards value-based living in a natural way.
3. Tohighlightplausibleimplicationsofsucha Holisticunderstanding Intermsofethicalhumanconduct, trustful and mutually fulfilling human behavior and mutually enriching interaction with Nature.

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

Course Outcome

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

CO1: To become more aware of holistic vision of life - themselves and their surroundings.

CO2: To become more responsible in life, in the Society and in handling problems with sustainable Solutions.

CO3: To sensitive towards their commitment towards what they understood towards environment and Socially responsible behavior.

CO4: To able to apply what have learnt to their own self in different day-to-day settings in real life and in handling problems with sustainable solutions.

CO5: To develop competence and capabilities for maintaining Health and Hygiene.

Reference Books:

R1- A Foundation Course in Human Values and Professional Ethics, R R Gaur, R Asthana, G P Bagaria, 2nd Revised Edition, Excel Books, New Delhi, 2019. ISBN 978-93-87034-47-1

R2- Teachers'ManualforAFoundationCourseinHumanValuesandProfessionalEthics,RRGaur, R Asthana,G P Bagaria, 2nd Revised Edition, Excel Books, New Delhi, 2019. ISBN 978-93- 87034-53-2

R3-JeevanVidya: EkParichaya, A Nagaraj, Jeevan Vidya Prakashan, Amarkantak,1999.

R4- Human Values, A.N. Tripathi, New Age Intl. Publishers, New Delhi, 2004.

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

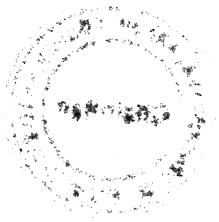
Chairman, Board of Studies

Chairman - BoS
MECH - HiCET

ACADEMIC COUNCIL * Chairman * HINDUSTHAN COLLEGE OF ENGG & TECH

Dean - Academics

Dean (Academics)
HiCET



HINDUSTHAN COLLEGE OF ENGINEERING AND TECHNOLOGY
An Autonomous Institution
Approved by AICTE, New Delhi, Affiliated to Anna University, Chennai
Accredited by NBA (AERO, AUTO, CIVIL, CSE, ECE, EEE, IT, MECH & MCT)
Accredited with 'A++' Grade by NAAC.
Coimbatore - 641 032

B E. MECHANICAL ENGINEERING

HINDUSTHAN
EDUCATIONAL AND CHARITABLE TRUST
HICET

CHOICE BASED CREDIT SYSTEM

Revised Curriculum and Syllabus for the even semester

Academic year 2024-25

Batch 2023-2027

CURRICULUM
R2022

HINDUSTHAN EDUCATIONAL AND CHARITABLE TRUST

HICET

HINDUSTHAN COLLEGE OF ENGINEERING AND TECHNOLOGY

An Autonomous Institution
Approved by AICTE, New Delhi, Affiliated to Anna University, Chennai
Accredited by NBA (AERO, AUTO, CIVIL, CSE, ECE, EEE, IT, MECH & MCT)
Accredited with 'A++' Grade by NAAC.
Coimbatore - 641 032

TÜVRheinland CERTIFIED

DETAILS OF CHANGES CARRIED OUT IN CURRICULUM & SYLLABUS
CBCS PATTERN
UNDERGRADUATE PROGRAMMES
B.E. MECHANICAL ENGINEERING REGULATION-2022
(For the students admitted during the academic year 2022-2023 and onwards)

Programme: Mechanical Engineering **Branch: Mechanical**

SEMESTER I											
S No	Course Code	Course Title	Category	L	T	P	C	TCP	CIA	ESE	Total
THEORY											
1	22MA1101	Matrices and Calculus	BSC	3	1	0	4	4	40	60	100
2	22ME1101	Engineering Drawing	ESC	1	2	0	3	5	40	60	100
THEORY WITH LAB COMPONENT											
3	22HE1151	English for Engineers	HSC	2	0	2	3	4	50	50	100
4	22PH1153	Physical Properties of Materials	BSC	2	0	2	3	4	50	50	100
5	22IT1151	Python Programming and practices	ESC	2	0	2	3	4	50	50	100
EEC COURSES (SE/AE)											
6	22HE1072	Entrepreneurship & Innovation	AEC	1	0	0	1	1	40	60	100
7	22HE1073	Introduction to soft skills	SEC	2	0	0	0	1	100	0	100
MANDATORY COURSES											
8	22MC1093/ 22MC1094	தமிழர்மரபு / HERITAGE OF TAMIL	MC	2	0	0	1	2	0	0	0
		TOTAL		**15**	**1**	**10**	**18**	**26**			

40

SEMESTER II											
S No	**Course Code**	**Course Title**	**Category**	**L**	**T**	**P**	**C**	**TCP**	**CIA**	**ESE**	**Total**
THEORY											
1	22MA2101	Differential Equations and Complex Analysis.	BSC	3	1	0	4	4	40	60	100
2	22CY2101	Environmental Studies	ESC	2	0	0	2	2	40	60	100
3	22PH2101	Basics of Material Science	BSC	2	0	0	2	2	40	60	100
4	22ME2101	Engineering Mechanics	ESC	3	0	0	3	3	40	60	100
THEORY WITH LAB COMPONENT											
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
PRACTICAL											
6	22ME2001	Engineering Practices	ESC	0	0	4	2	4	60	40	100
EEC COURSES (SE/AE)											
7	22HE2071	Design Thinking	AEC	1	0	2	2	3	100	0	100
8	22HE2072	Soft Skills and aptitude	SEC	1	0	0	1	1	100	0	100
MANDATORY COURSES											
9	22MC2094 /22MC2095	தமிழரும்தொழில்நுட்பமும்/ Tamils and Technology	MC	2	0	0	1	2	0	0	0
10	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 100 hours							
TOTAL				**18**	**1**	**10**	**23**	**29**			

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	22ME3201	Engineering Thermodynamics	PCC	3	0	0	3	3	40	60	100
3	22ME3202	Engineering Materials and Metallurgy	PCC	3	0	0	3	3	40	60	100
4	22ME3203	Electrical Drives and Control	PCC	3	0	0	3	3	40	60	100
5	22ME3204	Manufacturing Technology-I	PCC	3	0	0	3	3	40	60	100
THEORY WITH LAB COMPONENT											
6	22ME3251	Fluid Mechanics and Machinery	PCC	3	0	2	4	5	50	50	100
PRACTICAL											
7	22ME3001	Manufacturing Technology Laboratory-I	PCC	0	0	4	2	4	60	40	100
8	22ME3002	Computer Aided Modeling Lab	AEC	0	0	4	2	4	60	40	100
EEC COURSES (SE/AE)											
9	22HE3071	Soft Skills -2	SEC	1	0	0	1	1	100	0	100
MANDATORY COURSES											
10	22MC3091	Essence of Indian Traditional Knowledge	MC	2	0	0	0	2	0	0	0
		TOTAL		**15**	**3**	**14**	**25**	**32**			

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	0	100	100
2	22ME4201	Kinematics of Machinery	PCC	3	0	0	3	3	40	60	100
3	22ME4202	Hydraulic and Pneumatic Systems	PCC	3	0	0	3	3	40	60	100
4	22ME4203	Manufacturing Technology – II	PCC	3	0	0	3	3	40	60	100
5	22ME4204	Thermal Engineering	PCC	3	1	0	3	4	40	60	100
THEORY WITH LAB COMPONENT											
6	22ME4251	Strength of Materials	PCC	2	0	2	3	4	50	50	100
PRACTICAL											
7	22ME4001	Manufacturing Technology Laboratory-II	PCC	0	0	4	2	4	60	40	100
8	22ME4002	Thermal Engineering Lab	PCC	0	0	4	2	4	60	40	100
9	22ME4003	Mini Project	PCC	0	0	2	1	2	60	40	100
EEC COURSES (SE/AE)											

42

10	22HE4071	Soft Skills -3	SEC	1	0	0	1	1	100	0	100
		TOTAL		**16**	**1**	**12**	**23**	**29**			

SEMESTER V											
S No	**Course Code**	**Course Title**	**Category**	**L**	**T**	**P**	**C**	**TCP**	**CIA**	**ESE**	**Total**
THEORY											
1	22ME5201	Design of Machine Elements	PCC	3	1	0	3	4	40	60	100
2	22ME5202	Heat and Mass Transfer	PCC	3	0	0	3	3	40	60	100
3	22ME53XX	Professional Elective-1	PEC	3	0	0	3	3	40	60	100
4	22ME53XX	Professional Elective-2	PEC	3	0	0	3	3	40	60	100
5	22ME53XX	Professional Elective-3	PEC	3	0	0	3	3	40	60	100
THEORY WITH LAB COMPONENT											
7	22ME5251	Dynamics of Machines	PCC	2	0	2	3	4	50	50	100
PRACTICAL											
8	22ME5001	Heat Transfer Lab	PCC	0	0	4	1.5	4	60	40	100
9	22ME5072	Machine Drawing	ESC	0	0	4	1.5	4	60	40	100
EEC COURSES (SE/AE)											
10	22HE5071	Soft Skills -4/Foreign languages	SEC	1	0	0	1	1	100	0	100
		TOTAL		**18**	**1**	**6**	**22**	**25**			

SEMESTER VI											
S No	**Course Code**	**Course Title**	**Category**	**L**	**T**	**P**	**C**	**TCP**	**CIA**	**ESE**	**Total**
THEORY											
1	22HE6101	Professional Ethics	HSC	3	0	0	3	3	40	60	100
2	22ME6201	Design of Transmission systems	PCC	3	0	0	3	3	40	60	100
3	22ME63XX	Professional Elective-4	PEC	3	0	0	3	3	40	60	100
4	22ME63XX	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
THEORY WITH LAB COMPONENT											
7	22ME6251	Metrology and Quality control	PCC	2	0	2	3	4	50	50	100
PRACTICAL											
8	22ME6001	CAD/CAM Lab	PCC	0	0	4	1	4	60	40	100
EEC COURSES (SE/AE)											
9	**22HE6071**	Soft Skills - 5	SEC	2	0	0	2	2	100	0	100
		TOTAL		**20**	**0**	**8**	**24**	**28**			

SEMESTER VII											
S No	Course Code	Course Title	Category	L	T	P	C	TCP	CIA	ESE	Total
THEORY											
1	22ME7201	Engineering Economics and Finance Management	PCC	3	0	0	3	3	40	60	100
2	22ME7202	Artificial Intelligence for Mechanical Engineering	PCC	3	1	0	3	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
THEORY WITH LAB COMPONENT											
6	22ME7251	Finite Element Analysis	PCC	2	0	2	3	4	50	50	100
EEC COURSES (SE/AE)											
7	22ME7701	Internship	SEC	0	0	0	2	2	100	0	100
		TOTAL		**15**	**1**	**4**	**20**	**22**			
* - **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
EEC COURSES (SE/AE)											
1	22ME8901	Project Work/Granted Patent	SEC	0	0	20	10	20	100	100	200
		TOTAL		**0**	**0**	**20**	**10**	**20**			

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 theStudents who are going to be admitted in the Academic Year 2022 – 23.

SEMESTER WISE CREDIT DISTRIBUTION

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

OPEN ELECTIVE I AND II
(EMERGINGTECHNOLOGIES)

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

SL. NO.	COURSE CODE	COURSE TITLE	CATEGORY	PERIODS PERWEEK			TOTALCONTACTPERIODS	CREDITS
				L	T	P		
1	22AI6401	Artificial Intelligence and Machine Learning Fundamentals	OEC	2	0	2	4	3
2	22CS6401	Blockchain Technology	OEC	2	0	2	4	3
3	22EC6401	Cyber security	OEC	2	0	2	4	3
4	22EC6402	IoT Concepts and Applications	OEC	2	0	2	4	3
5	22IT6401	Data Science and Analytics	OEC	2	0	2	4	3
6	22BM6401	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

SL. NO.	COURSE CODE	COURSE TITLE	CATEGORY	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)

SL. NO.	COURSE CODE	COURSETITLE	CATEGORY	PERIODS PER WEEK			TOTAL CONTACT PERIODS	CREDITS
				L	T	P		
1	22ME7402	Hybrid and Electric Vehicle Technology	OEC	3	0	0	3	3
2	22MT7401	Project Management (Must in the list)	OEC	3	0	0	3	3
3	22ME7401	Total Quality Management (Must in the list)	OEC	3	0	0	3	3

OPEN ELECTIVE IV

SL. NO.	COURSE CODE	COURSETITLE	CATE GORY	PERIODS PERWEEK			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

Service Paper (Chemical Engineering)

SL. NO.	COURSE CODE	COURSETITLE	CATE GORY	PERIODS PERWEEK			TOTAL CONTACT PERIODS	CREDITS
				L	T	P		
1	22ME3231	Basic Mechanical Engineering	PCC	3	0	0	3	3

PROFESSIONAL ELECTIVE COURSES: VERTICALS

Note:

Students are permitted to choose all professional electives from any of the verticals.

Vertical I General	**Vertical II Modern Mobility Systems**	**Vertical III Product and Process Development**	**Vertical IV Robotics and Automation**	**Vertical V Computational Engineering**	**Vertical VI Logistics and Supply Chain Management**
22ME5301 Automobile Engineering	**22ME5304** Automotive Materials, Components, Design& Testing	**22ME5307** Value Engineering	**22ME5310** Sensors and Instrumentation	**22ME5313** Computational Solid Mechanics	**22ME5316** Automation in Manufacturing
22ME5302 Internet of Things for Mechanical Engineers	**22ME5305** Conventional and Futuristic Vehicle Technology	**22ME5308** Quality and Reliability Engineering	**22ME5311** Electrical Drives and Actuators	**22ME5314** Computational Fluid Dynamics and Heat transfer	**22ME5317** Warehousing Automation
22ME5303 Additive Manufacturing systems	**22ME5306** Renewable Powered Off Highway Vehicles and Emission Control Technology	**22ME5309** Production and Operations Management	**22ME5312** Embedded Systems and Programming	**22ME5315** Computational Bio Mechanics	**22ME5318** Material Handling Equipment, Repair and Maintenance
22ME6301 Principles of Management	**22ME6303** Vehicle Health Monitoring, Maintenance and Safety	**22ME6305** Ergonomics in Design	**22ME6307** Robotics	**22ME6309** Theory on Computation and Visualization	**22ME6311** Container Logistics
22ME6302 CAD/CAM	**22ME6304** CAE and CFD Approach in Future Mobility	**22ME6306** New Product Development	**22ME6308** Smart Mobility and Intelligent Vehicles	**22ME6310** Advanced Statistics and Data Analytics	**22ME6312** Robotics in Logistics
22ME7301 Entrepreneurship Development and Business Concepts	**22ME7302** Thermal Management of Batteries and Fuel Cells	**22ME7303** Product Life Cycle Management	**22ME7304** Haptics and Immersive Technologies	**22ME7305** Machine Learning for Intelligent Systems	**22ME7306** Data Science

Vertical I
General Core

S No	Course Code	Course Title	Category	Periods Per week			Total Contact Periods	Credits
				L	T	P		
1	22ME5301	Automobile Engineering	PEC	3	0	0	3	3
2	22ME5302	Internet of Things for Mechanical Engineers	PEC	3	0	0	3	3
3	22ME5303	Additive Manufacturing systems	PEC	3	0	0	3	3
4	22ME6301	Design of Transmission systems	PEC	3	0	0	3	3
5	22ME6302	CAD/CAM	PEC	3	0	0	3	3
6	22ME7301	Entrepreneurship Development and Business Concepts	PEC	3	0	0	3	3

Vertical II
Modern Mobility Systems

S No	Course Code	Course Title	Category	Periods Per week			Total Contact Periods	Credits
				L	T	P		
1	22ME5304	Automotive Materials, Components, Design & Testing	PEC	3	0	0	3	3
2	22ME5305	Conventional and Futuristic Vehicle Technology	PEC	3	0	0	3	3
3	22ME5306	Renewable Powered Off Highway Vehicles and Emission Control Technology	PEC	3	0	0	3	3
4	22ME6303	Vehicle Health Monitoring, Maintenance and Safety	PEC	3	0	0	3	3
5	22ME6304	CAE and CFD Approach in Future Mobility	PEC	3	0	0	3	3
6	22ME7302	Thermal Management of Batteries and Fuel Cells	PEC	3	0	0	3	3

Vertical III
Product and Process Development

S No	Course Code	Course Title	Category	Periods Per week			Total Contact Periods	Credits
				L	T	P		
1	22ME5307	Value Engineering	PEC	3	0	0	3	3
2	22ME5308	Quality and Reliability Engineering	PEC	3	0	0	3	3
3	22ME5309	Production and Operations Management	PEC	3	0	0	3	3
4	22ME6305	Ergonomics in Design	PEC	3	0	0	3	3
5	22ME6306	New Product Development	PEC	3	0	0	3	3
6	22ME7303	Product Life Cycle Management	PEC	3	0	0	3	3

Vertical IV
Robotics and Automation

S No	Course Code	Course Title	Category	Periods Per week			Total Contact Periods	Credits
				L	T	P		
1	22ME5310	Sensors and Instrumentation	PEC	3	0	0	3	3
2	22ME5311	Electrical Drives and Actuators	PEC	3	0	0	3	3
3	22ME5312	Embedded Systems and Programming	PEC	3	0	0	3	3
4	22ME6307	Robotics	PEC	3	0	0	3	3
5	22ME6308	Smart Mobility and Intelligent Vehicles	PEC	3	0	0	3	3
6	22ME7304	Haptics and Immersive Technologies	PEC	3	0	0	3	3

Vertical V
Computational Engineering

S No	Course Code	Course Title	Category	Periods Per week			Total Contact Periods	Credits
				L	T	P		
1	22ME5313	Computational Solid Mechanics	PEC	3	0	0	3	3
2	22ME5314	Computational Fluid Dynamics and Heat transfer	PEC	3	0	0	3	3
3	22ME5315	Computational Bio Mechanics	PEC	3	0	0	3	3
4	22ME6309	Theory on Computation and Visualization	PEC	3	0	0	3	3
5	22ME6310	Advanced Statistics and Data Analytics	PEC	3	0	0	3	3
6	22ME7305	Machine Learning for Intelligent Systems	PEC	3	0	0	3	3

Vertical VI
Logistics and Supply Chain Management

S No	Course Code	Course Title	Category	Periods Per week			Total Contact Periods	Credits
				L	T	P		
1	22ME5316	Automation in Manufacturing	PEC	3	0	0	3	3
2	22ME5317	Warehousing Automation	PEC	3	0	0	3	3
3	22ME5318	Material Handling Equipment, Repair and Maintenance	PEC	3	0	0	3	3
4	22ME6311	Container Logistics	PEC	3	0	0	3	3
5	22ME6312	Robotics in Logistics	PEC	3	0	0	3	3
6	22ME7306	Data Science	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 theaward of B.E. / B. Tech. (Honors) or Minor Degree.For B.E. / B. Tech. (Honors), 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 Vonwards. All these courses have to be in a particular vertical from any one of the other programmes.

Clause 4.10of Regulation 2022 is applicable for the Enrolmentof 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.

MECHANICAL ENGINEERING OFFERING MINOR DEGREE PROGRAM IN ELECTRIC VEHICLES

S No	Course Code	Course Title	Category	Periods Per week			Total Contact Periods	Credits
				L	T	P		
1	22ME5601	Sem 5: EV and Sub Systems.	MDC	3	0	0	3	3
2	22ME6601	Sem 6: E vehicle Dynamics	MDC	3	0	0	3	3
3	22ME6602	Sem6: Cell and battery management system	MDC	3	0	0	3	3
4	22ME7601	Sem 7: Electric Motor and control system	MDC	3	0	0	3	3
5	22ME7602	Sem 7: EV sensors and actuators	MDC	3	0	0	3	3
6	22ME8601	Sem 8: EV charging station	MDC	3	0	0	3	3

*MDC – Minor Degree Course

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

Vertical I
Fintech and Block Chain

S No	Course Code	Course Title	Category	Periods Per week			Total Contact Periods	Credits
				L	T	P		
1	22MB5231	Financial Management	MDC	3	0	0	3	3
2	22MB6231	Fundamentals of Investment	MDC	3	0	0	3	3
3	22MB6232	Banking, Financial Services andInsurance	MDC	3	0	0	3	3
4	22MB7231	Introduction to Blockchain and its Applications	MDC	3	0	0	3	3
5	22MB7232	Fintech Personal Finance and Payments	MDC	3	0	0	3	3
6	22MB8231	Introduction to Fintech	MDC	3	0	0	3	3

Vertical II
Entrepreneurship

S No	Course Code	Course Title	Category	Periods Per week			Total Contact Periods	Credits
				L	T	P		
1	22MB5232	Foundations of Entrepreneurship	MDC	3	0	0	3	3
2	22MB6233	Team Building & Leadership Management for Business	MDC	3	0	0	3	3
3	22MB6234	Creativity & Innovation in Entrepreneurship	MDC	3	0	0	3	3
4	22MB7233	Principles of Marketing Management For Business	MDC	3	0	0	3	3
5	22MB72334	Human Resource Management for Entrepreneurs	MDC	3	0	0	3	3
6	22MB8232	Financing New Business Ventures	MDC	3	0	0	3	3

Vertical III
Environment and Sustainability

S No	Course Code	Course Title	Category	Periods Per week			Total Contact Periods	Credits
				L	T	P		
1	22CE5232	Sustainable infrastructure Development	MDC	3	0	0	3	3
2	22AG6233	Sustainable Agriculture and Environmental Management	MDC	3	0	0	3	3
3	22BM6233	Sustainable Bio Materials	MDC	3	0	0	3	3
4	22ME7233	Materials for Energy Sustainability	MDC	3	0	0	3	3
5	22CE7233	Green Technology	MDC	3	0	0	3	3
6	22CE8232	Environmental Quality Monitoring and Analysis	MDC	3	0	0	3	3

B E (HONS) MECHANICAL ENGINEERING
DIGITAL AND GREEN MANUFACTURING

S No	Course Code	Course Title	Category	Periods Per week			Total Contact Periods	Credits
				L	T	P		
1	22ME5203	Sem 5: Digital Manufacturing and IoT	MDC	3	0	0	3	3
2	22ME6202	Sem 6: Lean Manufacturing	MDC	3	0	0	3	3
3	22ME6203	Sem 6: Modern Robotics	MDC	3	0	0	3	3
4	22ME7203	Sem 7: Green Manufacturing Design and Practices	MDC	3	0	0	3	3
5	22ME7204	Sem 7: Environment Sustainability and Impact Assessment	MDC	3	0	0	3	3
6	22ME8201	Sem 8: Green Supply Chain Management	MDC	3	0	0	3	3

ENERGY TECHNOLOGY

S No	Course Code	Course Title	Category	Periods Per week			Total Contact Periods	Credits
				L	T	P		
1	22ME5204	Sem 5: Bioenergy Conversion Technologies	MDC	3	0	0	3	3
2	22ME6204	Sem 6: Energy Conservation in Industries	MDC	3	0	0	3	3
3	22ME6205	Sem 6: Energy Storage Devices	MDC	3	0	0	3	3
4	22ME7205	Sem 7: Solar Energy Technology	MDC	3	0	0	3	3
5	22ME7206	Sem 7: Renewable Energy Technologies	MDC	3	0	0	3	3
6	22ME8202	Sem 8: New and Renewable Sources of Energy	MDC	3	0	0	3	3

PRODUCT AND PROCESS DEVELOPMENT

S No	Course Code	Course Title	Category	Periods Per week			Total Contact Periods	Credits
				L	T	P		
1	22ME5205	Sem 5: New Product Development	MDC	3	0	0	3	3
2	22ME6206	Sem 6: Ergonomics in Design	MDC	3	0	0	3	3
3	22ME6207	Sem 6: Advances in Composite Materials	MDC	3	0	0	3	3
4	22ME7207	Sem 7: Logistics and Supply Chain Management	MDC	3	0	0	3	3
5	22ME7208	Sem 7: EV Technologies	MDC	3	0	0	3	3
6	22ME8203	Sem 8: Heating, Ventilation and Air Conditioning Systems	MDC	3	0	0	3	3

Chairman, BoS

Chairman - BoS
MECH - HiCET

Dean Academics

Dean (Academics)
HiCET

Principal

PRINCIPAL
Hindusthan College Of Engineering & Technology
COIMBATORE - 641 032.

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

Course Objectives

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

Unit	Description	Instructional Hours
I	**FOURIER SERIES** 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
II	**BOUNDARY VALUE PROBLEMS** Classification of PDE - Problems based on one dimensional wave equation - One dimensional equation of heat conduction (excluding insulated edges).	12
III	**TWO DIMENSIONAL HEAT EQUATIONS** General and Steady state solution of two dimensional equation of heat conduction in infinite plate and semi circular plate.	12
IV	**FOURIER TRANSFORMS** Fourier Transform Pairs - Fourier Sine and Cosine transforms – Properties - Transforms of Simple functions – Convolution Theorem (Statement only) – Parseval's identity (Statement only).	12
V	**Z - TRANSFORMS AND DIFFERENCE EQUATIONS** Z- Transforms - Elementary properties – Inverse Z - transform (using partial fraction) – Convolution theorem(excluding proof)– Solution of difference equations using Z – transform	12
	Total Instructional Hours	**60**

Course Outcomes

At the end of the course, student shall be able to

CO1: Apply the principles of Fourier series which helps them to solve physical problems of engineering.

CO2: Apply the Fourier series in solving the boundary value problems.

CO3: Apply the Fourier series in solving the two dimensional heat equations.

CO4: Compute the Fourier transforms techniques which extend its applications.

CO5: Acquire knowledge about the Z- transforms for analyzing discrete-time signals and systems

TEXT BOOK:

T1- Erwin Kreyszig, "Advanced Engineering Mathematics", 10th Edition, Wiley India Private Ltd., New Delhi, 2023

T2- Bali. N.P and Manish Goyal & Watkins, "Advanced Engineering Mathematics", 7th Edition, Laxmi Publications Pvt Ltd, 2015

REFERENCES:

R1 -Veerarajan. 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	PSO11	PSO12
CO1	3	3	3	3	3	1	1	-	-	1	2	2	3	2
CO2	3	3	3	3	3	1	1	-	-	1	2	2	3	2
CO3	3	3	3	3	2	1	1	-	-	1	2	2	3	2
CO4	3	3	3	2	2	1	2	-	-	1	2	2	2	2
CO5	3	3	3	2	2	1	2	-	-	1	3	2	2	2
Avg	3	3	3	2.6	2.4	1	1.4	-	-	1	2.2	2	2.6	2

Chairman, Board of Studies

Chairman - BoS
MECH - HiCET

ACADEMIC COUNCIL ★ HINDUSTHAN COLLEGE OF ENGINEERING ★ Chairman

Dean - Academics

Dean (Academics)
HiCET

56

Programme	Course code	Name of the course	L	T	P	C
B.E.	22ME3201	ENGINEERINGTHERMODYNAMICS	3	0	0	3

Course Objectives

1. To learn the fundamentals of thermodynamics and energy conversion.
2. To gain knowledge on energy degradation in thermodynamic systems.
3. To impart knowledge on behavior of pure substances and working principle of steam power cycles.
4. To learn the thermodynamic relations.
5. To study the properties of atmospheric air.

Unit	Description	Instructional Hours
I	**FIRST LAW OF THERMODYNAMICS** Basic concepts: concept of continuum, microscopic and macroscopic approach, path and point functions, properties, thermodynamic system, equilibrium, state, path and process. Quasi-static, reversible and irreversible processes. Heat and work transfer: definition and comparison, sign convention. Zeroth law of thermodynamics: thermal equilibrium. First law of thermodynamics: application to closed and open systems.	9
II	**SECOND LAW OF THERMODYNAMICS** Heat Reservoirs: source and sink. Heat Engine, Refrigerator, and Heat pump. Statements and its corollaries. Carnot cycle, Clausius inequality. Concept of entropy: T-s diagram, Tds Equations, entropy change of pure substance, ideal gases, different processes, principle of increase in entropy and availability concepts.	9
III	**PROPERTIES OF PURE SUBSTANCE AND STEAM POWER CYCLES** Steam: formation and its thermodynamic properties, p-v, p-T, T-v, T-s, h-s diagrams. p-v-T surface. Use of steam tables and Mollier Chart. Estimation of steam properties and dryness fraction. Steam power cycles: Rankine cycle, Reheat and Regenerative cycles	9
IV	**THERMODYNAMIC RELATIONS AND GASES** Maxwell relations, Tds Equations, Difference and ratio of heat capacities, Energy equation, Joule- Thomson Coefficient, Clausius Clapeyron equation. Properties of Ideal and real gases: equations of state, Vander Waals equation for ideal and real gases, reduced properties, compressibility factor, generalised compressibility chart and its usage. Gas mixtures: mole and mass fractions, gas laws, gas constant.	9
V	**PSYCHROMETRY** Psychrometric properties, Property calculations of air vapour mixtures using psychrometric chart and expressions. Psychrometric process: sensible heating and cooling, humidification, dehumidification, adiabatic saturation, adiabatic mixing of two streams.	9
	Total Instructional Hours	**45**

Course Outcomes

At the end of the course, student shall be able to

CO1: Understand the thermodynamic principles and its applications.
CO2: Understand the energy conversion in various thermal systems.
CO3: Understand the losses and inefficient components in the thermodynamic system.
CO4: Apply the thermodynamic principles for predicting the properties of steam, gas and gas mixtures.
CO5: Apply the psychrometric principles for design of air conditioning systems.

TEXT BOOK:

T1 - Nag.P.K, "Engineering Thermodynamics", 6th Edition, Tata McGraw-Hill, New Delhi, 2017.
T2 - Cengel. Y. and Boles.M, "Thermodynamics - An Engineering Approach", 9 th Edition, Tata McGraw Hill, 2019.

REFERENCES:

R1- Natarajan E., "Engineering Thermodynamics: Fundamentals and Applications", Anuragam Publications, 2012.
R2 - Holman.J.P., "Thermodynamics", 3rd Edition. McGraw-Hill, 2014.

PO& PSO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO 10	PO 11	PO 12	PSO 1	PSO 2
CO1	1	1	1										1	1
CO2	1	2	2	2									2	
CO3	2	2	3	2										
CO4	3	1	1	2										
CO5	2	2	3	2	1					1			2	1
Avg	1.8	1.6	2	1.6	0.2	0	0	0	0	0.2	0	0	1	0.4

Chairman, Board of Studies

Chairman - BoS
MECH - HiCET

ACADEMIC COUNCIL * TECH * THANJAVUR
Chairman

Dean – Academics

Dean (Academics)
HiCET

58

Programme	Course code	Name of the course	L	T	P	C
B.E.	22ME3202	ENGINEERING MATERIALS AND METALLURGY	3	0	0	3

Course Objectives

1. To learn material classification and their atomic structure.
2. To study mechanical behavior of materials. Phase diagrams and its importance.
3. To understand heat treatment and surface treatments of metals.
4. To study the stress-strain behavior of various materials. fracture types.
5. To learn the properties of nonferrous alloys, polymers and ceramics.

Unit	Description	Instructional Hours
I	**BASIC CONCEPTS** Introduction to Materials Science. Defects-Point, Line, Area, Volume-Slip planes and slip systems, Schmidt's rule. Polymorphism and allotropy -Solidification– Nucleation and Growth mechanism. Cooling curve of pure metal and alloy	9
II	**PHASE DIAGRAMS AND PHASE TRANSFORMATION** Gibbs's Phase rule. Solubility and Solid Solutions -Isomorphous alloy system - Binary Eutectic alloy system (Lead-Tin System), Eutectoid and Peritectic system, Iron-Iron carbide equilibrium diagram. Phase Transformation-Temperature-Time-Transformation (TTT) and Continuous Cooling Transformation (CCT) Diagrams - Steels, Cast Irons and Stainless steels –types and applications –Effects of alloying elements.	9
III	**HEAT TREATMENT & SURFACE TREATMENTS** Heat Treatment –Annealing and its types, Normalizing, Aus-tempering, Mar-tempering, Quenching, Hardenability -Surface hardening processes –Flame and induction hardening, Carburizing, Nitriding and Carbonitriding—Basic concepts of wear and corrosion & their types.	9
IV	**MECHANICAL PROPERTIES AND MATERIALS** Stress-strain behavior of ferrous & non-ferrous metals, polymer and ceramics - Hardness, Fracture of metals -Ductile Fracture, Brittle Fracture, Fatigue – Endurance limit of ferrous and non-ferrous metals – Fatigue, Creep and rupture– mechanism of creep –stages of creep.	9
V	**NON FERROUS ALLOYS & COMPOSITE MATERIALS** Non Ferrous Alloys of Aluminum, Magnesium, Copper –Microstructure and mechanical property. Composites- Classification, properties and applications. Ceramics –Alumina, Zirconium, Silicon Carbide, Sialons -Processing, properties and applications of ceramics, Glasses –properties and applications.	9
	Total Instructional Hours	**45**

Course Outcomes

At the end of the course, student shall be able to

CO1: Understand the atomic structure & classification of engineering materials

CO2: Understand the alloy components and its composition variation with respect to temperature changes.

CO3: Understand the suitable materials and heat treatment methods for various industrial applications.

CO4: Understand the different types of materials testing and their applications.

CO5: Analyse the properties of non-ferrous alloys, polymers and ceramics.

TEXT BOOK:

T1 - Callister.W.D., Jr., (2018), Materials Science and Engineering: An Introduction, 9th ed., Wiley & Sons.

T2 -William F. Smith and Javad Hashemi (2022), Foundations of Materials Science and Engineering 6th edition.Mc Graw Hill

REFERENCES:

R1 - Anderson.C, K.D. Leaver, P. Leavers and R.D. Rawlings, (2013), Materials Science for Engineers, 5th edition, Tata McGraw Hill Publishers.

R2 -Sydney H Avner, (2015) "Introduction to Physical Metallurgy, Tata McGraw Hill Publishing Company Limited.

R3 - Krishnan K. Chawla, (2017) Composite materials, Science and Engineering 2nd edition, Springer.

PO& PSO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO 10	PO 11	PO 12	PSO 1	PSO 2
CO1	3	-	-	-	-	2	2	-	-	1	-	3	1	2
CO2	3	-	-	-	-	2	2	-	-	1	-	3	1	1
CO3	3	-	-	-	-	2	2	-	-	1	-	3	1	1
CO4	3	-	-	-	3	3	3	-	-	1	-	3	2	2
CO5	3	-	-	-	-	2	2	-	-	1	-	3	1	1
Avg	3	0	0	0	0.6	2.2	2.2	0	0	1	0	3	1.2	1.4

Chairman, Board of Studies

Chairman - BoS
MECH - HiCET

ACADEMIC COUNCIL
Chairman

Dean – Academics

Dean (Academics)
HiCET

Programme	Course code	Name of the course	L	T	P	C
B.E.	22ME3203	ELECTRICAL DRIVES AND CONTROLS	3	0	0	3

Course Objectives

1. To understand the basic concepts of different types of electrical machines and their performance.
2. To study the different methods of starting D.C motors and induction motors.
3. To study the conventional and solid-state drives.

Unit	Description	Instructional Hours
I	**INTRODUCTION** Basic Elements – Types of Electric Drives – factors influencing the choice of electrical drives – heating and cooling curves – Loading conditions and classes of duty – Selection of power rating for drive motors with regard to thermal overloading and Load variation factors	**8**
II	**DRIVE MOTOR CHARACTERISTICS** Mechanical characteristics – Speed-Torque characteristics of various types of load and drive motors – Braking of Electrical motors – DC motors: Shunt, series and compound - single phase and three phase induction motors.	9
III	**STARTING METHODS** Types of D.C Motor starters – Typical control circuits for shunt and series motors – Three phase squirrel cage and slip ring induction motors	8
IV	**CONVENTIONAL AND SOLID STATE SPEED CONTROL OF D.C. DRIVES** Speed control of DC series and shunt motors – Armature and field control, Ward-Leonard control system - Using controlled rectifiers and DC choppers – applications.	10
V	**CONVENTIONAL AND SOLID STATE SPEED CONTROL OF A.C. DRIVES** Speed control of three phase induction motor – Voltage control, voltage / frequency control, slip power recovery scheme – Using inverters and AC voltage regulators – applications.	**10**
	Total Instructional Hours	**45**

Course Outcomes

At the end of the course, student shall be able to
CO1: Understand the different types of electrical machines and their performance

TEXT BOOK:

T1 - Nagrath .I.J. & Kothari .D.P, "Electrical Machines", Tata McGraw-Hill, 2017
T2 - Vedam Subrahmaniam, "Electric Drives (Concepts and Applications)", Tata McGraw-Hill, 2021

REFERENCES:

1. Partab. H., "Art and Science and Utilisation of Electrical Energy", Dhanpat Rai and Sons, 2017
2. Pillai.S.K "A First Course on Electric Drives", Wiley Eastern Limited, 2012
3. Singh. M.D., K.B.Khanchandani, "Power Electronics", Tata McGraw-Hill, 2006.

61

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

Chairman, Board of Studies

Chairman - BoS
MECH - HiCET

Chairman

Dean – Academics

Dean (Academics)
HiCET

62

Programme	Course code	Name of the course	L	T	P	C
B.E.	22ME3204	MANUFACTURING TECHNOLOGY – I	3	0	0	3

Course Objectives

1. To learn the concepts of some basic manufacturing processes and fabrication techniques
2. To know the manufacturing of metal components in different methods such as metal casting.
3. To gain the metal joining, metal forming techniques.
4. To acquire knowledge in the bulk forming process such as forging and rolling.
5. To learn the manufacturing of plastic components.

Unit	Description	Instructional Hours
I	**METAL CASTING PROCESSES** Sand Casting: Sand Mould – Type of patterns - Pattern Materials – Pattern allowances – Moulding sand Properties and testing – Cores –Types and applications – Moulding machines– Types and applications; Melting furnaces: Blast and Cupola Furnaces; Special casting processes : Shell - investment – Pressure die casting - Centrifugal Casting - Continuous casting process – Stir casting; Casting Defects.	9
II	**METAL JOINING PROCESSES** Operating principle, basic equipment, merits and applications of: Fusion welding processes: Gas welding - Types – Flame characteristics; Manual metal arc welding – Gas Tungsten arc welding - Gas metal arc welding – Submerged arc welding – Electro slag welding; Operating principle and applications of: Resistance welding - Plasma arc welding – Thermit welding – Electron beam welding – Friction welding and Friction Stir Welding; Brazing and soldering; Weld defects: types, causes and cure.	9
III	**METAL FORMING PROCESSES** Hot working and cold working of metals – Forging processes – Open and closed die forging – forging operations. Rolling of metals– Types of Rolling mills – Flat strip rolling – shape rolling operations – Defects in rolled parts. Tube drawing – Principles of Extrusion – Types – Hot and Cold extrusion Principle of rod and wire drawing.	9
IV	**SHEET METAL FORMING PROCESS** Sheet metal characteristics – shearing, bending and drawing operations – Stretch forming operations – Formability of sheet metal –Special forming processes; Hydro forming – Rubber pad forming – Metal spinning– Explosive forming- Magnetic pulse forming- Peen forming- Super plastic forming – Micro forming.	9
V	**MANUFACTURE OF PLASTIC COMPONENTS** Types and characteristics of plastics –Thermoplastics and Thermosetting plastics – working principles and typical applications of Injection moulding, Plunger and screw machines – Compression moulding, Transfer Moulding – Blow moulding –Rotational moulding – Film blowing – Extrusion – Thermoforming – Bonding of Thermoplastics -industrial applications of plastics.	9
	Total Instructional Hours	**45**

Course Outcomes

At the end of the course, student shall be able to

CO1: Understand the suitable casting process for the given component.

CO2: Understand the suitable welding process and integrate the basic knowledge from material science

CO3: Rember the functions and applications of metal forming process

CO4: Analyse the basic calculation to fabricate sheet metal components.

CO5: Understand plastic component manufacturing.

TEXT BOOK:

T1 - Hajra Choudhary S.K and Hajra Choudhury. AK, "Elements of workshop Technology", volume I and II, Media promoters and Publishers pvt, Mumbai, 2018.

T2 - Rao, P.N. "Manufacturing Technology Foundry, Forming and Welding", 4th Ed, TMH-2023.

REFERENCES:

R1 - Sharma, P.C., "A Text book of production Technology", S.Chand and Co. Ltd., 2019.

R2 - Paul Degarma E, Black J.T and Ronald A. Kosher, "Materials and Processes, in Manufacturing" 8th Ed, Prentice – Hall of India, 2017.

R3 - Gowri.S, Hariharan.P, SureshBabu.A, "Manufacturing Technology I", Pearson Education, 2014.

PO& PSO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO 10	PO 11	PO 12	PSO 1	PSO 2
CO1	3	1	2	2	1	-	-	1	-	-	-	1	1	1
CO2	3	1	2	2	2	-	-	1	-	-	-	1	1	1
CO3	3	1	2	2	1	-	-	1	-	-	-	1	1	1
CO4	3	1	2	2	1	-	-	1	-	-	-	1	1	1
CO5	3	1	2	2	1	-	-	1	-	-	-	1	1	1
Avg	3	1	2	2	1.2	0	0	1	0	0	0	1	1	1

Chairman, Board of Studies

Chairman - BoS
MECH - HiCET

ACADEMIC COUNCIL Chairman

Dean – Academics

Dean (Academics)
HiCET

Programme	Course code	Name of the course	L	T	P	C
B.E.	22ME3251	FLUID MECHANICS AND MACHINERY	3	0	2	4

Course Objectives

1. To study the fluid laws, properties and measurements.
2. To expose various fluid flow measuring devices and calculate the flow losses in pipes.
3. To learn the concept of dimensional analysis
4. To gain the knowledge on working principles and performance curves of fluid pumps
5. To impart knowledge on various hydraulic turbines and performance curves...

Unit	Description	Instructional Hours
I	**INTRODUCTION TO FLUID AND FLUID FLOW** Fluid Properties - density, specific weight, specific volume, specific gravity, viscosity, compressibility, capillary, surface tension and buoyancy – pressure measurements- manometers, Continuity equation, theory of various types of flow - laminar, turbulent, unsteady, steady, non-uniform and uniform flows. Stream line, streak line and path.	8
II	**FLUID DYNAMICS AND FLOW THORUGH PIPE** Navier Stokes equation – derivation and problems, derivation of Euler's equation and Bernoulli's energy equation, Pipes in series and parallel. Reynolds number, Darcy-Weisbach equation, use of Moody diagram, minor losses-sudden expansion, sudden contraction and losses in pipe fittings.	9
III	**FLOW MEASUREMENT AND DIMENSIONAL ANALYSIS** Orificemeter, Venturimeter, Pitot tubes, Rotameter, dimensional analysis-Buckingham's theorem, Reynolds, Froude, Weber, Euler and Mach number and their applications. Calculation of discharge using Venturimeter & Orificemeter	9+5
IV	**HYDRAULIC PUMPS** Classifications of pumps –Centrifugal pumps– work done by the impeller -Head and efficiencies performance curves-velocity triangles – cavitation-priming-Reciprocating pump-slip, Indicator diagram, efficiency. Performance curves- theory of Air vessel. Experimentation on centrifugal pump and reciprocating pump.	9+5
V	**HYDRAULIC TURBINES** Classification of turbines – heads and efficiencies – velocity triangles. Theory of axial, radial and mixed flow turbines. Pelton wheel, Francis turbine and Kaplan turbines- work done by water on the runner. Specific speed– performance curves. Experimentation on Pelton wheel and Francis turbine.	9+5
	Total Instructional Hours	60

Course Outcomes

At the end of the course, student shall be able to
CO1: Apply the properties of fluids and flow characteristics.
CO2: Apply the momentum principle and losses in pipes in solving real life problems.
CO3: Understand the Dimensional and Model analysis.
CO4: Apply suitable types of pumps for various applications.
CO5: Analyze the performance of various hydraulic turbines.

TEXT BOOK:

T1- Rajput, R.K., "Fluid Mechanics and Hydraulic Machines,"S.Chand Publishers 2016.
T2 - Streeter, V.L., and Wylie, E.B., "Fluid Mechanics", McGraw-Hill Education, 9th edition 2017.

REFERENCES:

R1- Ramamrutham.S and Narayanan.R. "Fluid Hydraulics and Fluid Machines", Dhanpat Rai Publishing House (P) Ltd, New Delhi, 2012.
R2- Kumar K. L., "Engineering Fluid Mechanics", Eurasia Publishing House(p) Ltd., New Delhi 2014.
R3- White, F.M., "Fluid Mechanics", Tata Mcgraw-Hill, New Delhi, 2013.
R4- P.M.Modi & S.M.Seth, "Hydraulics and fluid mechanics including hydraulic machines", Standard book house, 2015.

PO& PSO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO 10	PO 11	PO 12	PSO 1	PSO 2
CO1	2	1	2	1	1	1	1	1	1	1	1	1	2	1
CO2	1	1	3	1	1	1	1	1	1	1	1	1	3	1
CO3	1	1	2	2	1	1	1	1	1	1	1	1	2	1
CO4	2	1	1	1	2	1	1	1	1	1	1	1	2	1
CO5	1	1	1	1	1	3	2	1	1	3	1	1	1	2
Avg	1.4	1	1.8	1.2	1.2	1.4	1.2	1	1	1.4	1	1	2	1.2

Chairman, Board of Studies

Chairman - BoS
MECH - HiCET

ACADEMIC COUNCIL * HINDUSTHAN COLLEGE OF ENGINEERING & TECHNOLOGY * MECH * Chairman

Dean – Academics

Dean (Academics)
HiCET

Programme	Course code	Name of the course	L	T	P	C
B.E.	22ME3001	MANUFACTURING TECHNOLOGY LAB – I	0	0	4	2

Course Objectives

1. To Study and practice the various operations that can be performed on the lathe, drilling and grinding machines etc. and equip with the practical knowledge required in the core industries.

Description of the Experiments

I.LIST OF EXPERIMENTS

1. Machining of Step Turning using a Lathe.
2. Machining of Knurling & Grooving using a Lathe.
3. Machining of Taper Turning using a Lathe.
4. Machining of Boring using a Lathe.
5. Machining of Internal Thread Cutting using a Lathe.
6. Machining of External Thread cutting using aLathe.
7. Machining of Eccentric Turning using a Lathe.
8. Drilling & Tapping in plates using drilling machine.
9. Surface grinding of a plate using surface grinder.

Total Instructional Hours 45

Course Outcomes

At the end of the course, student shall be able to
CO1 – Understand the use various lathe, drilling and grinding machines to fabricate various operations.

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

Chairman, Board of Studies

Chairman - BoS
MECH - HiCET

ACADEMIC COUNCIL * HINDUSTHAN COLLEGE OF ENGG & TECH * Chairman

Dean – Academics

Dean (Academics)
HiCET

67

Programme	Course code	Name of the course	L	T	P	C
B.E.	22ME3002	COMPUTER AIDED MODELING LAB	0	0	4	2

Course Objectives

1. To develop skills on using software for preparing 2D Drawings and 3D modeling.
2. To learn the importance of computer aided design and drawing in Engineering society.

Description of the Experiments

LIST OF EXERCISES USING DRAFTING SOFTWARE

1. Study of drafting software– Coordinate systems (absolute, relative, polar, etc.) – Creation of simple geometries like polygon, conic and special curves.
2. Draw the orthographic projections of simple solids like Prism, Pyramid, Cylinder, Cone and its dimensioning.
3. Draw and dimension the orthographic projections of Shaft Support.
4. Draw and dimension the orthographic projections of Machine Component.
5. Draw and dimension the orthographic projections of simple gate valve.
6. Draw the Plan and Elevation of simple Residential Building.

LIST OF EXERCISES USING MODELLING SOFTWARE

1. Study of Modeling software-Sketching and Part modeling - Tool familiarizations on Extrude, Revolve, Hole, shell.
2. Creation of Machine Block using 3D Modeling software.
3. Creation of solid journal bearing using 3D Modeling software.
4. Creation of step cone pulley using 3D Modeling software.

Total Instructional Hours 45

Course Outcomes

At the end of the course, student shall be able to
CO1: Apply the software package for drafting and modeling.
CO2: Create 2D Drawing and 3D modeling of Engineering Components. CO3: Apply basic concepts to develop construction drawing techniques

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

Chairman, Board of Studies

Chairman - BoS
MECH - HiCET

Dean – Academics

Dean (Academics)
HiCET

68

Programme	Course Code	Name of the Course	L	T	P	C
BE/BTECH	12HE6071	Soft Skill-II	1	0	0	1

Course Objectives

1. To make the students aware of the importance, the role and the content of soft skills through instruction, knowledge acquisition, demonstration and practice.
2. To learn everything from equations to probability with a completely different approach.
3. To make the students learn on an increased ability to explain the problem comprehensively.

Unit	Description	Instructional Hours
I	**Group Discussion & Presentation Skills:** GD skills – Understanding the objective and skills tested in a GD – General types of GDs – Roles in a GD – Do's & Don'ts – Mock GD & Feedback. - Presentation Skills – Stages involved in an effective presentation – selection of topic, content, aids – Engaging the audience – Time management – Mock Presentations & Feedback	4
II	**Interview Skills and Personality Skills:** Interview handling Skills – Self preparation checklist – Grooming tips: do's & don'ts – mock interview & feedback - Interpersonal skills-creative thinking-problem solving-analytical skills	3
III	**Business Etiquette & Ethics:** Etiquette – Telephone & E-mail etiquette – Dining etiquette – do's & Don'ts in a formal setting – how to impress. Ethics – Importance of Ethics and Values – Choices and Dilemmas faced – Discussions from news	3
IV	**Quantitative Aptitude:** Permutation, Combination - Probability - Logarithm - Quadratic Equations - Algebra - Progression - Geometry -	3
V	**Logical Reasoning:** Logical Connectives - Syllogisms - Venn Diagrams – Cubes - Coded inequalities - Conditions and Grouping	2

Course Outcomes

At the end of the course, student shall be able to

CO1	Students will have learnt to keep going according to plan, coping with the unfamiliar, managing disappointment and dealing with conflict.
CO2	Students will Actively participate meetings, Group Discussions / interviews and prepare & deliver presentations
CO3	Students will define professional behavior and suggest standards for appearance, actions and attitude in a Business environment
CO4	Students will be able to apply quantitative reasoning and mathematical analysis methodologies to understand and solve problems.
CO5	Students will excel in complex reasoning.

Reference Books:

R1: Bridging the Soft Skills Gap: How To Teach The Missing Basics To Todays Young Talent- Bruce Tulgan

R2: Quantitative Aptitude for Competitive Examinations (5th Edition) - Abhjit Guha

R3: How to crack test of Reasoning - Jaikishan and Premkishan

R4: The hand on guide to Analytical Reasoning and Logical Reasoning - Peeyush Bhardwaj

Chairman, Board of Studies
Chairman - BoS
MECH - HiCET

ACADEMIC COUNCIL * HICET * HINDUSTHAN COLLEGE OF ENGG

Dean – Academics
Dean (Academics)
HiCET

Programme /sem	Course Code	Name of the Course	L	T	P	C
B.E./B.Tech/ IV	22MC3091	ESSENCE OF INDIAN TRADITIONAL KNOWLEDGE	2	0	0	0

Course Objectives

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

Unit	Description	Instructional Hours
I	**Introduction to traditional knowledge:** Define traditional knowledge, nature and characteristics, scope and importance, kinds of traditional knowledge, Indigenous Knowledge (IK), characteristics, traditional knowledge vs indigenous knowledge, traditional knowledge vs western knowledge	6
II	**Protection of traditional knowledge:** The need for protecting traditional knowledge, Significance of TK Protection, value of TK in global economy, Role of Government to harness TK	6
III	**Itihas and Dharma-Shastra** **Itihas:** The Mahabharata-The Puranas-The Ramayana **Dharma - Shastra**: Manu Needhi-The Tirukkural–Thiru Arutpa	6
IV	**Traditional knowledge and intellectual property:** Systems of traditional knowledge protection, Legal concepts for the protection of traditional knowledge, Patents and traditional knowledge, Strategies to increase protection of traditional knowledge	6
V	**Indian philosophy** Jain–Buddhist–Charvaka–Samkhya-Yoga-Nyaya-Vaisheshika-SaivaSiddhanta	6
	Total Instructional Hours	**30**

Course Outcomes

At the end of the course, student shall be able to

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

REFERENCEBOOKS

R1.TraditionalKnowledgeSysteminIndia, byAmitJha,2009.
R2. Traditional Knowledge System in India by Amit Jha Atlantic publishers,2002.
R3."KnowledgeTraditionsandPracticesofIndia"KapilKapoor1,MichelDanin
R4.V.Sivaramakrishna(Ed.),CulturalHeritageofIndia-CourseMaterial,BharatiyaVidyaBhavan,Mumbai, 5thEdition, 2014.
R5. V N Jha(Eng. Trans,), Tarkasangraha of Annam Bhatta, Inernational Chinmay Foundation,Velliarnad,Amaku,am.R4.HumanValues,A.N.Tripathi,NewAgeIntl.Publishers,NewDelhi,2004.

HINDUSTHAN COLLEGE OF ENGG & TECH ACADEMIC COUNCIL Chairman

Dean (Academics) HiCET

70

HINDUSTHAN COLLEGE OF ENGINEERING AND TECHNOLOGY
An Autonomous Institution
Approved by AICTE, New Delhi, Affiliated to Anna University, Chennai
Accredited by NBA (AERO, AUTO, CIVIL, CSE, ECE, EEE, IT, MECH & MCT)
Accredited with 'A++' Grade by NAAC.
Coimbatore - 641 032

B E. MECHANICAL ENGINEERING

HINDUSTHAN
EDUCATIONAL AND CHARITABLE TRUST
HICET

CHOICE BASED CREDIT SYSTEM

Revised Curriculum and Syllabus for the ODD semester

Academic year 2024-25

Batch 2022-2026

CURRICULUM R2022

HINDUSTHAN COLLEGE OF ENGINEERING AND TECHNOLOGY

An Autonomous Institution
Approved by AICTE, New Delhi, Affiliated to Anna University, Chennai
Accredited by NBA (AERO, AUTO, CIVIL, CSE, ECE, EEE, IT, MECH & MCT)
Accredited with 'A++' Grade by NAAC.
Coimbatore - 641 032

DETAILS OF CHANGES CARRIED OUT IN CURRICULUM & SYLLABUS
CBCS PATTERN
UNDERGRADUATE PROGRAMMES
B.E. MECHANICAL ENGINEERING REGULATION-2022
(For the students admitted during the academic year 2022-2023 and onwards)

Programme: Mechanical Engineering **Branch: Mechanical**

SEMESTER I											
S No	Course Code	Course Title	Category	L	T	P	C	TCP	CIA	ESE	Total
THEORY											
1	22MA1101	Matrices and Calculus	BSC	3	1	0	4	4	40	60	100
2	22ME1101	Engineering Drawing	ESC	1	2	0	3	5	40	60	100
THEORY WITH LAB COMPONENT											
3	22HE1151	English for Engineers	HSC	2	0	2	3	4	50	50	100
4	22PH1153	Physical Properties of Materials	BSC	2	0	2	3	4	50	50	100
5	22IT1151	Python Programming and practices	ESC	2	0	2	3	4	50	50	100
EEC COURSES (SE/AE)											
6	22HE1072	Entrepreneurship & Innovation	AEC	1	0	0	1	1	40	60	100
7	22HE1073	Introduction to soft skills	SEC	2	0	0	0	1	100	0	100
MANDATORY COURSES											
8	22MC1093/ 22MC1094	தமிழர்மரபு / HERITAGE OF TAMIL	MC	2	0	0	1	2	0	0	0
		TOTAL		**15**	**1**	**10**	**18**	**26**			

SEMESTER II											
S No	Course Code	Course Title	Category	L	T	P	C	TCP	CIA	ESE	Total
THEORY											
1	22MA2101	Differential Equations and Complex Analysis.	BSC	3	1	0	4	4	40	60	100
2	22CY2101	Environmental Studies	ESC	2	0	0	2	2	40	60	100
3	22PH2101	Basics of Material Science	BSC	2	0	0	2	2	40	60	100
4	22ME2101	Engineering Mechanics	ESC	3	0	0	3	3	40	60	100
THEORY WITH LAB COMPONENT											
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
PRACTICAL											
6	22ME2001	Engineering Practices	ESC	0	0	4	2	4	60	40	100
EEC COURSES (SE/AE)											
7	22HE2071	Design Thinking	AEC	1	0	2	2	3	100	0	100
8	22HE2072	Soft Skills and aptitude	SEC	1	0	0	1	1	100	0	100
MANDATORY COURSES											
9	22MC2094 /22MC2095	தமிழரும்தொழில்நுட்பமும்/ Tamils and Technology	MC	2	0	0	1	2	0	0	0
10	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 100 hours							
		TOTAL		**18**	**1**	**10**	**23**	**29**			

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	22ME3201	Engineering Thermodynamics	PCC	3	0	0	3	3	40	60	100
3	22ME3202	Engineering Materials and Metallurgy	PCC	3	0	0	3	3	40	60	100
4	22ME3203	Electrical Drives and Control	PCC	3	0	0	3	3	40	60	100
5	22ME3204	Manufacturing Technology-I	PCC	3	0	0	3	3	40	60	100
THEORY WITH LAB COMPONENT											
6	22ME3251	Fluid Mechanics and Machinery	PCC	3	0	2	4	5	50	50	100
PRACTICAL											
7	22ME3001	Manufacturing Technology Laboratory-I	PCC	0	0	4	2	4	60	40	100
8	22ME3002	Computer Aided Modeling Lab	AEC	0	0	4	2	4	60	40	100
EEC COURSES (SE/AE)											
9	22HE3071	Soft Skills -2	SEC	1	0	0	1	1	100	0	100
MANDATORY COURSES											
10	22MC3091	Essence of Indian Traditional Knowledge	MC	2	0	0	0	2	0	0	0
		TOTAL		**15**	**3**	**14**	**25**	**32**			

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	0	100	100
2	22ME4201	Kinematics of Machinery	PCC	3	0	0	3	3	40	60	100
3	22ME4202	Hydraulic and Pneumatic Systems	PCC	3	0	0	3	3	40	60	100
4	22ME4203	Manufacturing Technology – II	PCC	3	0	0	3	3	40	60	100
5	22ME4204	Thermal Engineering	PCC	3	1	0	3	4	40	60	100
THEORY WITH LAB COMPONENT											
6	22ME4251	Strength of Materials	PCC	2	0	2	3	4	50	50	100
PRACTICAL											
7	22ME4001	Manufacturing Technology Laboratory-II	PCC	0	0	4	2	4	60	40	100
8	22ME4002	Thermal Engineering Lab	PCC	0	0	4	2	4	60	40	100
9	22ME4003	Mini Project	PCC	0	0	2	1	2	60	40	100
EEC COURSES (SE/AE)											
10	22HE4071	Soft Skills -3	SEC	1	0	0	1	1	100	0	100
		TOTAL		**16**	**1**	**12**	**23**	**29**			

SEMESTER V											
S No	Course Code	Course Title	Category	L	T	P	C	TCP	CIA	ESE	Total
THEORY											
1	22ME5201	Design of Machine Elements	PCC	3	1	0	3	4	40	60	100
2	22ME5202	Heat and Mass Transfer	PCC	3	0	0	3	3	40	60	100
3	22ME53XX	Professional Elective-1	PEC	3	0	0	3	3	40	60	100
4	22ME53XX	Professional Elective-2	PEC	3	0	0	3	3	40	60	100
5	22ME53XX	Professional Elective-3	PEC	3	0	0	3	3	40	60	100
THEORY WITH LAB COMPONENT											
7	22ME5251	Dynamics of Machines	PCC	2	0	2	3	4	50	50	100
PRACTICAL											
8	22ME5001	Heat Transfer Lab	PCC	0	0	4	1.5	4	60	40	100
9	22ME5072	Machine Drawing	ESC	0	0	4	1.5	4	60	40	100
EEC COURSES (SE/AE)											
10	22HE5071	Soft Skills -4/Foreign languages	SEC	1	0	0	1	1	100	0	100
		TOTAL		**18**	**1**	**6**	**22**	**25**			

SEMESTER VI											
S No	Course Code	Course Title	Category	L	T	P	C	TCP	CIA	ESE	Total
THEORY											
1	22HE6101	Professional Ethics	HSC	3	0	0	3	3	40	60	100
2	22ME6201	Design of Transmission systems	PCC	3	0	0	3	3	40	60	100
3	22ME63XX	Professional Elective-4	PEC	3	0	0	3	3	40	60	100
4	22ME63XX	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
THEORY WITH LAB COMPONENT											
7	22ME6251	Metrology and Quality control	PCC	2	0	2	3	4	50	50	100
PRACTICAL											
8	22ME6001	CAD/CAM Lab	PCC	0	0	4	1	4	60	40	100
EEC COURSES (SE/AE)											
9	**22HE6071**	Soft Skills - 5	SEC	2	0	0	2	2	100	0	100
		TOTAL		**20**	**0**	**8**	**24**	**28**			

SEMESTER VII											
S No	**Course Code**	**Course Title**	**Category**	**L**	**T**	**P**	**C**	**TCP**	**CIA**	**ESE**	**Total**
THEORY											
1	22ME7201	Engineering Economics and Finance Management	PCC	3	0	0	3	3	40	60	100
2	22ME7202	Artificial Intelligence for Mechanical Engineering	PCC	3	1	0	3	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
THEORY WITH LAB COMPONENT											
6	22ME7251	Finite Element Analysis	PCC	2	0	2	3	4	50	50	100
EEC COURSES (SE/AE)											
7	22ME7701	Internship	SEC	0	0	0	2	2	100	0	100
		TOTAL		**15**	**1**	**4**	**20**	**22**			
* - **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**
EEC COURSES (SE/AE)											
1	22ME8901	Project Work/Granted Patent	SEC	0	0	20	10	20	100	100	200
		TOTAL		**0**	**0**	**20**	**10**	**20**			

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 theStudents who are going to be admitted in the Academic Year 2022 – 23.

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	7	-	-	1	-	-	-	15
4	PCC	-	-	18	20	11	7	9	-	64
5	PEC	-	-	-	-	9	6	3	-	18
6	OEC	-	-	-	-	-	6	6	-	12
7	EEC	3	3	3	1	1	2	2	10	25
8	MC	1	✓	-	-	-	-	-	-	-
Total		**18**	**23**	**25**	**23**	**22**	**24**	**20**	**10**	**165**

OPEN ELECTIVE I AND II
(EMERGINGTECHNOLOGIES)

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

SL. NO.	COURSE CODE	COURSE TITLE	CATEGORY	PERIODS PERWEEK			TOTAL CONTACT PERIODS	CREDITS
				L	T	P		
1	22AI6401	Artificial Intelligence and Machine Learning Fundamentals	OEC	2	0	2	4	3
2	22CS6401	Blockchain Technology	OEC	2	0	2	4	3
3	22EC6401	Cyber security	OEC	2	0	2	4	3
4	22EC6402	IoT Concepts and Applications	OEC	2	0	2	4	3
5	22IT6401	Data Science and Analytics	OEC	2	0	2	4	3
6	22BM6401	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

SL. NO.	COURSE CODE	COURSE TITLE	CATEGORY	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

80

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)

SL. NO.	COURSE CODE	COURSETITLE	CATEGORY	PERIODS PER WEEK			TOTAL CONTACT PERIODS	CREDITS
				L	T	P		
1	22ME7402	Hybrid and Electric Vehicle Technology	OEC	3	0	0	3	3
2	22MT7401	Project Management (Must in the list)	OEC	3	0	0	3	3
3	22ME7401	Total Quality Management (Must in the list)	OEC	3	0	0	3	3

OPEN ELECTIVE IV

SL. NO.	COURSE CODE	COURSETITLE	CATE GORY	PERIODS PERWEEK			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

Service Paper (Chemical Engineering)

SL. NO.	COURSE CODE	COURSETITLE	CATE GORY	PERIODS PERWEEK			TOTAL CONTACT PERIODS	CREDITS
				L	T	P		
1	22ME3231	Basic Mechanical Engineering	PCC	3	0	0	3	3

PROFESSIONAL ELECTIVE COURSES: VERTICALS

Note:

Students are permitted to choose all professional electives from any of the verticals.

Vertical I General	Vertical II Modern Mobility Systems	Vertical III Product and Process Development	Vertical IV Robotics and Automation	Vertical V Computational Engineering	Vertical VI Logistics and Supply Chain Management
22ME5301 Automobile Engineering	**22ME5304** Automotive Materials, Components, Design& Testing	**22ME5307** Value Engineering	**22ME5310** Sensors and Instrumentation	**22ME5313** Computational Solid Mechanics	**22ME5316** Automation in Manufacturing
22ME5302 Internet of Things for Mechanical Engineers	**22ME5305** Conventional and Futuristic Vehicle Technology	**22ME5308** Quality and Reliability Engineering	**22ME5311** Electrical Drives and Actuators	**22ME5314** Computational Fluid Dynamics and Heat transfer	**22ME5317** Warehousing Automation
22ME5303 Additive Manufacturing systems	**22ME5306** Renewable Powered Off Highway Vehicles and Emission Control Technology	**22ME5309** Production and Operations Management	**22ME5312** Embedded Systems and Programming	**22ME5315** Computational Bio Mechanics	**22ME5318** Material Handling Equipment, Repair and Maintenance
22ME6301 Principles of Management	**22ME6303** Vehicle Health Monitoring, Maintenance and Safety	**22ME6305** Ergonomics in Design	**22ME6307** Robotics	**22ME6309** Theory on Computation and Visualization	**22ME6311** Container Logistics
22ME6302 CAD/CAM	**22ME6304** CAE and CFD Approach in Future Mobility	**22ME6306** New Product Development	**22ME6308** Smart Mobility and Intelligent Vehicles	**22ME6310** Advanced Statistics and Data Analytics	**22ME6312** Robotics in Logistics
22ME7301 Entrepreneurship Development and Business Concepts	**22ME7302** Thermal Management of Batteries and Fuel Cells	**22ME7303** Product Life Cycle Management	**22ME7304** Haptics and Immersive Technologies	**22ME7305** Machine Learning for Intelligent Systems	**22ME7306** Data Science

82

Vertical I

General Core

S No	Course Code	Course Title	Category	Periods Per week			Total Contact Periods	Credits
				L	T	P		
1	22ME5301	Automobile Engineering	PEC	3	0	0	3	3
2	22ME5302	Internet of Things for Mechanical Engineers	PEC	3	0	0	3	3
3	22ME5303	Additive Manufacturing systems	PEC	3	0	0	3	3
4	22ME6301	Design of Transmission systems	PEC	3	0	0	3	3
5	22ME6302	CAD/CAM	PEC	3	0	0	3	3
6	22ME7301	Entrepreneurship Development and Business Concepts	PEC	3	0	0	3	3

Vertical II

Modern Mobility Systems

S No	Course Code	Course Title	Category	Periods Per week			Total Contact Periods	Credits
				L	T	P		
1	22ME5304	Automotive Materials, Components, Design & Testing	PEC	3	0	0	3	3
2	22ME5305	Conventional and Futuristic Vehicle Technology	PEC	3	0	0	3	3
3	22ME5306	Renewable Powered Off Highway Vehicles and Emission Control Technology	PEC	3	0	0	3	3
4	22ME6303	Vehicle Health Monitoring, Maintenance and Safety	PEC	3	0	0	3	3
5	22ME6304	CAE and CFD Approach in Future Mobility	PEC	3	0	0	3	3
6	22ME7302	Thermal Management of Batteries and Fuel Cells	PEC	3	0	0	3	3

Vertical III

Product and Process Development

S No	Course Code	Course Title	Category	Periods Per week			Total Contact Periods	Credits
				L	T	P		
1	22ME5307	Value Engineering	PEC	3	0	0	3	3
2	22ME5308	Quality and Reliability Engineering	PEC	3	0	0	3	3
3	22ME5309	Production and Operations Management	PEC	3	0	0	3	3
4	22ME6305	Ergonomics in Design	PEC	3	0	0	3	3
5	22ME6306	New Product Development	PEC	3	0	0	3	3
6	22ME7303	Product Life Cycle Management	PEC	3	0	0	3	3

Vertical IV

Robotics and Automation

S No	Course Code	Course Title	Category	Periods Per week			Total Contact Periods	Credits
				L	T	P		
1	22ME5310	Sensors and Instrumentation	PEC	3	0	0	3	3
2	22ME5311	Electrical Drives and Actuators	PEC	3	0	0	3	3
3	22ME5312	Embedded Systems and Programming	PEC	3	0	0	3	3
4	22ME6307	Robotics	PEC	3	0	0	3	3
5	22ME6308	Smart Mobility and Intelligent Vehicles	PEC	3	0	0	3	3
6	22ME7304	Haptics and Immersive Technologies	PEC	3	0	0	3	3

Vertical V

Computational Engineering

S No	Course Code	Course Title	Category	Periods Per week			Total Contact Periods	Credits
				L	T	P		
1	22ME5313	Computational Solid Mechanics	PEC	3	0	0	3	3
2	22ME5314	Computational Fluid Dynamics and Heat transfer	PEC	3	0	0	3	3
3	22ME5315	Computational Bio Mechanics	PEC	3	0	0	3	3
4	22ME6309	Theory on Computation and Visualization	PEC	3	0	0	3	3
5	22ME6310	Advanced Statistics and Data Analytics	PEC	3	0	0	3	3
6	22ME7305	Machine Learning for Intelligent Systems	PEC	3	0	0	3	3

Vertical VI

Logistics and Supply Chain Management

S No	Course Code	Course Title	Category	Periods Per week			Total Contact Periods	Credits
				L	T	P		
1	22ME5316	Automation in Manufacturing	PEC	3	0	0	3	3
2	22ME5317	Warehousing Automation	PEC	3	0	0	3	3
3	22ME5318	Material Handling Equipment, Repair and Maintenance	PEC	3	0	0	3	3
4	22ME6311	Container Logistics	PEC	3	0	0	3	3
5	22ME6312	Robotics in Logistics	PEC	3	0	0	3	3
6	22ME7306	Data Science	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 theaward of B.E. / B. Tech. (Honors) or Minor Degree.For B.E. / B. Tech. (Honors), 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 Vonwards. All these courses have to be in a particular vertical from any one of the other programmes.

Clause 4.10of Regulation 2022 is applicable for the Enrolmentof 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.

MECHANICAL ENGINEERING OFFERING MINOR DEGREE PROGRAM IN ELECTRIC VEHICLES

S No	Course Code	Course Title	Category	Periods Per week			Total Contact Periods	Credits
				L	T	P		
1	22ME5601	Sem 5: EV and Sub Systems.	MDC	3	0	0	3	3
2	22ME6601	Sem 6: E vehicle Dynamics	MDC	3	0	0	3	3
3	22ME6602	Sem6: Cell and battery management system	MDC	3	0	0	3	3
4	22ME7601	Sem 7: Electric Motor and control system	MDC	3	0	0	3	3
5	22ME7602	Sem 7: EV sensors and actuators	MDC	3	0	0	3	3
6	22ME8601	Sem 8: EV charging station	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.

85.

Vertical I
Fintech and Block Chain

S No	Course Code	Course Title	Category	Periods Per week			Total Contact Periods	Credits
				L	T	P		
1	22MB5231	Financial Management	MDC	3	0	0	3	3
2	22MB6231	Fundamentals of Investment	MDC	3	0	0	3	3
3	22MB6232	Banking, Financial Services andInsurance	MDC	3	0	0	3	3
4	22MB7231	Introduction to Blockchain and its Applications	MDC	3	0	0	3	3
5	22MB7232	Fintech Personal Finance and Payments	MDC	3	0	0	3	3
6	22MB8231	Introduction to Fintech	MDC	3	0	0	3	3

Vertical II
Entrepreneurship

S No	Course Code	Course Title	Category	Periods Per week			Total Contact Periods	Credits
				L	T	P		
1	22MB5232	Foundations of Entrepreneurship	MDC	3	0	0	3	3
2	22MB6233	Team Building & Leadership Management for Business	MDC	3	0	0	3	3
3	22MB6234	Creativity & Innovation in Entrepreneurship	MDC	3	0	0	3	3
4	22MB7233	Principles of Marketing Management For Business	MDC	3	0	0	3	3
5	22MB72334	Human Resource Management for Entrepreneurs	MDC	3	0	0	3	3
6	22MB8232	Financing New Business Ventures	MDC	3	0	0	3	3

Vertical III
Environment and Sustainability

S No	Course Code	Course Title	Category	Periods Per week			Total Contact Periods	Credits
				L	T	P		
1	22CE5232	Sustainable infrastructure Development	MDC	3	0	0	3	3
2	22AG6233	Sustainable Agriculture and Environmental Management	MDC	3	0	0	3	3
3	22BM6233	Sustainable Bio Materials	MDC	3	0	0	3	3
4	22ME7233	Materials for Energy Sustainability	MDC	3	0	0	3	3
5	22CE7233	Green Technology	MDC	3	0	0	3	3
6	22CE8232	Environmental Quality Monitoring and Analysis	MDC	3	0	0	3	3

B E (HONS) MECHANICAL ENGINEERING
DIGITAL AND GREEN MANUFACTURING

S No	Course Code	Course Title	Category	Periods Per week			Total Contact Periods	Credits
				L	T	P		
1	22ME5203	Sem 5: Digital Manufacturing and IoT	MDC	3	0	0	3	3
2	22ME6202	Sem 6: Lean Manufacturing	MDC	3	0	0	3	3
3	22ME6203	Sem 6: Modern Robotics	MDC	3	0	0	3	3
4	22ME7203	Sem 7: Green Manufacturing Design and Practices	MDC	3	0	0	3	3
5	22ME7204	Sem 7: Environment Sustainability and Impact Assessment	MDC	3	0	0	3	3
6	22ME8201	Sem 8: Green Supply Chain Management	MDC	3	0	0	3	3

ENERGY TECHNOLOGY

S No	Course Code	Course Title	Category	Periods Per week			Total Contact Periods	Credits
				L	T	P		
1	22ME5204	Sem 5: Bioenergy Conversion Technologies	MDC	3	0	0	3	3
2	22ME6204	Sem 6: Energy Conservation in Industries	MDC	3	0	0	3	3
3	22ME6205	Sem 6: Energy Storage Devices	MDC	3	0	0	3	3
4	22ME7205	Sem 7: Solar Energy Technology	MDC	3	0	0	3	3
5	22ME7206	Sem 7: Renewable Energy Technologies	MDC	3	0	0	3	3
6	22ME8202	Sem 8: New and Renewable Sources of Energy	MDC	3	0	0	3	3

87

PRODUCT AND PROCESS DEVELOPMENT

S No	Course Code	Course Title	Category	Periods Per week			Total Contact Periods	Credits
				L	T	P		
1	22ME5205	Sem 5: New Product Development	MDC	3	0	0	3	3
2	22ME6206	Sem 6: Ergonomics in Design	MDC	3	0	0	3	3
3	22ME6207	Sem 6: Advances in Composite Materials	MDC	3	0	0	3	3
4	22ME7207	Sem 7: Logistics and Supply Chain Management	MDC	3	0	0	3	3
5	22ME7208	Sem 7: EV Technologies	MDC	3	0	0	3	3
6	22ME8203	Sem 8: Heating, Ventilation and Air Conditioning Systems	MDC	3	0	0	3	3

Chairman, BoS

Chairman - BoS
MECH - HiCET

Dean Academics

Dean (Academics)
HiCET

Principal

PRINCIPAL
Hindusthan College Of Engineering & Technology
COIMBATORE - 641 032.

88

SYLLABUS

89

Programme	Course code	Name of the course	L	T	P	C
B.E.	22ME5201	DESIGN OF MACHINE ELEMENTS (Common to mechanical and Automobile Engineering)	3	1	0	3

Course Objectives

1. To study the design function in mechanical engineering, different steps involved in designing and the relation of design activity with manufacturing activity.
2. To know the different types of failure modes and criteria.
3. To learn the principles involved in evaluating the shape and dimensions of a component to satisfy functional and strength requirements.
4. To gain design knowledge of the different types of elements used in the machine design process, for e.g. Shafts, couplings etc. and will be able to design these elements for each application.
5. To learn to use catalogues and standard machine components

Unit	Description	Instructional Hours
I	**STEADY STRESSES AND VARIABLE STRESSES IN MACHINE MEMBERS** Introduction to the design process - factors influencing machine design – selection of materials based on mechanical properties–preferred numbers, fits and tolerances - calculation of principal stresses for various load combinations, eccentric loading – theories of failure –Variable stresses - Soderberg, Gerber and Goodman methods for combination of stresses and their application in design problems.	10
II	**DESIGN OF SHAFTS AND COUPLINGS** Design of solid & hollow shaft based on strength and rigidity with steady loading subjected to pure torsion. Design of shafts carrying pulleys & gears (Combined loading), Design and drawing of couplings – Rigid and Flexible.	8
III	**DESIGN OF TEMPORARY AND PERMANENT JOINTS** Threaded fasteners - Bolted joints, Knuckle joints – Welded joints, riveted joints for structures – theory of bonded joints	9
IV	**DESIGN OF SPRINGS AND FLYWHEEL** Various types of springs, Design of helical springs and Leaf springs – Design of Flywheel considering stresses in rims and arms for engines and presses.	9
V	**DESIGN OF BEARINGS** Sliding contact and rolling contact bearings - Hydrodynamic journal bearings, Sommerfield Number, Raimondi and Boyd graphs- Selection of Rolling Contact bearings.	9
	Total Instructional Hours	45

Course Outcomes

At the end of the course, student shall be able to

CO1 - Understand the use of stress analysis, theories of failure and materials in the design of machine components.

CO2 - Understand the assumptions with respect to material, factor of safety, static and dynamic loads for various machine components.

CO3 – Analyse the shafts based on strength and rigidity and couplings.

CO4 - Analyse the springs and considering stresses in flywheel components.

CO5 - Analyse the Sliding contact and rolling contact bearings.

TEXT BOOK:

T1. Bhandari V.B, "Design of Machine Elements", 3rd Edition, Tata McGraw-Hill Book Co, 2018.

T2. Joseph Shigley, Charles Mischke, Richard Budynas and Keith Nisbett "Mechanical Engineering Design", 9th Edition, Tata McGraw-Hill, 2020

REFERENCES:

R1. Robert C. Juvinall and Kurt M. Marshek, "Fundamentals of Machine Design", 4th Ed, Wiley, 2005.

R2. Alfred Hall, Halowenko, A and Laughlin, H., "Machine Design", Tata McGraw-Hill BookCo.(Schaum's Outline), 2010.

R3. Sundararajamoorthy T. V. Shanmugam .N, "Machine Design", Anuradha Publications, Chennai, 2003.

R4. Ansel C Ugural, "Mechanical Design – An Integral Approach", 1st Edition, Tata McGraw-Hill Book Co, 2004

90

PO& PSO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO 10	PO 11	PO 12	PSO 1	PSO 2
CO1	3	2	1	2	2	-	-	-	-	-	2	2	3	2
CO2	3	3	1	2	2	-	-	-	-	-	-	1	3	3
CO3	3	3	1	2	1	-	-	-	-	-	1	1	3	3
CO4	3	3	2	2	2	-	-	-	-	-	1	1	3	3
CO5	3	3	3	2	2	-	-	-	-	-	1	1	3	3
Avg	3	2.8	1.6	2	1.8	0	0	0	0	0	1	1.2	3	2.8

Chairman, Board of Studies

Chairman - BoS
MECH - HiCET

Chairman

Dean – Academics

Dean (Academics)
HiCET

Programme	Course code	Name of the course	L	T	P	C
B.E.	22ME5202	HEAT AND MASS TRANSFER	3	0	0	3

Course Objectives

1. To study the various modes of heat transfer and its applications.
2. To enable the students to understand the free and forced convection concepts.
3. To learn about phase change heat transfer and heat exchangers.
4. To acquire knowledge about radiation laws and gas radiation.
5. To enhance the students for understanding the basic concepts of mass transfer.

Unit	Description	Instructional Hours
I	**CONDUCTION** Heat Conduction equation – Cartesian and Cylindrical Coordinates-One Dimensional Steady State Heat Conduction: Plain and Composite Systems-Conduction with heat generation. Extended Surfaces- Unsteady State Heat Conduction: Lumped Analysis, Semi Infinite and Infinite Solids –Use of Heisler's charts.	9
II	**CONVECTION** Free and Forced Convection - Hydrodynamic and Thermal Boundary Layer- Free and Forced Convection during external flow over Horizontal, Vertical, Inclined Plates, Cylinders and Internal flow through tubes.	9
III	**PHASE CHANGE HEAT TRANSFER AND HEAT EXCHANGERS** Nusselt's theory of condensation - Regimes of Pool boiling and Flow boiling-Correlations in boiling and condensation. Heat Exchanger Types: Overall Heat Transfer Coefficient, Fouling Factors –Analysis of heat exchanger: LMTD – NTU method.	9
IV	**RADIATION** Basic Concepts, Laws of Radiation – Black and Grey body radiation –radiation shield - Shape Factor– Gas radiations (basics study) - Green House Effect.	9
V	**MASS TRANSFER** Basic Concepts – Diffusion Mass Transfer – Flick's Law of Diffusion – Steady state Molecular Diffusion– Convective Mass Transfer – Momentum, Heat and Mass Transfer Analogy –Convective Mass Transfer Correlations.	9
	Total Instructional Hours	**45**

Course Outcomes

At the end of the course, student shall be able to

CO1: Analyse the conduction heat transfer concepts in the engineering applications.
CO2: Understand the convection phenomena.
CO3: Analyse the heat exchangers and phase change heat transfer.
CO4: Understand the Black Body and Grey body radiation.
CO5: Understand the basics of mass transfer.

TEXT BOOK:

T1 Sachdeva R C, "Fundamentals of Engineering Heat and Mass Transfer" New Age International, August 2007, Reprint 2018, 5rd edition.
T2 Yunus Cengal "Heat and Mass Transfer" Tata McGraw Hill, 3rd edition, 2020.

REFERENCES:

R1 Kothandaraman C.P "Fundamentals of Heat and Mass Transfer" New Age International, 3rd Edition, 2006, Reprint 2008.
R2 Nag P.K, "Heat Transfer" - Tata McGraw-Hill, New Delhi, 2002 .
R3 Holman J.P, "Heat Transfer" - Tata McGraw Hill, Ninth edition, 2007.
R4 S.P. Venkateshan, "Heat Transfer", Ane Books, New Delhi, 2014

92

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

Chairman, Board of Studies

Chairman - BoS
MECH - HiCET

ACADEMIC COUNCIL
Chairman
KUMARAGURU COLLEGE OF ENGG & TECH

Dean - Academics

Dean (Academics)
HiCET

93

Programme	Course code	Name of the course	L	T	P	C
B.E.	22MA5251	DYNAMICS OF MACHINES	2	0	2	3

Course Objectives

1. To study the method of static force analysis and dynamic force analysis of mechanisms and flywheel.
2. To study the undesirable effects of unbalances in rotors and engines.
3. To learn the concept of natural vibratory systems and their analysis.
4. To learn the concept of forced vibratory systems and their analysis.
5. To know principles of governors and gyroscopes.

Unit	Description	Instructional Hours
I	**FORCE ANALYSIS AND FLYWHEELS** Static force analysis of mechanisms – D Alembert's principle - Inertia force and Inertia torque – Dynamic force analysis - Dynamic Analysis in Reciprocating Engines – Gas Forces – Equivalent masses - Bearing loads - Crank shaft torque – Engine shaking forces. Turning moment diagrams – Fluctuation of energy, speed - Flywheels of engines and punching press. **Moment of Inertia of Round bar by Bifilar Suspension and Compound Pendulum.**	9
II	**BALANCING** Static and dynamic balancing – Balancing of rotating masses - Balancing of reciprocating masses in a single cylinder engine – Primary and secondary unbalanced forces - Balancing in multi- cylinder engines – Balancing machines **static balancing on static balancing machine.**	9
III	**FREE VIBRATION** Basic features of vibratory systems - Basic elements and lumping of parameters - Degrees of freedom - Single degree of freedom - Free vibration - Equations of motion - Natural frequency - Whirling of shafts and critical speed - Torsional vibration of two and three rotor systems, torsionally equivalent shaft. Determination of frequency for various elements. **Natural Frequency of Torsional Vibrations.**	9
IV	**DAMPED AND FORCED VIBRATIONS** Damped vibration - Types of damping – Logarithmic decrement - Response to periodic forcing - Harmonic Forcing – Forced vibration caused by unbalance - Support motion – Force transmissibility and amplitude transmissibility - Vibration isolation. **Transverse Vibrations, The critical speed of Shaft.**	9
V	**MECHANISMS FOR CONTROL** Governors - Types - Centrifugal governors – Porter & Proell governor, Hartnell, Hartung – Characteristics - Effect of friction - Controlling Force Gyroscopes - Gyroscopic couple – Gyroscopic stabilization - Gyroscopic effects in airplanes and ships. **Watt, Porter & Proell Governors**	9
	Total Instructional Hours	**45**

Course Outcomes

At the end of the course, student shall be able to

CO1: Analyse the inertia forces in reciprocating and rotating masses and turning moments in flywheels.

CO2: Understand the reciprocating and rotating masses.

CO3: Analyze free vibration systems.

CO4: Understand the frequency of damped forced vibration systems.

CO5: Understand the gyroscopic couple and sensitivity of governor.

TEXT BOOK:

T1 -Rattan S.S., "Theory of Machines", 3rd edition, TMH, New Delhi, 2019.

T2 -Uicker. J.J, G.R. Pennock, J.E. Shigley, "Theory of Machines and Mechanisms", 6th Ed, Oxford University Press, New York, 2019.

REFERENCES:

R1 -Shigley J.E. and Uicker J.J., "Theory of Machines and Mechanisms", McGraw-Hill, Inc., 4th Ed, 2010.

R2 -Ghosh A. and Mallick A.K., "Theory of Mechanisms and Machines", Affiliated East- West Press Pvt. Ltd., New Delhi, 3rd edition, 2004.

R3 -Khurmi, R.S.,"Theory of Machines", 14th Edition, S Chand Publications, 2005.

R4- F. B. Sayyad, "Dynamics of Machinery", McMillan Publishers India Ltd., Tech-Max Educational resources, 2011.

94

PO& PSO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO 10	PO 11	PO 12	PSO 1	PSO 2
CO1	2	2	2	-	-	1	-	-	-	-	1	1	2	2
CO2	2	1	-	2	-	-	1	-	-	-	2	1	2	1
CO3	3	1	1	1	1	2	-	-	-	-	1	2	3	1
CO4	2	1	1	1	1	2	-	-	-	-	1	2	2	1
CO5	1	1	1	1	-	1	-	-	-	-	-	-	1	1
Avg	2	1.2	1	1	0.4	1.2	0.2	0	0	0	1	1.2	2	1.2

Chairman, Board of Studies

Chairman - BoS
MECH - HiCET

Dean – Academics

Dean (Academics)
HiCET

95

Programme	Course code	Name of the course	L	T	P	C
B.E.	22ME5001	HEAT TRANSFER LAB	0	0	3	1.5

Course Objectives

1. Determination of thermal conductivity of conduction apparatus.
2. Determination of the heat transfer coefficient of convection apparatus.
3. Calculation of effectiveness of heat exchangers.
4. Determination of emissivity of a grey surface.
5. Performance of air conditioning and refrigeration systems.

Description of the Experiments

1. Thermal conductivity measurement using guarded plate apparatus.
2. Thermal conductivity measurement of pipe insulation using lagged pipe apparatus.
3. Determination of heat transfer coefficient under natural convection from a vertical cylinder.
4. Determination of heat transfer coefficient under forced convection from a tube.
5. Determination of Thermal conductivity of composite wall.
6. Determination of Thermal conductivity of insulating powder.
7. Heat transfer from pin-fin apparatus.
8. Determination of Stefan – Boltzmann constant.
9. Determination of Emissivity of a grey surface.
10. Effectiveness of Parallel / Counter flow heat exchanger.
11. Performance test on refrigeration system.
12. Performance test on air-conditioning system.

Total Instructional Hours 45

Course Outcomes

At the end of the course, student shall be able to
CO1: Apply the various modes of heat transfer in thermal systems.
CO2: Understand the working principle of refrigeration and air conditioning systems.

PO& PSO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO 10	PO 11	PO 12	PSO 1	PSO 2
CO1	2	1	1	1	1	1	-	-	1	-	1	-	-	-
CO2	2	2	1	2	-	-	-	-	1	1	1	1	2	2
CO3	2	2	2	2	-	2	-	-	1	1	1	1	2	2
CO4	2	2	2	1	-	2	2	-	1	2	1	1	2	2
CO5	2	2	2	2	-	2	2	-	-	2	1	-	2	2
Avg	**2**	**1.8**	**1.6**	**1.6**	**0.2**	**1.4**	**0.8**	**-**	**0.8**	**1.2**	**1**	**0.6**	**1.6**	**1.6**

Chairman, Board of Studies

Chairman - BoS
MECH - HiCE

ACADEMIC COUNCIL * HINDUSTHAN COLLEGE OF ENG. * Chairman

Dean - Academics

Dean (Academics)
HiCET

Programme	Course code	Name of the course	L	T	P	C
B.E.	22ME5072	MACHINE DRAWING (Theory with Lab Component)	0	0	4	1.5

Course Objectives

1. To impart the knowledge of limits, fits and tolerances, orthographic-sectional and assembly drawing procedures.
2. To provide the practice to draw assembly orthographic views of various machine parts.
3. To provide the practice and develop the detailed part drawing.
4. To impart the knowledge of shape and structure of different types of screws, keys and Couplings.
5. To provide the practice and develop the detailed mechanical components drawing.

Unit	Description	Instructional Hours
I	**LIMITS, FITS AND TOLERANCES** Limit System- Tolerance, Limits, Deviation, Actual Deviation, Upper Deviation, Lower Deviation, Allowance, Basic Size, Design Size, Actual Size. Fits-Types, Tolerances of Form and Position-Form and Position Variation, Geometrical Tolerance, Tolerance Zone, Indicating Geometrical Tolerances: Indication of Surface Roughness, Standard Abbreviations and Symbols used in industries.	7
II	**SECTIONAL VIEWS** Sections- Hatching of Sections, Cutting Planes, Revolved or Removed Section, Sectional Views- Full Section, Half Sections and Auxiliary Sections.	7
III	**STANDARD PART DRAWINGS** Drawing standards and Designation of Bolts, nuts, screws, keys, pins, Rivets, Welded Joints- Dimensioning of Welds	7
IV	**DRAWINGS OF VARIOUS VIEWS** Shaft joints: Cotter joint and Knuckle joint. Keys & Shaft coupling: Flanged coupling, Flexible coupling and Universal coupling. Shaft bearing: Solid and bush bearing, Plummer block. Pulley: Belt pulley, V belt pulley.	12
V	**ASSEMBLY DRAWING OF MECHANICAL COMPONENTS** Lathe Tail stock, Machine Vice, Pipe Vice, Simple Eccentric, Screw jack, Stuffing Box, Plummer Block.	12
	Total Instructional Hours	**45**

Course Outcomes

At the end of the course, student shall be able to

CO1 Understand the use of limits, fits and tolerances, orthographic-sectional and assembly drawing procedures in real world problems.

CO2 Apply sectional view, assembly and orthographic concepts to draw various machine parts.

CO3 Understand the Concept of fasteners and different joints.

CO4 Analyse and demonstrate the projections and sectional views of various mechanical elements.

CO5 Understand the assembly drawings of mechanical components.

TEXT BOOK:

T1. Narayana K.L. and Kannaiah P., —Machine Drawing, 4th Edition, New Age International Publishers Ltd., New Delhi, 2020.

T2. Gopalakrishna K.R., —Machine Drawing‖, 22nd Edition, Subhas Publications, New Delhi, 2018.

REFERENCES:

R1. Bhatt N.D. and Panchal V.M., —Machine Drawing‖, 45th Edition, Charotar Publishing House Pvt. Ltd., Gujarat, 2010.

R2. Sidheswar N., Kannaiah P., Sastry V.V., —Machine Drawing‖, 27th Reprint, Tata-McGraw Hill Education, Chennai, 2004.

R3. Faculty of Mechanical Engineering —Design Data‖, Revised Edition 1978, Reprint on October 2011, Kalaikathir Achchagam, 2011.

R4. Junnarkar, N.D., "Machine Drawing", 1st Edition, Pearson Education, 2004.

97

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

Chairman, Board of Studies

Chairman - BoS
MECH - HiCET

ACADEMIC COUNCIL
Chairman

Dean – Academics

Dean (Academics)
HiCET

98

PROFESSIONAL ELECTIVE – I

Programme	Course code	Name of the course	L	T	P	C
B.E.	22ME5301	AUTOMOBILE ENGINEERING	3	0	0	3

Course Objectives

1. The anatomy of the automobile in general.
2. The location and importance of each part.
3. The functioning of the engine and its accessories, gear box, clutch, brakes, steering, axles and wheels.
4. Suspension, frame, springs and other connections.
5. Emissions, ignition, controls, electrical systems and ventilation.

Unit	Description	Instructional Hours
I	**VEHICLE STRUCTURES AND ENGINE** Types of Automobiles - Vehicle Construction, Chassis –Types, Frame and Body – Types. Engine types, Components of Engine – Functions and Materials. Vehicle aerodynamics, Introduction to Electronic Engine Management System.	9
II	**FUEL SUPPLY SYSTEM AND ELECTRICAL SYSTEM** Carburetion and Simple carburetor - Electronically controlled gasoline fuel injection system – Mono- point and Multi-Point Fuel Injection Systems (MPFI). Diesel engine fuel supply system - Types, Electronically controlled diesel fuel injection system – CRDI. General layout of electrical system – Different sub circuits. Construction and operation of battery - Lighting system – Starting motor and drives.	9
III	**TRANSMISSION SYSTEMS** Clutch – Types and Construction, Gear Boxes – Types, Manual and Automatic, Selector mechanism - Over Drives – Transfer Box - Fluid flywheel - Torque converter – Propeller shaft – Slip Joint – Universal Joints – Differential unit. Rear Axle – Hotchkiss drive and Torque Tube drive. Turbocharger and supercharger.	9
IV	**STEERING, BRAKES AND SUSPENSION SYSTEMS** Wheels and Tyres – Wheel alignment parameters, Types of Front axle - Steering geometry and mechanism - Steering gear box and types – Power Steering. Brakes – Types, Hydraulic and Pneumatic braking systems - Construction and working, Antilock Braking System, electronic brake force distribution (EBD) and Traction Control.	9
V	**ALTERNATIVE FUELS IN AUTOMOBILES** Introduction to MV Act, Pollution Norms, Alternative fuels - Hydrogen- Ethanol – Compressed Natural Gas (CNG) - Liquefied Petroleum Gas (LPG), alternative power plants, Nano flow – Electric - Hybrid Vehicle -Fuel Cells-Solar Cars. Emission Control & Safety: Global Standards, Indian Pollution norms for Petrol & Diesel vehicles, Safety measures in automobiles.	9
	Total Instructional Hours	**45**

Course Outcomes

At the end of the course, student shall be able to

CO1 - Understand the function of various automobile components and engine parts.
CO2 - Understand the fuel supply systems and electrical systems in automobiles.
CO3 - Understand the working of transmission system and its various elements.
CO4 - Understand the working of suspension, steering and braking systems.
CO5 - Understand the various alternate fuels that could be used in automobiles.

TEXT BOOK:

T1 Kirpal Singh, "Automobile Engineering", Vol 1 & 2, Seventh Edition, Standard Publishers, New Delhi, 2021.
T2 Jain K.K. and Asthana .R.B, "Automobile Engineering" Tata McGraw Hill Publishers, New Delhi, 2020.

REFERENCES:

R1 Joseph Heitner, "Automotive Mechanics," Second Edition, East-West Press, 2006.
R2 Martin W, Stockel and Martin T Stockle , "Automotive Mechanics Fundamentals," The Good heart –Will Cox Company Inc, USA ,2002.
R3 Srinivasan S., "Automotive Mechanics", Tata McGraw Hill, 2nd Edition, 2009.
R4 Ganesan V. "Internal Combustion Engines", Third Edition, Tata McGraw-Hill, 2012

99

PO& PSO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO 10	PO 11	PO 12	PSO 1	PSO 2
CO1	2	1	2	1	1	1	1	1	1	1	1	1	2	1
CO2	1	1	3	1	1	1	1	1	1	1	1	1	3	1
CO3	1	1	2	2	1	1	1	1	1	1	1	1	2	1
CO4	2	1	1	1	2	1	1	1	1	1	1	1	2	1
CO5	1	1	1	1	1	3	2	1	1	3	1	1	1	2
Avg	1.4	1	1.8	1.2	1.2	1.4	1.2	1	1	1.4	1	1	2	1.2

Chairman, Board of Studies

Chairman - BoS
MECH - HiCET

Dean – Academics

Dean (Academics)
HiCET

100

Programme	Course code	Name of the course	L	T	P	C
B.E.	22ME5302	INTERNET OF THINGS FOR MECHANICAL ENGINEERS	3	0	0	3

Course Objectives

1. To know the evolution of IoT, IoT networking components, and addressing strategies in IoT.
2. To understand various sensing devices, actuator types and microcontrollers.
3. To acquire knowledge of processing in IoT.
4. To know IOT Smart Design/Fabrication.
5. To acquire knowledge of Smart Manufacturing.

Unit	Description	Instructional Hours
I	**BASICS OF NETWORKING** Basics of Networking: Introduction, Network Types, layered network models Emergence of IoT: Introduction, Evolution of IoT, Enabling IoT and the Complex Interdependence of Technologies, IoT Networking Components	9
II	**IOT SENSING, ACTUATION AND MICROCONTROLLERS** Measuring physical and virtual quantities in digital world, Overview of Sensors working, Analog Vs Digital Sensors, Wired Vs Wireless Sensors, Types of Sensors, Types of Converters Types of Transducers and Actuator, Controlling Hardware, Types of Controller, Role of microcontroller as gateway to interfacing sensors and actuators, Microcontroller Vs Microprocessor, Type of microcontrollers in embedded System	9
III	**IOT PROCESSING TOPOLOGIES AND TYPES** IoT Processing Topologies and Types: Data Format, Importance of Processing in IoT, Processing Topologies, IoT Device Design and Selection Considerations, Processing Offloading.	9
IV	**SMART DESIGN/FABRICATION** Smart Design/Fabrication - Digital Tools, Product Representation and Exchange Technologies and Standards, Agile (Additive) Manufacturing Systems and Standards. Mass Customization, Smart Machine Tools, Robotics and Automation (perception, manipulation, mobility, autonomy), Smart Perception – Sensor networks and Devices.	9
V	**INTRODUCTION TO SMART MANUFACTURING** Smart manufacturing concepts really and how it differs from conventional/legacy manufacturing-Smart Manufacturing Processes- Three Dimensions: (1) Demand Driven and Integrated Supply Chains;(2) Dynamically Optimized Manufacturing Enterprises (plant + enterprise operations);(3) Real Time, Sustainable Resource Management (intelligent energy demand management, production energy optimization and reduction of GHG)	9
	Total Instructional Hours	**45**

Course Outcomes

At the end of the course, student shall be able to

CO1 Describe the evolution of IoT, IoT networking components, and addressing strategies in IoT.
CO2 Classify various sensing devices, actuator types and microcontrollers.
CO3 Demonstrate the processing in IoT.
CO4 Explain Associated IOT Smart Design/Fabrication.
CO5 Illustrate Smart Manufacturing.

TEXT BOOK:

T1.Sudip Misra, Anandarup Mukherjee, Arijit Roy, "Introduction to IoT", Cambridge University Press 2021..
T2. Hajjaj, S S H. and Gsangaya, K. R., (2022), "The Internet of Mechanical Things: The IoT Framework for Mechanical Engineers," CRC Press,
T3. Raj, P. and Raman, A. C., (2017), "The Internet of Things: Enabling Technologies, Platforms, and Use Cases," Auerbach Publications/CRC Press,
T4. Adrian McEwen, A. and Cassimally, H., (2018), "Designing the Internet of Things," John Wiley and Sons,

REFERENCES:

R1 daCosta, F., (2013), "Rethinking the Internet of Things: A Scalable Approach to Connecting Everything", Apress Publications.
R2.S. Misra, C. Roy, and A. Mukherjee, 2020. Introduction to Industrial Internet of Things and Industry 4.0. CRC Press.
R3.Vijay Madisetti and Arshdeep Bahga, "Internet of Things (A Hands-on-Approach)",1st Edition, VPT, 2014.

101

PO& PSO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO 10	PO 11	PO 12	PSO 1	PSO 2
CO1	-	-	-	-	-	-	-	-	-	1	1	2	-	2
CO2	-	-	-	-	3	-	-	-	-	1	1	3	1	1
CO3	-	-	-	-	3	1	-	-	3	2	1	3	1	2
CO4	-	-	1	2	-	-	-	-	1	3	1	2	2	2
CO5	-	-	1	2	-	1	-	-	1	2	1	3	2	1
Avg	-	-	1	2	3	1	-	-	1.3	1.8	1	2.6	1.5	1.6

Chairman, Board of Studies

Chairman - BoS
MECH - HiCET

ACADEMIC CO... Chairman

Dean – Academics

Dean (Academics)
HiCET

102

Programme	Course code	Name of the course	L	T	P	C
B.E.	22ME5303	ADDITIVE MANUFACTURING SYSTEMS	3	0	0	3

Course Objectives

1. To know the principle methods, areas of usage, possibilities and limitations as well as environmental effects of the Rapid Prototyping technologies.
2. To acquire knowledge of solid and liquid based Rapid prototyping system.
3. To provide information about Power based prototyping system.
4. To be familiar with the characteristics of the different materials those are used in lean Manufacturing.
5. To impart knowledge of characteristics and issues of Just in time.

Unit	Description	Instructional Hours
I	**INTRODUCTION** Need - Development of RP systems – RP process chain - Impact of Rapid Prototyping and Tooling on Product Development – Benefits- Applications – Digital prototyping – Virtual prototyping.	7
II	**REVERSE ENGINEERING AND CAD MODELING** Basic concept - Digitization techniques – Model Reconstruction – Data Processing for Rapid Prototyping: CAD model preparation, Data Requirements – Geometric modeling techniques: Wire frame, surface and solid modeling – Data formats - Data interfacing - Part orientation and support generation - Support structure design - Model Slicing and contour data organization - Direct and adaptive slicing - Tool path generation	10
III	**SOLID AND LIQUID BASED ADDITIVE MANUFACTURINGSYSTEMS** Stereo lithography Apparatus (SLA), Fused deposition Modeling (FDM), Laminated object manufacturing (LOM), three dimensional printing: Working Principles, details of processes, products, materials, advantages, limitations and applications - Case studies.	9
IV	**POWDER BASED ADDITIVE MANUFACTURING SYSTEMS** Selective Laser Sintering (SLS), Direct Metal Laser Sintering (DMLS), Three-Dimensional Printing, Laser Engineered Net Shaping (LENS), Processes, materials, products, advantages, applications and limitations – Case Studies.	9
V	**OTHER ADDITIVE MANUFACTURING SYSTEMS** Introduction - basic process of Shape Deposition Manufacturing (SDM) and its applications. Selective Laser Melting (SLM), Electron Beam Melting (EBM) – Rapid Manufacturing.	9
	Total Instructional Hours	**45**

Course Outcomes

At the end of the course, student shall be able to

CO1: Understand the basics of additive manufacturing techniques in manufacturing.

CO2: Understand the concepts of modeling, data processing and reverse engineering in additive Manufacturing.

CO3: Apply the liquid and solid based additive manufacturing system in suitable applications.

CO4: Apply powder based additive manufacturing system in suitable applications.

CO5: Apply the new technologies in additive manufacturing for various applications.

TEXT BOOK:

T1 Ian Gibson, David W. Rosen, Brent Stucker, Springer (2019). Additive Manufacturing Technologies Rapid prototyping: Direct Digital Manufacturing.

T2 Hopkinson, N., R. Hague and P. Dickens, (2020) Rapid Manufacturing: An Industrial Revolution for the Digital Age, John Wiley, New York.

REFERENCES:

R1 Chua C.K, Leong K.F and Lim C.S, "Rapid Prototyping: Principles and Applications", World Scientific, 2003.

R2 Rafiq I.Noorani, "Rapid Prototyping: Principles and Applications", Wiley & Sons, 2006.

R3 Wiley Gibson, "Advanced manufacturing technology for medical applications",2008.

R4 Liou, L.W. and Liou, F.W., "Rapid Prototyping and Engineering applications: A tool box for prototype development", CRC Press., United States, 2011.

103

PO& PSO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO 10	PO 11	PO 12	PSO 1	PSO 2
CO1	2	1	2	1	1	1	1	1	1	1	1	1	2	1
CO2	1	1	3	1	1	1	1	1	1	1	1	1	3	1
CO3	1	1	2	2	1	1	1	1	1	1	1	1	2	1
CO4	2	1	1	1	2	1	1	1	1	1	1	1	2	1
CO5	1	1	1	1	1	3	2	1	1	3	1	1	1	2
Avg	**1.4**	**1**	**1.8**	**1.2**	**1.2**	**1.4**	**1.2**	**1**	**1**	**1.4**	**1**	**1**	**2**	**1.2**

Chairman, Board of Studies

Chairman - BoS
MECH - HiCET

Dean–Academics

Dean (Academics)
HiCET

104

Programme	Course code	Name of the course	L	T	P	C
B.E.	22HE5071	SOFT SKILLS - IV	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	**INTRODUCTION TO SOFT SKILLS** 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	**ART OF COMMUNICATION** 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	**WORLD OF TEAMS** 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	**QUANTITATIVE APTITUDE** Averages - Profit and loss - Partnerships - Time and work - Time, Speed and Distance - Problems based on trains - Problems based on boats and streams	3
V	**LOGICAL REASONING** Clocks - Calendars - Direction Sense - Data Interpretation: Tables, Pie Chart, Bar Graph - Data Sufficiency	4
	Total Instructional Hours	**15**

Course Outcomes

At the end of the course, student shall be able to

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.

REFERENCES:

R1 Frederick H. Wentz , Soft Skills Training: A Workbook to Develop Skills for Employment

R2 Arun Sharma, How to prepare for data interpretation for CAT.

R3 Jaikishan and Premkishan, How to Crack TEST OF REASONING in all competitive examinations.

R4 B.S. Sijwali, A New Approach To Reasoning Verbal & Non-Verbal

R5 Dr. R.S. Aggarwal, Quantitative Aptitude for Competitive Examinations - S. Chand

Chairman, Board of Studies

Chairman - BoS
MECH - HiCET

Dean – Academics

Dean (Academics)
HiCET

105

CURRICULUM
(MINOR)
R2022

MECHANICAL ENGINEERING OFFERING MINOR DEGREE PROGRAM IN ELECTRIC VEHICLES

S No	Course Code	Course Title	Category	Periods Per week			Total Contact Periods	Credits
				L	T	P		
1	22ME5601	Sem 5: EV and Sub Systems.	MDC	3	0	0	3	3
2	22ME6601	Sem 6: E vehicle Dynamics	MDC	3	0	0	3	3
3	22ME6602	Sem6: Cell and battery management system	MDC	3	0	0	3	3
4	22ME7601	Sem 7: Electric Motor and control system	MDC	3	0	0	3	3
5	22ME7602	Sem 7: EV sensors and actuators	MDC	3	0	0	3	3
6	22ME8601	Sem 8: EV charging station	MDC	3	0	0	3	3

*MDC – Minor Degree Course

Programme	Course code	Name of the course	L	T	P	C
B.E.	22ME5601	EV AND SUB SYSTEMS	3	0	0	3

Course Objectives

The student should be able

1. To introduce the fundamental concepts of various vehicle frames and axles.
2. To Study the steering system and its geometry.
3. To Learn the different types of drivelines and drives used in Automotive.
4. To understand the working principle of conventional and independent suspension systems.
5. To learn brake and its subsystems.

Unit	Description	Instructional Hours
I	**UNIT I INTRODUCTION, FRAME** Types of Chassis layout, with reference to Power Plant location and drive, various types of frames, Loads acting on vehicle frame, Constructional details and materials for frames, Testing of frames, Types of Front Axles and Stub Axles.	9
II	**UNIT II STEERING SYSTEM** Front Wheel Geometry, Condition for True Rolling Motion of Wheels during Steering, Ackerman's and Davis Steering Mechanisms, Steering Error Curve, Steering Linkages, Different Types of Steering Gears, Slip Angle, Over–Steer and Under–Steer, Reversible and Irreversible Steering, EPAS.	9
III	**UNIT III TRANSMISSION** Wilson gear box- Cotal electric transmission. Chevrolet "Turboglide" transmission. – Four speeds longitudinally mounted automatic transmission -Hydraulic control systems of automatic transmission. Continuously Variable Transmission (CVT) — types – Operations. Electric drivetypes- Principle of early and modified Ward Leonard Control system- Advantages & limitations - Automated Manual Transmission (AMT) - Modern electric drives.	9
IV	**UNIT IV SUSPENSION SYSTEM** Need for Suspension System, Types of Suspension Springs, Constructional details and characteristics of Single Leaf, Multi–Leaf, Coil, and Torsion bar, Rubber, Pneumatic and Hydro – elastic Suspension Spring Systems, Independent Suspension System, Shock Absorbers, Types and Constructional details.	9
V	**UNIT V BRAKING SYSTEM** Theory of Automobile Braking, Stopping Distance Time and Braking Efficiency, Effect of Weight Transfer during Braking, Theory of Drum Brakes, Loading and Trailing Shoes, Braking Torque, Constructional Details of Drum Brake and its Activators, Disc Brake Theory, Types and Construction, Hydraulic Braking System, Mechanical Braking System, Pneumatic Braking System, Power–Assisted Braking System, Anti–Lock Braking System, Constructional Details.	9
	Total Instructional Hours	**45**

Course Outcomes

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

CO1 Understand the different types of frame and chassis used in Automotive.

CO2. Understand the steering system and its geometry..

CO3 Analyse the different types of drivelines and drives used in Automotive

CO4. Understand the working principle of conventional and independent suspension systems.

CO5. Analyse the principles of brake and its subsystems.

TEXT BOOK:

1. Kirpal Singh, Automobile Engineering, Standard Publisher, New Delhi , 2017
2. K.K. Ramalingam, "Automobile Engineering", sci-tech publication (India), 2018.
3. R.K. Rajput, A Text–Book of Automobile Engineering, Laxmi Publications Private Limited, 2019

REFERENCES:

R1 Heinz Hazler, Modern Vehicle Technology, Butterworth, London, 2005.
R2. Heldt P.M., Automotive Chassis, Chilton Co., New York, 1990
R3. Newton Steeds and Garret, Motor Vehicles, 13th Edition, Butterworth, London, 2005.
R4. N.K. Giri, Automotive Mechanics, Kanna Publishers, 2007
R5. William. H. Crows – Work shop Manuel – 2005

108

PO& PSO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	1	1	1	-	1	-	-	-	-		1	1	1
CO2	3	1	1	1	-	2	2	-	1	-	1	1	1	1
CO3	3	1	1	1	-	-	-	-	-	-	-	1	1	1
CO4	3	1	1	1	-	-	-	-	-	-	-	1	1	1
CO5	3	1	1	1	-	2	1	-	1	-	1	1	1	1
Avg	**3**	**1**	**1**	**1**	-	**1**	**0.6**	-	**0.4**	-	**0.4**	**1**	**1**	**1**

Chairman, Board of Studies

Chairman - BoS
MECH - HiCET

ACADEMIC COUNCIL * HINDUSTHAN COLLEGE * Chairman

Dean – Academics

Dean (Academics)
HiCET

109

CURRICULUM
(HONS)
R2022

B E (HONS) MECHANICAL ENGINEERING

DIGITAL AND GREEN MANUFACTURING

S No	Course Code	Course Title	Category	Periods Per week			Total Contact Periods	Credits
				L	T	P		
1	22ME5203	Sem 5: Digital Manufacturing and IoT	MDC	3	0	0	3	3
2	22ME6202	Sem 6: Lean Manufacturing	MDC	3	0	0	3	3
3	22ME6203	Sem 6: Modern Robotics	MDC	3	0	0	3	3
4	22ME7203	Sem 7: Green Manufacturing Design and Practices	MDC	3	0	0	3	3
5	22ME7204	Sem 7: Environment Sustainability and Impact Assessment	MDC	3	0	0	3	3
6	22ME8201	Sem 8: Green Supply Chain Management	MDC	3	0	0	3	3

RENEWABLE ENERGY TECHNOLOGY

S No	Course Code	Course Title	Category	Periods Per week			Total Contact Periods	Credits
				L	T	P		
1	22ME5204	Sem 5: Bioenergy Conversion Technologies	MDC	3	0	0	3	3
2	22ME6204	Sem 6: Energy Conservation in Industries	MDC	3	0	0	3	3
3	22ME6205	Sem 6: Energy Storage Devices	MDC	3	0	0	3	3
4	22ME7205	Sem 7: Solar Energy Technology	MDC	3	0	0	3	3
5	22ME7206	Sem 7: Renewable Energy Technologies	MDC	3	0	0	3	3
6	22ME8202	Sem 8: New and Renewable Sources of Energy	MDC	3	0	0	3	3

111

PRODUCT AND PROCESS DEVELOPMENT

S No	Course Code	Course Title	Category	Periods Per week			Total Contact Periods	Credits
				L	T	P		
1	22ME5205	Sem 5: New Product Development	MDC	3	0	0	3	3
2	22ME6206	Sem 6: Ergonomics in Design	MDC	3	0	0	3	3
3	22ME6207	Sem 6: Advances in Composite Materials	MDC	3	0	0	3	3
4	22ME7207	Sem 7: Logistics and Supply Chain Management	MDC	3	0	0	3	3
5	22ME7208	Sem 7: EV Technologies	MDC	3	0	0	3	3
6	22ME8203	Sem 8: Heating, Ventilation and Air Conditioning Systems	MDC	3	0	0	3	3

112

Programme	Course code	Name of the course	L	T	P	C
B.E.	22MEXXX1	DIGITAL MANUFACTURING AND IOT	3	0	0	3

Course Objectives

1. To study the various aspects of digital manufacturing.
2. 2 To inculcate the importance of DM in Product Lifecycle Management and Supply
3. chain Management.
4. 3 To formulate of smart manufacturing systems in the digital work environment.
5. 4 To interpret IoT to support the digital manufacturing.
6. 5 To elaborate the significance of digital twin.

Unit	Description	Instructional Hours
I	**INTRODUCTION** Introduction – Need – Overview of Digital Manufacturing and the Past – Aspects of Digital Manufacturing: Product life cycle, Smart factory, and value chain management – Practical Benefits of Digital Manufacturing – The Future of Digital Manufacturing.	9
II	**DIGITAL LIFE CYCLE & SUPPLY CHAIN MANAGEMENT** Collaborative Product Development, Mapping Requirements to specifications – Part Numbering, Engineering Vaulting, and Product reuse – Engineering Change Management, Bill of Material and Process Consistency – Digital Mock up and Prototype development – Virtual testing and collateral. Overview of Digital Supply Chain - Scope& Challenges in Digital SC - Effective Digital Transformation - Future Practices in SCM.	9
III	**SMART FACTORY** Smart Factory – Levels of Smart Factories – Benefits – Technologies used in Smart Factory – Smart Factory in IoT- Key Principles of a Smart Factory – Creating a Smart Factory – Smart Factories and Cybersecurity.	9
IV	**INDUSTRY 4.0** Introduction – Industry 4.0 –Internet of Things – Industrial Internet of Things – Framework: Connectivity devices and services – Intelligent networks of manufacturing – Cloud computing – Data analytics –Cyber physical systems –Machine to Machine communication – Case Studies.	9
V	**STUDY OF DIGITAL TWIN** Basic Concepts – Features and Implementation – Digital Twin: Digital Thread and Digital Shadow- Building Blocks – Types – Characteristics of a Good Digital Twin Platform – Benefits, Impact & Challenges – Future of Digital Twins.	9
	Total Instructional Hours	**45**

Course Outcomes

At the end of the course, student shall be able to

CO1: Understand the use various elements in the digital manufacturing.

CO2. Understand the concepts involved in digital product development life cycle process and supply chain management in digital environment.

CO3. Apply the proper procedure of validating practical work through digital validation in Factories.

CO4. Analyse the concepts of IoT and its role in digital manufacturing.

CO5. Analyse and optimize various practical manufacturing process through digital twin.

TEXT BOOK:

T1 Zude Zhou, Shane (Shengquan) Xie and Dejun Chen, Fundamentals of Digital Manufacturing Science, Springer-Verlag London Limited, 2018.

T2. Alasdair Gilchrist, "Industry 4.0: The Industrial Internet of Things", A press, 2019.

REFERENCES:

R1. Lihui Wang and Andrew YehChing Nee, Collaborative Design and Planning for Digital Manufacturing, Springer-Verlag London Limited, 2009.

R2. Andrew Yeh Chris Nee, Fei Tao, and Meng Zhang, "Digital Twin Driven Smart Manufacturing", Elsevier Science., United States, 2019.

R3. Alp Ustundag and Emre Cevikcan, "Industry 4.0: Managing The Digital Transformation", Springer Series in Advanced Manufacturing., Switzerland, 2017

R4. Ronald R. Yager and Jordan Pascual Espada, "New Advances in the Internet of Things", Springer., Switzerland, 2018.

R5. Ronald R. Yager and Jordan Pascual Espada, "New Advances in the Internet of Things", Springer., Switzerland, 2018.

113

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

Chairman, Board of Studies

Chairman - BoS
MECH - HiCET

ACADEMIC COUNCIL ★ KINGS ENGINEERING COLLEGE OF ENGG & TECH ★ Chairman

Dean – Academics

Dean (Academics) .
HiCET

Programme	Course code	Name of the course	L	T	P	C
B.E.	22MEXXX1	BIOENERGY CONVERSION TECHNOLOGIES	3	0	0	3

Course Objectives

1. To elucidate on biomass, types, availability, and characteristics
2. To study the bio-methanation process.
3. To impart knowledge on combustion of biofuels
4. To describe on the significance of equivalence ratio on thermochemical conversion of biomass
5. To provide insight to the possibilities of producing liquid fuels from biomass

Unit	Description	Instructional Hours
I	**INTRODUCTION** Biomass: types – advantages and drawbacks – typical characteristics – proximate & ultimate analysis – comparison with coal - Indian scenario - carbon neutrality – biomass assessment studies – typical conversion mechanisms - densification technologies	9
II	**BIOMETHANATION** Biomethenation process – influencing parameters – typical feed stocks – Biogas plants: types and design, Biogas appliances – burner, luminaries and power generation systems – Industrial effluent based biogas plants.	9
III	**COMBUSTION** Perfect, complete and incomplete combustion – stoichiometric air requirement for biofuels - equivalence ratio – fixed Bed and fluid Bed combustion	9
IV	**GASIFICATION, PYROLYSIS AND CARBONISATION** Chemistry of gasification - types – comparison – typical application – performance evaluation – economics. Pyrolysis - Classification - process governing parameters – Typical yield rates. Carbonization – merits of carbonized fuels – techniques adopted for carbonisation	9
V	**LIQUIFIED BIOFUELS** Straight Vegetable Oil (SVO) as fuel - Biodiesel production from oil seeds, waste oils and algae - Process and chemistry - Biodiesel Vs. Diesel – comparison on emission and performance fronts. Production of alcoholic fuels (methanol and ethanol) from biomass – engine modifications	9
	Total Instructional Hours	45

Course Outcomes

At the end of the course, student shall be able to

CO1: Understand the surplus biomass availability of any given area.

CO2. Analyse a biogas plant for a variety of biofuels.

CO3. Analyse and compare the cost of steam generation from biofuels with that of coal and petroleum fuels.

CO4. Analyse the influence of process governing parameters in thermochemical conversion of biomass.

CO5. Understand the liquid biofuels for power generation from biomass.

TEXT BOOK:

T1 Biomass for Bioenergy and Biomaterials, by Nidhi Adlakha, Rakesh Bhatnagar , Syed Shams Yazdani, CRC Press; 1st edition (22 October 2021), ISBN-10 : 0367745550

T2. Bioenergy and Biochemical Processing Technologies, by Augustine O. Ayeni, Samuel EshorameSanni , Solomon U. Oranusi, Springer (30 June 2022).

REFERENCES:

R1. David Boyles, Bio Energy Technology Thermodynamics and costs, Ellis Hoknood Chichester,1984.

R2. Iyer PVR et al, Thermochemical Characterization of Biomass, M N E S

R3. Khandelwal KC, Mahdi SS, Biogas Technology – A Practical Handbook, Tata McGraw Hill, 1986

R4. Mahaeswari, R.C. Bio Energy for Rural Energisation, Concepts Publication,1997

R5. Tom B Reed, Biomass Gasification – Principles and Technology, Noyce Data Corporation, 1981

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

Chairman, Board of Studies

Chairman - BoS
MECH - HiCET

ACADEMIC COUNCIL
Chairman
HINDUSTHAN COLLEGE OF ENGG & TECH

Dean – Academics

Dean (Academics)
HiCET

Programme	Course code	Name of the course	L	T	P	C
B.E.	22MEXXX1	NEW PRODUCT DEVELOPMENT	3	0	0	3

Course Objectives

1. To introduce the fundamental concepts of the new product development
2. To develop material specifications, analysis and process.
3. To Learn the Feasibility Studies & reporting of new product development.
4. To study the New product qualification and Market Survey on similar products of new product development
5. To learn Reverse Engineering. Cloud points generation, converting cloud data to 3D model

Unit	Description	Instructional Hours
I	**FUNDAMENTALS OF NPD** Introduction – Reading of Drawing – Grid reading, Revisions, ECN (Engg. Change Note), Component material grade, Specifications, customer specific requirements – Basics of monitoring of NPD applying Gantt chart, Critical path analysis – Fundamentals of BOM (Bill of Materials), Engg. BOM & Manufacturing BOM. Basics of MIS software and their application in industries like SAP, MS Dynamics, Oracle ERP Cloud – QFD.	9
II	**MATERIAL SPECIFICATIONS, ANALYSIS & PROCESS** Material specification standards – ISO, DIN, JIS, ASTM, EN, etc. – Awareness on various manufacturing process like Metal castings & Forming, Machining (Conventional, 3 Axis, 4 Axis, 5 Axis), Fabrications, Welding process. Qualifications of parts mechanical, physical & Chemical properties and their test report preparation and submission. Fundamentals of DFMEA & PFMEA, Fundamentals of FEA, Bend Analysis, Hot Distortion, Metal and Material Flow, Fill and Solidification analysis.	9
III	**ESSENTIALS OF NPD** RFQ (Request of Quotation) Processing – Feasibility Studies & reporting – CFT (Cross Function Team) discussion on new product and reporting – Concept design, Machine selection for tool making, Machining – Manufacturing Process selection, Machining Planning, cutting tool selection – Various Inspection methods – Manual measuring, CMM – GOM (Geometric Optical Measuring), Lay out marking and Cut section analysis. Tool Design and Detail drawings preparation, release of details to machine shop and CAM programing. Tool assembly and shop floor trials. Initial sample submission with PPAP documents.	9
IV	**CRITERIONS OF NPD** New product qualification for Dimensions, Mechanical & Physical Properties, Internal Soundness proving through X-Ray, Radiography, Ultrasonic Testing, MPT, etc. Agreement with customer for testing frequencies. Market Survey on similar products, Risk analysis, validating samples with simulation results, Lesson Learned & Horizontal deployment in NPD.	9
V	**REPORTING & FORWARD-THINKING OF NPD** Detailed study on PPAP with 18 elements reporting, APQP and its 5 Sections, APQP vs PPAP, Importance of SOP (Standard Operating Procedure) – Purpose & documents, deployment in shop floor. Prototyping & RPT - Concepts, Application and its advantages, 3D Printing – resin models, Sand cores for foundries; Reverse Engineering. Cloud points generation, converting cloud data to 3D model – Advantages & Limitation of RE, CE (Concurrent Engineering) – Basics, Application and its advantages in NPD (to reduce development lead time, time to Market, Improve productivity and product cost.)	9
	Total Instructional Hours	45

Course Outcomes

At the end of the course, student shall be able to

CO1 Understand the fundamental concepts and customer specific requirements of the New Product development

CO2. Understand the Material specification standards, analysis and fabrication, manufacturing process.

CO3. Analyse the Feasibility Studies & reporting of New Product development

CO4. Analyse the New product qualification and Market Survey on similar products of new product development

CO5. Understand the Reverse Engineering. Cloud points generation, converting cloud data to 3D model

TEXT BOOK:

T1 Product Development – Sten Jonsson

T2. Product Design & Development – Karl T. Ulrich, Maria C. Young, Steven D. Eppinger

REFERENCES:

R1 Revolutionizing Product Development – Steven C Wheelwright & Kim B. Clark Change by Design

R2. Toyota Product Development System – James Morgan & Jeffrey K. Liker

R3. Winning at New Products – Robert Brands 3rd Edition

R4. Product Design & Value Engineering – Dr. M.A. Bulsara &Dr. H.R. Thakkar

PO& PSO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO 10	PO 11	PO 12	PSO 1	PSO 2
CO1	2	2	2	3	3			1			1		2	1
CO2	2	2	2	3	2	1		1					3	1
CO3	2	3	3	3	2								2	1
CO4	2	2	3	3	3		1	1					2	1
CO5	3	3	3	3	3					1			1	2
Avg	2.2	2.4	2.6	3	2.6	1	1	1		1	1		2	1.2

Chairman, Board of Studies

Chairman - BoS
MECH - HiCET

ACADEMIC COUNCIL
HINDUSTHAN COLLEGE OF ENGG & TECH
Chairman

Dean – Academics

Dean (Academics)
HiCET

118

HINDUSTHAN COLLEGE OF ENGINEERING AND TECHNOLOGY
An Autonomous Institution
Approved by AICTE, New Delhi, Affiliated to Anna University, Chennai
Accredited by NBA (AERO, AUTO, CIVIL, CSE, ECE, EEE, IT, MECH & MCT)
Accredited with 'A++' Grade by NAAC.
Coimbatore - 641 032

B E. MECHANICAL ENGINEERING

HINDUSTHAN
EDUCATIONAL AND CHARITABLE TRUST
HICET

CHOICE BASED CREDIT SYSTEM

Revised Curriculum and Syllabus for the ODD semester

Academic year 2024-25

Batch 2021-2025

CURRICULUM
R2019

HINDUSTHAN COLLEGE OF ENGINEERING AND TECHNOLOGY

An Autonomous Institution
Approved by AICTE, New Delhi, Affiliated to Anna University, Chennai
Accredited by NBA (AERO, AUTO, CIVIL, CSE, ECE, EEE, IT, MECH & MCT)
Accredited with 'A++' Grade by NAAC.
Coimbatore - 641 032

DETAILS OF CHANGES CARRIED OUT IN CURRICULUM & SYLLABUS

CBCS PATTERN

UNDERGRADUATE PROGRAMMES

B.E. MECHANICAL ENGINEERING REGULATION-2019 (Revised on July 2021)

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

SEMESTER I – 20 Credits

S.No	Course Code	Name of the Course	Course Category	L	T	P	C	CIA	ESE	TOTAL
THEORY										
1	21HE1101	Technical English	HS	2	1	0	3	25	75	100
2	21MA1102	Calculus and Linear Algebra	BS	3	1	0	4	25	75	100
THEORY & LAB COMPONENT										
3	21PH1101	Applied Physics	BS	2	0	2	3	50	50	100
4	21CY1101	Engineering Chemistry	BS	2	0	2	3	50	50	100
5	21CS1151	Problem Solving and Python Programming	ES	2	0	2	3	50	50	100
6	21ME1152	Engineering Drawing	ES	1	0	4	3	50	50	100
PRACTICAL										
7	21HE1001	Language Competency Enhancement Course - I	HS	0	0	1	1	100	0	100
MANDATORY										
8	21MC1191	Induction Program	MC	0	0	0	0	0	0	0
9	*21HE1072*	*Career Guidance –Level I*	*EEC*	*1*	*0*	*0*	*0*	*100*	*0*	*100*
10	*21HE1073*	*Entrepreneurship & Innovation*	*EEC*	*2*	*0*	*0*	*0*	*100*	*0*	*100*
Total Credits				15	2	11	20	550	350	900

122

SEMESTER II – 22 Credits

S.No	Course Code	Name of the Course	Course Category	L	T	P	C	CIA	ESE	TOTAL
THEORY										
1	21HE2101	Business English for Engineers	HS	2	1	0	3	25	75	100
2	21MA2101	Differential Equations and Complex Variables	BS	3	1	0	4	25	75	100
THEORY & LAB COMPONENT										
3	21PH2151	Materials Science	BS	2	0	2	3	25	75	100
4	21CY2151	Environmental Sciences	BS	2	0	2	3	25	75	100
5	21EE2103	Basics of Electrical and Electronics Engineering	ES	3	0	0	3	25	75	100
6	21ME2101	Engineering Mechanics	ES	3	0	0	3	25	75	100
PRACTICAL										
7	21ME2001	Engineering Practices	ES	0	0	4	2	50	50	100
8	21HE2071/ 21HE2071R	Language Enhancement Course-II	HS	1	0	0	1	100	0	100
9	*21HE2072*	*Career Guidance – Level II*	*EEC*	*2*	*0*	*0*	*0*	*100*	*0*	*100*
Total Credits				18	2	8	22	400	500	900

SEMESTER III – 20 Credits

S.No	Course Code	Name of the Course	Course Category	L	T	P	C	CIA	ESE	TOTAL
THEORY										
1	21MA3101	Fourier Series and Statistics	BS	3	1	0	4	25	75	100
2	21ME3201	Manufacturing Technology-I	PC	3	0	0	3	25	75	100
3	21ME3202	Engineering Thermodynamics	PC	3	0	0	3	25	75	100
4	21ME3203	Engineering Materials and Metallurgy	PC	3	0	0	3	25	75	100
THEORY & LAB COMPONENT										
5	21ME3251	Fluid Mechanics and Machinery	PC	3	0	2	4	50	50	100
PRACTICAL										
6	21ME3001	Manufacturing Technology Lab – I	PC	0	0	3	1.5	50	50	100
7	21ME3002	Computer Aided Drawing Lab	PC	0	0	3	1.5	50	50	100
MANDATORY										
8	21AC3191	India Constitution	AC	2	0	0	0	0	0	0
9	*21HE3071*	*Career Guidance Level – III*	*EEC*	*2*	*0*	*0*	*0*	*100*	*0*	*100*
10	*21HE3073*	*Leadership Management Skills*	*EEC*	*1*	*0*	*0*	*0*	*100*	*0*	*100*
Total Credits				20	1	8	20	450	450	900

SEMESTER IV – 21 Credits

S.No	Course Code	Name of the Course	Course Category	L	T	P	C	CIA	ESE	TOTAL
THEORY										
1	21MA4101	Numerical Methods	BS	3	1	0	4	25	75	100
2	21ME4201	Manufacturing Technology – II	PC	3	0	0	3	25	75	100
3	21ME4202	Thermal Engineering	PC	3	0	0	3	25	75	100
4	21ME4203	Kinematics of Machinery	PC	3	1	0	4	25	75	100
THEORY & LAB COMPONENT										
5	21ME4251	Strength of Materials	PC	3	0	2	4	50	50	100
PRACTICAL										
6	21ME4001	Manufacturing Technology Lab–II	PC	0	0	3	1.5	50	50	100
7	21ME4002	Thermal Engineering Lab	PC	0	0	3	1.5	50	50	100
MANDATORY										
8	21AC4191	Value Education - Essence of Indian Traditional Knowledge	AC	2	0	0	0	0	0	0
9	*21HE4072*	*Career Guidance Level – IV*	*EEC*	*2*	*0*	*0*	*0*	*100*	*0*	*100*
10	*21HE4073*	*Ideation Skills*	*EEC*	*1*	*0*	*0*	*0*	*100*	*0*	*100*
Total Credits				20	2	8	21	450	450	900

SEMESTER V – 24 Credits

S.No	Course Code	Name of the Course	Course Category	L	T	P	C	CIA	ESE	TOTAL
THEORY										
1	21ME5201	Dynamics of Machines	PC	3	0	0	3	25	75	100
2	21ME5202	Heat and Mass Transfer	PC	3	1	0	4	25	75	100
3	21ME5203	Design of Machine Elements	PC	3	0	0	3	25	75	100
4	21ME5204	Automobile Engineering	PC	3	0	0	3	25	75	100
5	21ME53XX	**Professional Elective – I**	PE	3	0	0	3	25	75	100
THEORY & LAB COMPONENT										
6	21ME5251	Machine Drawing	PC	2	0	2	3	50	50	100
PRACTICAL										
7	21ME5001	Dynamics Lab	PC	0	0	3	1.5	50	50	100
8	21ME5002	Heat Transfer Lab	PC	0	0	3	1.5	50	50	100
9	*21HE5071*	*Soft Skills - I*	*EEC*	*1*	*0*	*0*	*1*	*100*		*100*
10	*21HE5072*	*Design Thinking*	*EEC*	*1*	*0*	*0*	*1*	*100*		*100*
Total Credits				19	1	8	24	350	525	1000

SEMESTER VI – 24 Credits

S.No	Course Code	Name of the Course	Course Category	L	T	P	C	CIA	ESE	TOTAL
		THEORY								
1	21ME6181	Principles of Management	HS	3	0	0	3	25	75	100
2	21ME6201	CAD/CAM	PC	3	0	0	3	25	75	100
3	21ME6202	Metrology and Quality Control	PC	3	0	0	3	25	75	100
4	21ME6203	Design of Transmission Systems	PC	3	0	0	3	25	75	100
5	21ME63XX	**Professional Elective - II**	PE	3	0	0	3	25	75	100
6	21XX64XX	**Open Elective –I**	OE	3	0	0	3	25	75	100
		PRACTICAL								
7	21ME6001	CAD/CAM Lab	PC	0	0	3	1.5	50	50	100
8	21ME6002	Metrology and Measurements Lab	PC	0	0	3	1.5	50	50	100
9	*21HE6071*	*Soft Skill-II*	*EEC*	*1*	*0*	*0*	*1*	*100*		*100*
10	*21HE6072*	*Intellectual Property Rights (IPR)*	*EEC*	*1*	*0*	*0*	*1*	*100*		*100*
11	21ME6701	Internship / Industrial Training	EEC	0	0	0	1	0	100	100
Total Credits				20	0	6	24	450	650	1000

SEMESTER VII – 20 Credits

S.No	Course Code	Name of the Course	Course Category	L	T	P	C	CIA	ESE	TOTAL
		THEORY								
1	21ME7201	Finite Element Analysis	PC	3	0	0	3	25	75	100
2	21ME7202	Power Plant Engineering	PC	3	0	0	3	25	75	100
3	21XX74XX	Open Elective -II	OE	3	0	0	3	25	75	100
4	21ME73XX	Professional Elective – III	PE	3	0	0	3	25	75	100
5	21ME73XX	Professional Elective- IV	PE	3	0	0	3	25	75	100
		PRACTICAL								
6	21ME7001	Computer Aided Analysis Lab	PC	0	0	3	1.5	50	50	100
7	21ME7002	Comprehension Lab	PC	0	0	3	1.5	50	50	100
8	21ME7901	Project Work – Phase I	EEC	0	0	4	2	50	50	100
Total Credits				15	0	10	20	275	525	800

SEMESTER VIII – 14 Credits

S.No	Course Code	Name of the Course	Course Category	L	T	P	C	CIA	ESE	TOTAL
THEORY										
1	21ME8201	Engineering Economics and Cost Estimation	PC	3	0	0	3	25	75	100
2	21ME8XXX	**Professional Elective- V**	PE	3	0	0	3	25	75	100
PRACTICAL										
3	21ME8901	Project Work – Phase II	EEC	0	0	12	8	100	100	200
Total Credits				6	0	12	14	150	250	400

LIST OF PROFESSIONAL ELECTIVES

S.No	Course Code	Name of the Course	Course Category	L	T	P	C	CIA	ESE	TOTAL
PROFESSIONAL ELECTIVE I										
1	21ME5301	Advanced Foundry Technology	PE	3	0	0	3	25	75	100
2	21ME5302	Advanced Welding Technology	PE	3	0	0	3	25	75	100
3	21ME5303	CNC Technology	PE	3	0	0	3	25	75	100
4	21ME5304	Unconventional Machining Processes	PE	3	0	0	3	25	75	100
5	21ME5305	Hydraulic and Pneumatic systems	PE	3	0	0	3	25	75	100

PROFESSIONAL ELECTIVE II

S.No	Course Code	Name of the Course	Course Category	L	T	P	C	CIA	ESE	TOTAL
1	21ME6301	Refrigeration and Air Conditioning	PE	3	0	0	3	25	75	100
2	21ME6302	Advanced I.C. Engines	PE	3	0	0	3	25	75	100
3	21ME6303	Design of Heat Exchangers	PE	3	0	0	3	25	75	100
4	21ME6304	Gas Dynamics and Jet Propulsion	PE	3	0	0	3	25	75	100
5	21ME6305	Energy Conservation and Management	PE	3	0	0	3	25	75	100

PROFESSIONAL ELECTIVE III

S.No	Course Code	Name of the Course	Course Category	L	T	P	C	CIA	ESE	TOTAL
1	21ME7301	Design of Jigs, Fixtures and Press Tools	PE	3	0	0	3	25	75	100
2	21ME7302	Tool and Die Design	PE	3	0	0	3	25	75	100
3	21ME7303	Mechatronics	PE	3	0	0	3	25	75	100
4	21ME7304	Composite materials	PE	3	0	0	3	25	75	100
5	21ME7305	Industrial Robotics and Expert Systems	PE	3	0	0	3	25	75	100

PROFESSIONAL ELECTIVE IV

S.No	Course Code	Name of the Course	Course Category	L	T	P	C	CIA	ESE	TOTAL
1	21ME7306	Operations Research	PE	3	0	0	3	25	75	100
2	21ME7307	Industrial Engineering	PE	3	0	0	3	25	75	100
3	21ME7308	Industrial Safety Engineering	PE	3	0	0	3	25	75	100
4	21ME7309	Maintenance Engineering	PE	3	0	0	3	25	75	100
5	21ME7310	Metrology and Non Destructive Testing	PE	3	0	0	3	25	75	100

PROFESSIONAL ELECTIVE V

S.No	Course Code	Name of the Course	Course Category	L	T	P	C	CIA	ESE	TOTAL
1	21ME8181	Total Quality Management	HS	3	0	0	3	25	75	100
2	21ME8182	Entrepreneurship Development and Business Concepts	HS	3	0	0	3	25	75	100
3	21ME8183	Logistics and Supply Chain Management	HS	3	0	0	3	25	75	100
4	21ME8301	Production Planning and Control	PE	3	0	0	3	25	75	100
5	21ME8302	Heating, Ventilation and Air Conditioning Systems	PE	3	0	0	3	25	75	100

OPEN ELECTIVES

S. No	Course Code	Name of the Course	Course Category	L	T	P	C	CIA	ESE	TOTAL
1	21ME6401	Renewable Energy Sources	OE	3	0	0	3	25	75	100
2	21ME7401	Additive Manufacturing Techniques	OE	3	0	0	3	25	75	100

List of Life Skill Courses under Open Elective									
S. No	Course Code	Course Name	L	T	P	C	CIA	ESE	Total
1	21LSZ401	General Studies for Competitive Examinations	3	0	0	3	25	75	100
2	21LSZ402	Human Rights, Women Rights and Gender Equality	3	0	0	3	25	75	100
3	21LSZ403	Indian Ethos and Human Values	3	0	0	3	25	75	100
4	21LSZ404	Indian Constitution and Political System	3	0	0	3	25	75	100
5	21LSZ405	Yoga for Human Excellence	3	0	0	3	25	75	100

(Note: Z Stands for semester, students can't choose twice the course)

ADDITIONAL CREDIT COURSE FOR MECHANICAL ENGINEERING

S. No.	Sem. No	Course Code	Course Title	L	T	P	C	CIA	ESE	TOTAL
1	IV	21ME4071	Geometric dimensioning and tolerance	2	0	0	1	100	-	100
2	V	21ME5071	Tool and Die Design	2	0	0	1	100	-	100
3	VI	21ME6071	Servicing of Refrigeration and Air Conditioning Equipment's	2	0	0	1	100	-	100
4	VII	21ME7071	Energy Auditing Practices	2	0	0	1	100	-	100

CREDIT DISTRIBUTION

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

* Student can earn extra credit 35 over and above the total credits

130

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. (Honors) or Minor Degree For B.E. / B. Tech. (Honors), 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 4.10of Regulation 2019 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.

MECHANICAL ENGINEERING OFFERING MINOR DEGREE PROGRAM IN ELECTRIC VEHICLES

S No	Course Code	Course Title	Category	Periods Per week			Total Contact Periods	Credits
				L	T	P		
1	21ME5231	Sem 5: EV and Sub Systems.	MDC	3	0	0	3	3
2	21ME6231	Sem 6: E vehicle Dynamics	MDC	3	0	0	3	3
3	21ME6232	Sem6: Cell and battery management system	MDC	3	0	0	3	3
4	21ME7231	Sem 7: Electric Motor and control system	MDC	3	0	0	3	3
5	21ME7232	Sem 7: EV sensors and actuators	MDC	3	0	0	3	3
6	21ME8231	Sem 8: EV charging station	MDC	3	0	0	3	3

*MDC – Minor Degree Course

131

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

Vertical I

Fintech and Block Chain

S No	Course Code	Course Title	Category	Periods Per week			Total Contact Periods	Credits
				L	T	P		
1	21MB5231	Financial Management	MDC	3	0	0	3	3
2	21MB6231	Fundamentals of Investment	MDC	3	0	0	3	3
3	21MB6232	Banking, Financial Services andInsurance	MDC	3	0	0	3	3
4	21MB7231	Introduction to Blockchain and its Applications	MDC	3	0	0	3	3
5	21MB7232	Fintech Personal Finance and Payments	MDC	3	0	0	3	3
6	21MB8231	Introduction to Fintech	MDC	3	0	0	3	3

Vertical II

Entrepreneurship

S No	Course Code	Course Title	Category	Periods Per week			Total Contact Periods	Credits
				L	T	P		
1	21MB5232	Foundations of Entrepreneurship	MDC	3	0	0	3	3
2	21MB6233	Team Building & Leadership Management for Business	MDC	3	0	0	3	3
3	21MB6234	Creativity & Innovation in Entrepreneurship	MDC	3	0	0	3	3
4	21MB7233	Principles of Marketing Management for Business	MDC	3	0	0	3	3
5	21MB72334	Human Resource Management for Entrepreneurs	MDC	3	0	0	3	3
6	21MB8232	Financing New Business Ventures	MDC	3	0	0	3	3

Vertical III

Environment and Sustainability

S No	Course Code	Course Title	Category	Periods Per week			Total Contact Periods	Credits
				L	T	P		
1	21CE5232	Sustainable Infrastructure Development	MDC	3	0	0	3	3
2	21AG6233	Sustainable Agriculture and Environmental Management	MDC	3	0	0	3	3
3	21BM6233	Sustainable Bio Materials	MDC	3	0	0	3	3
4	21ME7233	Materials for Energy Sustainability	MDC	3	0	0	3	3
5	21CE7233	Green Technology	MDC	3	0	0	3	3
6	21CE8232	Environmental Quality Monitoring and Analysis	MDC	3	0	0	3	3

B E (HONS) MECHANICAL ENGINEERING

DIGITAL AND GREEN MANUFACTURING

S No	Course Code	Course Title	Category	Periods Per week			Total Contact Periods	Credits
				L	T	P		
1	21ME5205	Sem 5: Digital Manufacturing and IoT	MDC	3	0	0	3	3
2	21ME6204	Sem 6: Lean Manufacturing	MDC	3	0	0	3	3
3	21ME6205	Sem 6: Modern Robotics	MDC	3	0	0	3	3
4	21ME7203	Sem 7: Green Manufacturing Design and Practices	MDC	3	0	0	3	3
5	21ME7204	Sem 7: Environment Sustainability and Impact Assessment	MDC	3	0	0	3	3
6	21ME8202	Sem 8: Green Supply Chain Management	MDC	3	0	0	3	3

RENEWABLE ENERGY TECHNOLOGY

S No	Course Code	Course Title	Category	Periods Per week			Total Contact Periods	Credits
				L	T	P		
1	21ME5206	Sem 5: Bioenergy Conversion Technologies	MDC	3	0	0	3	3
2	21ME6206	Sem 6: Energy Conservation in Industries	MDC	3	0	0	3	3
3	21ME6207	Sem 6: Energy Storage Devices	MDC	3	0	0	3	3
4	21ME7205	Sem 7: Solar Energy Technology	MDC	3	0	0	3	3
5	21ME7206	Sem 7: Renewable Energy Technologies	MDC	3	0	0	3	3
6	21ME8203	Sem 8: New and Renewable Sources of Energy	MDC	3	0	0	3	3

PRODUCT AND PROCESS DEVELOPMENT

S No	Course Code	Course Title	Category	Periods Per week			Total Contact Periods	Credits
				L	T	P		
1	21ME5207	Sem 5: New Product Development	MDC	3	0	0	3	3
2	21ME6208	Sem 6: Ergonomics in Design	MDC	3	0	0	3	3
3	21ME6209	Sem 6: Advances in Composite Materials	MDC	3	0	0	3	3
4	21ME7207	Sem 7: Logistics and Supply Chain Management	MDC	3	0	0	3	3
5	21ME7208	Sem 7: EV Technologies	MDC	3	0	0	3	3
6	21ME8204	Sem 8: Heating, Ventilation and Air Conditioning Systems	MDC	3	0	0	3	3

Chairman BoS

Chairman - BoS
MECH - HiCE

Dean Academics

Dean (Academics)
HiCET

Principal

PRINCIPAL
Hindusthan College Of Engineering & Technology
COIMBATORE - 641 032

SYLLABUS

135

Programme	Course code	Name of the course	L	T	P	C
B.E.	21ME7201	FINITE ELEMENT ANALYSIS (Common to mechanical and Automobile Engineering)	3	0	0	3

Course Objectives

1. To equip the students with the finite element analysis fundamentals
2. To enable the students to formulate the design problems using Finite Element Analysis
3. To acquire knowledge on solving 2-D structural and thermal problems.
4. To develop proficiency in the application of FEM to realistic axisymmetric engineering problems.
5. To enable the students to solve Isoparametric elements

Unit	Description	Instructional Hours
I	**I INTRODUCTION** Historical background – Matrix approach – Application to the continuum – Discretization – Matrix algebra – Gaussian elimination – Governing equations for continuum – Classical Techniques in FEM– Weighted residual method – Ritz method.	9
II	**II ONE DIMENSIONAL PROBLEMS** Finite element modeling –shape functions- Potential energy approach – Galerkin approach –Assembly of stiffness matrix and load vector – General form of finite element equations –linear bar element– Quadratic shape function- Applications to plane trusses - Beam elements - one dimensional steady state conduction and convective heat transfer problems.	9
III	**III TWO DIMENSIONAL SCALAR VARIABLE PROBLEMS** Introduction – Finite element modeling – Scalar valued problem – Poisson equation –Triangular elements – Element stiffness matrix – Force vector – Galerkin approach - Stress calculation – Temperature effects-Heat transfer problems.	9
IV	**IV TWO DIMENSIONAL VECTOR VARIABLE PROBLEMS** Axisymmetric formulation – Element stiffness matrix and force vector – Galerkin approach – Body forces and temperature effects – Stress calculations – Boundary conditions – Applications to cylinders under internal or external pressures.	9
V	**V ISOPARAMETRIC FORMULATION** Natural coordinate systems - Isoparametric elements-The four-node quadrilateral element– Shape functions for isoparametric elements – Element stiffness matrix and force vector – Lagrangean and serendipity elements – Numerical integration - Stiffness integration – Stress calculations – Four node quadrilateral for axisymmetric problems.	9
	Total Instructional Hours	**45**

Course Outcomes

At the end of the course, student shall be able to

CO1: Understand the mathematical model for solution of engineering design problems
CO2: Understand the solution for real time 1D structural problems and heat transfer problems.
CO3: Analyse the heat transfer and structural problems using 2D elements
CO4: Understand the stages in solving engineering problems under axisymmetric condition
CO5: Analyse and solve the real time problems using iso-parametric elements

TEXT BOOK:

T1 Seshu P, "Text Book of Finite Element Analysis", Prentice-Hall of India Pvt. Ltd., New Delhi, 2017.
T2 Hutton D.V., "Fundamentals of Finite Element Analysis", McGraw Hill, International Edition,2019.

REFERENCES:

R1 Rao S.S., "The Finite Element Method in Engineering", 3rd Edition, Butterworth Heinemann, 2011
R2 Logan D.L., "A first course in Finite Element Method", Thomson Asia Pvt. Ltd., 2002
R3 Chandrupatla T.R., Belegundu A.D., "Introduction to Finite Element in Engineering", Pearson Pvt. Ltd,2007
R4 Reddy,J.N. "Introduction to the Finite Element Method", 4th Edition, Tata McGrawHill,2018

PO& PSO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO 10	PO 11	PO 12	PSO 1	PSO 2
CO1	3	1	1	2	-	1	2	-	-	1	1	2	1	1
CO2	3	1	1	2	-	1	2	-	-	1	1	2	1	1
CO3	3	1	1	2	-	1	2	-	-	1	1	2	1	1
CO4	3	1	1	2	-	1	2	-	-	1	1	2	1	1
CO5	3	2	2	2	-	1	2	-	-	2	1	2	1	1
Avg	3	2.2	2.2	2	0	1	2	0	0	2.2	1	2	1	1

Chairman, Board of Studies

Chairman - BoS
MECH - HiCET

ACADEMIC COUNCIL
Chairman
HINDUSTHAN COLLEGE OF ENGG & TECH

Dean – Academics

Dean (Academics)
HiCET

137

Programme	Course code	Name of the course	L	T	P	C
B.E.	21ME7202	POWER PLANT ENGINEERING	3	0	0	3

Course Objectives

1. To learn the working principle of steam power plants.
2. To study the need of captive power generation system.
3. To gain knowledge about the environmental benefits of nuclear power plant.
4. To learn the benefits of various renewable energy sources.
5. To evaluate cost of energy.

Unit	Description	Instructional Hours
I	**STEAM POWER PLANTS** Review of basic vapour power cycles. Layout of steam power plant: components-types of boilers, turbines, condensers and cooling towers. Coal and ash handling of steam power plant, draught system and ash disposal in coal power plants. Feed water treatment. Cogeneration systems.	9
II	**DIESEL, GAS TURBINE AND COMBINED CYCLE POWER PLANTS** Components of diesel and gas Turbine Power plants. Combined gas turbine cycle power plants. Integrated gasifier based combined cycle systems. Cycle analysis.	9
III	**NUCLEAR POWER PLANTS** Basics of Nuclear Engineering, Layout and subsystems of Nuclear Power Plants, Working of Nuclear Reactors: Boiling Water Reactor (BWR), Pressurized Water Reactor (PWR), Canadian deuterium uranium reactor (CANDU), Gas Cooled and Liquid Metal Cooled Reactors. Safety measures for Nuclear Power plants and disposal of nuclear waste.	9
IV	**RENEWABLE ENERGY POWER PLANTS** Hydro Electric Power Plants – Classification, Typical Layout and associated components including Turbines. Principle, Construction and working of Wind, Tidal, Solar Photo Voltaic (SPV), Solar Thermal, Geo Thermal, Biogas, Fuel Cell power systems, MHD Power plants.	9
V	**ENERGY ECONOMICS** Power tariff types, Load distribution parameters, load curve, Comparison of site selection criteria, relative merits & demerits, Capital & Operating Cost of different power plants.	9
	Total Instructional Hours	45

Course Outcomes

At the end of the course, student shall be able to

CO1: Understand the operation and maintenance of steam power plants.
CO2: Analyse the environmental impacts of captive power plants.
CO3: Understand the working principle of nuclear power plants.
CO4: Understand the environmental benefits of renewable energy power plants.
CO5: Analyze the energy utilization and energy demand forecasting.

TEXT BOOK:

T1 - Nag. P.K., "Power Plant Engineering", Third Edition, Tata McGraw – Hill Publishing Company Ltd., 2018.

T2 - Thomas C. Elliott, Kao Chen and Robert C. Swanekamp, "Power Plant Engineering", Standard Handbook of McGraw – Hill, 2020.

REFERENCES:

R1 - El-Wakil. M.M., "Power Plant Technology", Tata McGraw – Hill Publishing Company Ltd., 2010. R2 - Black & Veatch, Springer, "Power Plant Engineering", 1996.

R3 - Godfrey Boyle, "Renewable energy", Open University, Oxford University Press in association with the Open University, 2004.

R4 -N.K. Bansal, Non-Conventional Energy Resources, Vikas Publishing House, 2014.

PO& PSO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO 10	PO 11	PO 12	PSO 1	PSO 2
CO1	3	1	2	2	1	2	2	2	1	2	2	3	2	1
CO2	3	1	2	2	1	2	2	2	1	1	1	3	2	1
CO3	3	1	2	2	1	2	3	2	2	2	1	2	2	3
CO4	3	1	2	2	1	2	3	2	2	1	1	3	1	3
CO5	2	1	2	2	1	3	2	2	2	3	1	3	1	3
Avg	2.8	1	2	2	1	2.2	2.4	2	1.6	1.8	1.2	2.8	1.6	2.2

Chairman, Board of Studies

Chairman - BoS
MECH - HiCET

ACADEMIC COUNCIL ★ HINDUSTHAN COLLEGE OF ENGG & TECH ★
Chairman

Dean – Academics

Dean (Academics).
HiCET

139

Programme	Course code	Name of the course	L	T	P	C
B.E.	19ME7001	COMPUTER AIDED ANALYSIS LABORATORY	0	0	3	1.5

Course Objectives

1. To develop the student's skills in proper modeling, meshing, and setting up material properties, loads, and constraints for computer simulation and analysis.
2. To expose the student's to different applications of simulation and analysis tools and then solves the problem using software packages.
3. To provide the student's with some knowledge in multi-physics analysis –interaction between structure and thermal.

Description of the Experiments

A Analysis (Using Software)

1. Stress analysis of beams.
2. Stress analysis of a plate with a circular hole.
3. Stress analysis of rectangular L – bracket.
4. Stress analysis of an Axi-symmetric component.
5. Modal analysis of beams.
6. Modal analysis of a 2D component.
7. Harmonic analysis of a 2D component.
8. Thermal stress analysis of a 2D component.
9. Conductive heat transfer analysis of a 2Dcomponent.
10. Convective heat transfer analysis of a 2Dcomponent.

Total Instructional Hours 45

Course Outcomes

At the end of the course, student shall be able to

CO1: Understand the design problem that involves interaction between heat and stress, generate the model using a proper element type, and then solve the problem.

CO2: Understand the non-linear structural, thermal, and flow problems using software packages.

CO3: Analyze and display the results such as von-Mises stress, displacement, temperature, pressure, and velocity etc. obtained from computer analysis.

PO& PSO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO 10	PO 11	PO 12	PSO 1	PSO 2
CO1	2	2	2	1	1	-	-	-	-	3	3	3	3	2
CO2	1	2	2	1	2	-	-	-	-	2	2	3	2	2
CO3	1	2	2	1	2	-	-	-	-	2	2	3	2	1
Avg	1.3	2	2	1	1.6	0	0	0	0	2.3	2.3	3	1.3	1.6

Chairman, Board of Studies

Chairman - BoS
MECH - HiCE

ACADEMIC COUNCIL * TECH * Chairman

Dean – Academics

Dean (Academics)
HiCET

140

Programme	Course code	Name of the course	L	T	P	C
B.E.	19ME7002	COMPREHENSION LAB	0	0	3	1.5

Course Objectives

To provide opportunity and encourage the student to apply the knowledge acquired during the earlier semesters to real life problems which he / she may have to face in future as an engineer through periodic exercise.

METHOD OF EVALUATION

- The problems given to the students should be of real, like industrial problems selected by the faculty members of the concerned course.
- While learning as how to solve the real time problems, student will receive guidance from the faculty and also review various courses learnt earlier.
- The students work individually and as a group to solve a variety of problems given to them.
- Further this comprehension is to achieve an understanding of the fundamentals of contemporary manufacturing systems including design, materials, manufacturing, process, product and process control, computer integrated manufacture and quality.
- The evaluation is based on continuous assessment by the Faculty Member constituted by the professor in-charge of the course.
- The students will be assessed 100% internally through weekly test with objective type questions on all the subject related topics.

Total Instructional Hours 45

Course Outcomes

At the end of the course, student shall be able to
CO1: Understand and comprehend any given problem related to mechanical engineering field.
CO2: Apply knowledge to real time industrial solutions.

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

Chairman, Board of Studies

Chairman - BoS
MECH - HiC

ACADEMIC COUNCIL Chairman

Dean – Academics

Dean (Academics)
HiCET

141

Programme	Course code	Name of the course	L	T	P	C
B.E.	19ME7901	PROJECT PHASE - I	0	0	4	2

Course Objectives

1. To identify a specific problem for the current need of the society and collecting information related to the same through detailed review of literature.
2. To develop the methodology to solve the identified problem.
3. To train the students in preparing project reports and to face reviews and viva-voce examination.

Project work assignment

- Enable the students to form a convenient group with not more than four students.
- The project groups are assigned with a supervisor who is the faculty member of the respective department.
- In the case of industrial projects, one additional supervisor may be assigned as external supervisor.
- The students have to identify a technical problem related to the Mechanical Engineering based on the technical knowledge gained during the period of study.
- Four hours per week have been allotted in the time table.
- During project works, students can get the guidance from the supervisor(s), visiting library for literature review, conducting experiments related to the project work, computer simulation studies, field work, visiting industries (in the case of industry sponsored project works), case studies or basic research and development work assigned by the supervisor.
- The student has to make two presentations based on their project works.
- The solutions provided by the students should be technically, economically and environment friendly feasible.
- The project evaluation committee (constituted by the Head of Department) has evaluated the problem identification.
- The students has to consolidate the work as project report, which includes Introduction, Literature review, Modeling or simulation details, Experimental details, Results and discussions and Conclusions.
- The student should follow the guidelines for preparing the project work.

Course Outcome

At the end of the course, student shall be able to

CO1• At the end of the course the students will have a clear idea of their area of work and they will be in a position to carry out the remaining phase II work in a systematic way.

PO& PSO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO 10	PO 11	PO 12	PSO 1	PSO 2
CO1	3	2	2	-	-	-	-	-	-	-	1	3	2	2
CO2	3	2	3	-	-	-	-	-	-	-	2	3	2	2
CO3	3	3	3	-	-	-	-	-	-	-	1	3	2	2
Avg	3	2.3	2.6	-	-	-	-	-	-	-	1.3	3	2	2

Chairman, Board of Studies

Chairman - BoS
MECH - HiCET

Chairman

Dean – Academics

Dean (Academics)
HiCET

PROFESSIONAL ELECTIVE – III

Programme	Course code	Name of the course	L	T	P	C
B.E.	21ME7301	DESIGN OF JIGS, FIXTURES AND PRESS TOOLS (Common to mechanical and AutomobileEngineering)	3	0	0	3

Course Objectives

1. To understand the functions and design principles of Jigs, fixtures and press tools Study important methods of analysis of in chromatography.
2. To gain proficiency in the development of required views of the final design.
3. To impart knowledge in Jigs and fixtures, and various kinds of locating devices.
4. To understand the Principles of jigs and fixtures.
5. To know the important considerations while designing Jigs and Fixtures.

Unit	Description	Instructional Hours
I	**PURPOSE TYPES AND FUNCTIONS OF JIGS AND FIXTURES** Tool design objectives - Production devices–inspection devices, Materials used in Jigs and Fixtures – Types of Jigs - Types of Fixtures-Mechanical, pneumatic and hydraulic actuation-Analysis of clamping force-Tolerance and error analysis, Poka Yoke.	9
II	**JIGS** Drill bushes–different types of jigs-plate latch, channel, box, post, angle plate, angular post, turnover, pot jigs-Automatic drill jigs-Rack and pinion operated. Air operated Jig components. Design and development of Jigs for given components.	9
III	**FIXTURES** General principles of boring, lathe, milling and broaching fixtures- Grinding, planning and shaping fixtures assembly, Inspection and welding fixtures- Modular fixtures. Design and development of fixtures for given components.	9
IV	**PRESS WORKING TERMINOLOGIES AND ELEMENTS OF DIES AND STRIP LAY OUT** Press working terminology-Presses and press accessories-Computation of capacities and tonnage requirements. Elements of progressive combination and compound dies: Die block-die shoe. Bolster plate-punch plate- punch holder-guide pins and bushes – strippers – knockouts-stops –pilots- Selection of standard die sets strip layout-strip lay out calculations.	9
V	**DESIGN AND DEVELOPMENT OF DIES** Design and development of progressive and compound dies for Blanking and piercing operations. Bending dies – development of bending dies-forming and drawing dies-Development of drawing dies. Design considerations in forging, extrusion, casting and plastic dies.	9
	Total Instructional Hours	45

Course Outcomes

At the end of the course, student shall be able to

CO1: Understand and analyze the types and functions of jigs and fixtures.
CO2: Understand the design, specify and analyze the jigs for various applications.
CO3: Understand the fixtures for various applications.
CO4: Analyze the press working terminologies of die and strip layout.
CO5: Analyse the design and development of dies for different applications.

TEXT BOOK:

TEXT BOOKS:

T1 - Edward G. Hoffman, —Jigs & Fixture Design, 6th Edition, Thomson-Delmar Learning, Singapore, 2018.
T2 - Donaldson C, —Tool Design, 5th Edition, Tata McGraw-Hill, 2019.

REFERENCES:

R1 - Joshi P.H., —Jigs & Fixtures, 5nd Edition, Tata McGraw-Hill Publishing Company Ltd., New Delhi, 2014. R2 - Kempster, —Jigs & Fixtures Design, 5rd Edition, The English Language Book Society, 2010.
R3 - Hiram E. Grant, —Jigs and Fixture, 3rd Edition, Tata McGraw-Hill, New Delhi, 2009.
R4 - K. Venkataraman, "Design of Jigs Fixtures & Press Tools", Anne Publications, 2015.

PO& PSO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO 10	PO 11	PO 12	PSO 1	PSO 2
CO1	2	1	2	1	1	1	1	1	1	1	1	1	2	1
CO2	1	1	3	1	1	1	1	1	1	1	1	1	3	1
CO3	1	1	2	2	1	1	1	1	1	1	1	1	2	1
CO4	2	1	1	1	2	1	1	1	1	1	1	1	2	1
CO5	1	1	1	1	1	3	2	1	1	3	1	1	1	2
Avg	1.4	1	1.8	1.2	1.2	1.4	1.2	1	1	1.4	1	1	2	1.2

Chairman, Board of Studies

Chairman - BoS
MECH - HiCET

Dean – Academics

Dean (Academics)
HiCET

Programme	Course code	Name of the course	L	T	P	C
B.E.	21ME7302	TOOL AND DIE DESIGN	3	0	0	3

Course Objectives

1. To understand the fundamentals of work holding devices.
2. To impart knowledge in design tools, dies, jigs and fixtures.
3. To analyze and optimize an existing jig and fixture.
4. To gain proficiency when design of dies for press work and forging.
5. To design tools to maintain precision accuracy of the component produced.

Unit	Description	Instructional Hours
I	**DESIGN OF CUTTING TOOLS** Metal cutting process - Selection of tool materials - Design of single point and multipoint cutting tool - Form tools, Drills, Milling cutters, broaches and chip breakers – Problems on design of single point cutting tools only.	9
II	**LOCATING AND CLAMPING METHODS** Basic Principles of Location - Locating methods and devices - Principles of clamping - Mechanical, Pneumatic and Hydraulic actuation - Clamping force analysis – Design problems.	9
III	**DESIGN OF JIGS AND FIXTURES** Types of drill jigs - General considerations in the design of drill jigs - Drill bushings - Types, methods of construction - Simple designs of Plate, Channel, Boxes, Post, Angle plate, Turnovers and Pot Jigs. Types of fixtures - Fixtures for machine tools: Lathe, Milling, Boring, Broaching and grinding - Assembly fixtures - Inspection and Welding fixtures.	9
IV	**DESIGN OF DIES** Press tools - Fundamentals of die-cutting operations - Cutting action in punch and die operations - Die clearance - Blanking and Piercing Die construction – Pilots - Strippers and Pressure Pads.	9
V	**PRESS WORK MATERIALS AND MOULD DESIGN** Strip layout - Design of simple progressive and compound die sets - Forging Die – Flow lines, V parting lines, open and close die forging; Materials for die block. General mould construction. Design of ejection, feed and cooling systems. Parting surface design. Side cores and side cavities. Product design for die casting and injection molding.	9
	Total Instructional Hours	**45**

Course Outcomes

At the end of the course, student shall be able to

CO1: Understand the importance of work holding device.
CO2: Analyse the design jigs and fixtures.
CO3: Understand the required specifications of a press for required operations.
CO4: Understand the tools and dies for required operations.
CO5: Analyse the design, specify and analyze the dies for different application

TEXT BOOK:

T1 - Donaldson C., Lecain G.H. and Goold V.C. (2020), Tool Design, Tata McGraw- Hill Publishing Company Ltd., New Delhi.
T2 - Jeff Lantrip, David A. Smith and John G. Nee, (2018) Fundamentals of Tool Design, Society of Manufacturing Engineers.

REFERENCES:

R1 - Joshi P. H., "Jigs and Fixtures", 2nd Edition, Tata McGraw-Hill Publishing Company Ltd., New Delhi, 2004.
R2 - Edward G. Hoffman, "Jigs and Fixtures Design", Thomson - Delmar Learning Series, Singapore,2004.
R3 – Nagpal G. R., "Metal Forming Processes", Khanna Pub., New Delhi, 2000.
R4 – Sadhu Singh, "Theory of plasticity and Metal Forming Processes", Khanna Publishers, 2005.

PO& PSO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO 10	PO 11	PO 12	PSO 1	PSO 2
CO1	3	1	2	-	3	-	-	-	-	3	2	3	3	1
CO2	3	2	2	2	3	-	-	-	-	3	3	3	3	1
CO3	3	1	2	2	3	-	-	-	-	3	3	3	3	2
CO4	3	1	2	-	3	-	-	-	-	2	2	3	2	1
CO5	3	1	2	-	3	-	-	-	-	3	3	3	3	2
Avg	3	1.2	2	2	3	0	0	0	0	2.8	2.6	3	2.8	1.4

Chairman, Board of Studies

Chairman - BoS
MECH - HiCET

ACADEMIC COUNCIL * HINDUSTHAN COLLEGE * Chairman

Dean – Academics

Dean (Academics)
HiCET

Programme	Course code	Name of the course	L	T	P	C
B.E.	21ME7303	MECHATRONICS	3	0	0	3

Course Objectives

1. To learn interdisciplinary applications.
2. To impart knowledge of Microprocessor and Microcontroller.
3. To Study the Programmable Peripheral Interface and Architecture.
4. To learn PLC architecture, programming and applications.
5. To impart knowledge in various Actuators and Mechatronics system design.

Unit	Description	Instructional Hours
I	**INTRODUCTION** Introduction to Mechatronics – Systems – Concepts of Mechatronics approach – Need for Mechatronics – Emerging areas of Mechatronics – Classification of Mechatronics. Sensors and Transducers: Static and dynamic Characteristics of Sensor, Potentiometers – LVDT – Capacitance sensors – Strain gauges – Eddy current sensor – Hall effect sensor – Temperature sensors – Light sensors.	9
II	**MICROPROCESSOR AND MICROCONTROLLER** Introduction – Architecture of 8085 – Pin Configuration – Addressing Modes – Instruction set, Timing diagram of 8085 – Concepts of 8051 microcontroller – Block diagram.	9
III	**PROGRAMMABLE PERIPHERAL INTERFACE** Introduction – Architecture of 8255, Keyboard interfacing, LED display – interfacing, ADC and DAC interface, Temperature Control – Stepper Motor Control – Traffic Control interface.	9
IV	**PROGRAMMABLE LOGIC CONTROLLER** Introduction – Basic structure – Input and output processing – Programming – Mnemonics – Timers, counters and internal relays – Data handling – Selection of PLC.	9
V	**ACTUATORS AND MECHATRONIC SYSTEM DESIGN** Types of Stepper and Servo motors – Construction – Working Principle – Advantages and Disadvantages. Design process-stages of design process – Traditional and Mechatronics design concepts – Case studies of Mechatronics systems – Pick and place Robot – Engine Management system – Automatic car park barrier.	9
	Total Instructional Hours	**45**

Course Outcomes

At the end of the course, student shall be able to

CO1- Understand interdisciplinary applications of Electronics, Electrical, Mechanical and Computer Systems for the Control of Mechanical, Electronic Systems and sensor technology.
CO2- Understand the architecture of Microprocessor and Microcontroller.
CO3- Understand the Programmable Peripheral Interface and Architecture
CO4- Analyse the programming and application of programmable logic controllers.
CO5- Understand the various Actuators and Mechatronics system design

TEXT BOOK:

T1. Bolton, "Mechatronics", Prentice Hall, 2018
T2. Ramesh S Gaonkar, "Microprocessor Architecture, Programming, and Applications with the 8085", 5th Edition, Prentice Hall, 2019

REFERENCES:

R1.Bradley D.A, Dawson D, Buru N.C and Loader A.J, "Mechatronics", Chapman and Hall, 1993.
R2.Clarence W, de Silva, "Mechatronics" CRC Press, First Indian Re-print, 2013
R3.Devadas Shetty and Richard A. Kolk, "Mechatronics Systems Design", PWS publishing company, 2007.
R4.Krishna Kant, "Microprocessors & Microcontrollers", Prentice Hall of India, 2007.

PO& PSO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO 10	PO 11	PO 12	PSO 1	PSO 2
CO1	3	1	1	2	-	1	2	-	-	1	1	2	1	1
CO2	3	1	1	2	-	1	2	-	-	1	1	2	1	1
CO3	3	1	1	2	-	1	2	-	-	1	1	2	1	1
CO4	3	1	1	2	-	1	2	-	-	1	1	2	1	1
CO5	3	2	2	2	-	1	2	-	-	2	1	2	1	1
Avg	3	1.2	1..2	2	-	1	2	-	-	1.2	1	2	1	1

Chairman, Board of Studies

Chairman - BoS
MECH - HiCET

ACADEMIC COUNCIL
Chairman
HICET COLLEGE OF ENGG & TECH

Dean – Academics

Dean (Academics)
HiCET

Programme	Course code	Name of the course	L	T	P	C
B.E.	21ME7304	COMPOSITE MATERIALS FOR ENGINEERING	3	0	0	3

Course Objectives

1. To understand the fundamentals of composite material strength and its mechanical behavior.
2. Understanding the analysis of fiber reinforced Laminate design for different combinations of plies with different orientations of the fiber.
3. Study of residual stresses in Laminates during processing.

Unit	Description	Instructional Hours
I	**INTRODUCTION** Definition, Need, General characteristics, Applications, Fibers-Glass, Carbon, Ceramic and Aramid fibers, Polymer Matrix Composite (PMC), Ceramic Matrix Composite (CMC), Metal Matrix Composite (MMC), Characteristics of fibers and matrices, Smart materials, types and Characteristics.	9
II	**MECHANICS AND PERFORMANCE** Characteristics of fiber reinforced Lamina, Laminates, Inter-laminar stresses, Static Mechanical Properties, Fatigue and Impact properties, Environmental effects, Fracture Behavior and Damage Tolerance.	9
III	**MANUFACTURING** Bag Moulding, Compression moulding, Filament winding, Other Manufacturing Processes, Quality Inspection method.	9
IV	**ANALYSIS** Analysis of an orthographic lamina, Hooke's law, stiffness and compliance matrices, Strengths of orthographic lamina, Stress analysis of laminated composite Beams, plates, shells and etc, Free vibration	9
V	**DESIGN** Failure predictions in a Unidirectional Lamina, Failure predictions for Un-notched Laminates, Laminated Design Consideration, Bolted and Bonded Joints, Design examples.	9
	Total Instructional Hours	**45**

Course Outcomes

At the end of the course, student shall be able to

CO1: Understand the fundamentals of fibers, matrices and composites.

CO2: Understand the various manufacturing processes involved in the fabrication of composite material.

CO3: Understand the performance of composite materials.

CO4: Understand and solve problems concerning the mechanics of composite materials.

CO5: Understand the design calculations for the development of fiber reinforced matrics.

TEXT BOOK:

T1 Mallick P.K., —Fiber Reinforced Composites: Materials, Manufacturing and Design, Taylor and Francis, 2018.

T2 Autar K. Kaw, —Mechanics of Composite Materials‖, CRC Press, 2020.

REFERENCES:

R1 Bhagwan D. Agarwal, Lawrence J. Broutman, Chandrashekhar K., —Analysis and Performance of Fiber Composites‖, 3rd Edition, John Wiley & Sons, New York, 2006.

R2 Gibson R.F., —Principles of Composite Material Mechanics", 3rd Edition, CRC Press, 2011.

R3 Chawla K.K., —Composite Materials‖, 3rd Edition, Springer Verlag, Boston, 2012.

R4 Hyer, M.W., "Stress Analysis of Fiber – Reinforced Composite Materials", McGraw Hill, 1998.

PO& PSO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO11	PSO12
CO1	3	-	-	-	-	2	2	-	-	1	-	3	1	2
CO2	3	-	-	-	-	2	2	-	-	1	-	3	1	1
CO3	3	-	-	-	-	2	2	-	-	1	-	3	1	1
CO4	3	-	-	-	3	3	3	-	-	1	-	3	2	2
CO5	3	-	-	-	-	2	2	-	-	1	-	3	1	1
Avg	3	0	0	0	0.6	2.2	2.2	0	0	1	0	3	1.2	1.4

Chairman, Board of Studies

Chairman - BoS
MECH - HiCET

ACADEMIC COUNCIL Chairman

Dean – Academics

Dean (Academics)
HiCET

Programme	Course code	Name of the course	L	T	P	C
B.E.	21ME7305	INDUSTRIAL ROBOTICS AND EXPERT SYSTEMS	3	0	0	3

Course Objectives

1. To learn the functions of the basic components of a Robot.
2. To study the use of various types of End Effectors and Sensors.
3. To impart knowledge in Robot Kinematics and Programming.
4. To learn Robot safety issues and economics.
5. To impart knowledge in Robot cell design.

Unit	Description	Instructional Hours
I	**INTRODUCTION AND ROBOT KINEMATICS** Definition need and scope of Industrial robots – Robot anatomy – Work volume – Precision movement – End effectors – Sensors. Robot Kinematics – Direct and inverse kinematics – Robot trajectories – Control of robot manipulators – Robot dynamics – Methods for orientation and location of objects.	10
II	**ROBOT DRIVES AND CONTROL** Controlling the Robot motion – Position and velocity sensing devices – Design of drive systems – Hydraulic and Pneumatic drives – Linear and rotary actuators and control valves – Electro hydraulic servo valves, electric drives – Motors – Designing ofend effectors – Vacuum, magnetic and air operated grippers.	9
III	**ROBOT SENSORS** Transducers and Sensors – Tactile sensor – Proximity and range sensors – Sensing joint forces – Robotic vision system – Image Representation - Image Grabbing – Image processing and analysis – Edge Enhancement – Contrast Stretching – Band Rationing - Image segmentation – Pattern recognition – Training of vision system.	9
IV	**ROBOT CELL DESIGN AND APPLICATION** Robot work cell design and control – Safety in Robotics – Robot cell layouts – Multiple Robots and machine interference – Robot cycle time analysis. Industrial application of robots.	9
V	**ROBOT PROGRAMMING, ARTIFICIAL INTELLIGENCE AND EXPERT SYSTEMS** Methods of Robot Programming – Characteristics of task level languages lead through programming methods – Motion interpolation. Artificial intelligence – Basics – Goals of artificial intelligence – AI techniques – problem representation in AI – Problem reduction and solution techniques - Application of AI and KBES in Robots.	8
	Total Instructional Hours	**45**

Course Outcomes

At the end of the course, student shall be able to
CO1: Understand the functions of the basic components of a Robot.
CO2: Understand the various Robot drives and End Effectors.
CO3: Understand the of Robot sensors.
CO4: Understand the Robot cell design and applications.
CO5: Understand the robot programming and AI.

TEXT BOOK:

T1 – Fu.K.S., R.C. Gonzalez and C.S.G. Lee, "Robotics Control, Sensing, Vision and Intelligence", McGraw Hill, 2016.
T2 - YoramKoren," Robotics for Engineers' Mc Graw-Hill, 2020.

REFERENCES:

R1 - Mikell, P. Groover, Mitchell Weis, Roger, N. Nagel, Nicholas G. Odrey," Industrial Robotics Technology, Programming and Applications", Mc Graw-Hill, Int. 1986.
R2 - Richard. D, Klafter, Thomas, A, Chmielewski, Michael Negin, "Robotics Engineering - An Integrated Approach", Prentice-Hall of India Pvt. Ltd., 1984.
R3 - Deb, S.R." Robotics Technology and Flexible Automation", Tata Mc Graw-Hill, 1994.
R4 -Robin R. Murphy " Introduction to AI Robotics" PHI Learning Private Limited, 2000.

PO& PSO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO 10	PO 11	PO 12	PSO 1	PSO 2
CO1	3	2	2	-	1	-	-	-	-	-	-	-	1	1
CO2	3	3	2	-	1	-	-	-	-	-	-	-	1	1
CO3	3	2	2	-	1	-	-	-	-	-	-	-	1	1
CO4	3	2	3	-	1	-	-	-	-	-	-	-	1	1
CO5	3	2	3	-	1	-	-	-	-	-	-	-	1	1
Avg	3	2.2	2.4	-	1	-	-	-	-	-	-	-	1	1

Chairman, Board of Studies

Chairman - BOS
MECH - HiCET

ACADEMIC COUNCIL
Chairman

Dean – Academics

Dean (Academics)
HiCET

Programme	Course code	Name of the course	L	T	P	C
B.E.	21ME7306	OPERATIONS RESEARCH	3	0	0	3

Course Objectives

1. To provide students the knowledge of optimization techniques and approaches.
2. To enable the students, apply mathematical and computational skills needed for the practical utility of Operations Research.
3. To explore the industrial applications of Transportation and Assignment models.
4. To teach students about networking, Inventory, decision, replacement models and queuing theory
5. To introduce students to research methods and current trends in Operations Research.

Unit	Description	Instructional Hours
I	**LINEAR PROGRAMMING** The phases of OR study – formation of an L.P model – graphical solution – simplex algorithm – artificial variables technique (Big M method, two phase method), duality in simplex.	9
II	**SEQUENCING AND NETWORKS MODEL** Sequencing –Problem with N jobs and 2 machines - 3 machines and „M" machines. Network models – Basic Concepts – Construction of Networks – Project Network – CPM and PERT - Critical Path Scheduling – Crashing of Network.	9
III	**TRANSPORTATION AND ASSIGNMENT PROBLEM** Transportation model – Initial solution by North West corner method – least Cost method – VAM. Optimality test – MODI method and stepping stone method. Assignment model – formulation – balanced and unbalanced assignment problems.	9
IV	**INVENTORY MODELS** Inventory models – Various Costs and Concepts–EOQ–Deterministic inventory models – Production models – Stochastic Inventory models – Buffer stock.	9
V	**REPLACEMENT MODEL AND QUEING THEORY** Replacement models – Items that deteriorate with time - When money value changes – Items that fail completely – Individual replacement and Group replacement. Queuing models – Poisson arrivals and Exponential service times – Single channel models and Multi-channel models.	9
	Total Instructional Hours	45

Course Outcomes

At the end of the course, student shall be able to

CO1: Apply operations research techniques like Linear Programming problems in industrial optimization problems.

CO2: Apply the concepts of PERT and CPM for decision making and optimally managing projects.

CO3: Analyze the various methods under transportation model and apply the model for testing the closeness of their results to optimal results.

CO4: Analyze and apply appropriate inventory techniques in domain specific situations.

CO5: Analyze the replacement model techniques and to apply appropriate queuing theories in domain specific situations.

TEXT BOOK:

T1- Mittal, K. V. and Mohan, C. "Optimization Methods in Operations Research and Systems Analysis", New Age, 2021.

T2- Taha, H. A, "Operations Research - An Introduction", Pearson, 9th Edition, 2018.

REFERENCES:

R1- Hiller, F. S. and Liebermann, G. J. "Introduction to Operations Research", Tata McGraw Hill, 2015.

R2 Ravindran, A , Phillips, D. T and Solberg, J. J. "Operations Research: Principles and Practice", John Willey and Sons, 2nd Edition, 2014.

R3-Hadley G - 'Linear Programming' - Narosa Book Distributors Private Ltd. – 2006.

R4-Wagner,"Operations Research", Prentice Hall of India, 2000.

152

PO& PSO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO 10	PO 11	PO 12	PSO 1	PSO 2
CO1	2	2	2	3	3			1			1		2	1
CO2	2	2	2	3	2	1		1					3	1
CO3	2	3	3	3	2								2	1
CO4	2	2	3	3	3		1	1					2	1
CO5	3	3	3	3	3					1			1	2
Avg	2.2	2.4	2.6	3	2.6	1	1	1		1	1		2	1.2

Chairman, Board of Studies

Chairman - BoS
MECH - HiCET

ACADEMIC COUNCIL * Chairman * HICET COLLEGE OF ENGG & TECH

Dean – Academics

Dean (Academics)
HiCET

Programme	Course code	Name of the course	L	T	P	C
B.E.	21ME7307	INDUSTRIAL ENGINEERING	3	0	0	3

Course Objectives

1. To introduce the concepts, principles and framework of contents of Industrial Engineering.
2. To introduce the principles of work study and Method study.
3. To introduce the concepts and frame work of work measurements.
4. To introduce the concepts of various facility design, material handlings & Ergonomic work design.
5. To introduce concepts of various cost accounting and financial management & acquaint the students with different aspects of Industrial Safety rules.

Unit	Description	Instructional Hours
I	**INTRODUCTION TO INDUSTRIAL ENGINEERING AND PRODUCTIVITY** Introduction - Definition and Role of Industrial Engineering, Contribution of Taylor and Gilbreth, Organization, organizational structure, organization charts; Types of organization. - Formal line, military organization, functional organization, line & staff organization, Productivity: Definition of productivity, Productivity of materials, land, building, machine and power. Measurement of productivity: factors affecting the productivity.	9
II	**METHOD STUDY** Work Study: Definition, objectives and scope of work-study. Human factors in work-study. Method Study: Definition, objective and scope of method study, SIMO chart, and micro motion study. Definition and installation of the improved method, brief concept about synthetic motion studies. (Numerical); Introduction to Value Engineering and Value Analysis.	9
III	**WORK MEASUREMENTS** Work Measurements: Definition, objectives and uses; Work measurement techniques. Work sampling - need, confidence levels, sample size determinations, random observation conducting study with the simple problems. Time study: Definition, time study equipment, selection of job, steps in time study. scales of rating, factors affecting rate of working, allowances and standard time determination; Introduction to PMTS and MTM. (Numerical), Introduction to MOST.	9
IV	**FACILITY DESIGN &ERGONOMICS** Facility location Factors and Evaluation of Alternate Locations; Types of Plant Layout; Computer Aided Layout Design Techniques; Assembly Line Balancing (Numerical); Material Handling: Principles, Types of Material Handling Devices; Ergonomic Design Standards- Study of development of stress in human body and their consequences. Case Studies.	9
V	**ENGINEERING ECONOMY AND INDUSTRIAL SAFETY** Engineering Economy and Costing: Elementary Cost Accounting and Methods of Depreciation; Break-Even Analysis (Numerical); Introduction to Debit and Credit Note, Financial Statements (Profit and Loss Account and Balance Sheet), Techniques for Evaluation of Capital Investments. Industrial Safety: Safety Organization, Safety Programme, General Safety Rules.	9
	Total Instructional Hours	**45**

Course Outcomes

At the end of the course, student shall be able to

CO1: Apply the Industrial Engineering concepts in the industrial environment.

CO2: Analyse and implement different concepts involved in methods study and understanding of work content in different situations. Undertake project work based on the course content.

CO3: Analyse the different aspects of work measurement system design and standards.

CO4: Understand the facilities design pertinent to manufacturing industries& working comfortability in industries.

CO5: Understand the various cost accounting and financial management practices widely applied in industries and different safety rules followed in industries.

TEXT BOOK:

T1 - MartendTelsang, Industrial Engineering, S. Chand Publication.

T2 - Banga and Sharma, Industrial Organization & Engineering Economics, Khanna publication.

REFERENCES:

R1 - Introduction to Work Study by ILO, ISBN 978-81-204-1718.

R2 - Oxford & IBH Publishing Company, New Delhi, Second Indian Adaptation, 2008.

R3 – Maynard.H.B., KJell, Maynard's Industrial Engineering Hand Book, McGraw Hill Education.

R4 – Khanna.O. P., Industrial engineering and management, Dhanpat Rai publication.

PO& PSO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO 10	PO 11	PO 12	PSO 1	PSO 2
CO1	2	2	2	3	3			1			1		2	1
CO2	2	2	2	3	2	1		1					3	1
CO3	2	3	3	3	2								2	1
CO4	2	2	3	3	3		1	1					2	1
CO5	3	3	3	3	3					1			1	2
Avg	2.2	2.4	2.6	3	2.6	1	1	1		1	1		2	1.2

Chairman, Board of Studies

Chairman - BoS
MECH - HiCET

ACADEMIC COUNCIL
Chairman
VIKRAM COLLEGE OF ENGG & TECH

Dean – Academics

Dean (Academics)
HiCET

Programme	Course code	Name of the course	L	T	P	C
B.E.	21ME7308	INDUSTRIAL SAFETY ENGINEERINGAND ENVIRONMENT	3	0	0	3

Course Objectives

1. To provide in depth knowledge in Principles of safety and Prevention of accident in various fields.
2. To understand the basics on safety organization.
3. To expose the students to the basics in Human safety and hazard management.
4. To learn about human safety.
5. To study about Industrial Hygiene and Hazards.

Unit	Description	Instructional Hours
I	**ACCIDENT PREVENTION** Definitions and theories of accident, injury, unsafe act, unsafe condition and dangerous occurrence - Theories and principles of accident causation - Cost of accidents, Accident reporting and investigations, Safety committees and their need, types and advantages - Safety education and training and their importance - Various training methods - Accident prevention and Motivating factors of safety - suggestion schemes, Safety performance - Definitions connected with measuring safety performance as per Indian and International standards.	9
II	**SAFETY IN MATERIAL HANDLING** General safety consideration in material handling, Ropes, Chains, Sling, Hoops, Clamps, Arresting gears and Prime movers - Ergonomic consideration in material handling, Design, installation, operation and maintenance of conveying equipments, Hoisting, traveling and slewing mechanisms, Selection, operation and maintenance of industrial trucks, Mobile cranes and Tower crane.	9
III	**SAFETY IN CHEMICAL INDUSTRIES** Safety in the design process of chemical plants - Safety in operational and maintenance of chemical plants Exposure of personnel - Operational activities and hazards, Safety in storage and handling of chemicals and gases, Hazards during transportation and Pipeline transport - Safety in chemical laboratories Specific safety consideration for cement, paper and pharmaceutical, Specific safety consideration for petroleum, petro - chemical, rubber, fertilizer and distilleries.	9
IV	**ENVIRONMENTAL IMPACT ASSESSMENT** Evolution, Concepts, Methodologies, Screening, Scoping and Checklist of EIA Rapid and Comprehensive EIA Legislative and environmental clearance procedure in India - Prediction tools for EIA Assessment of Impact of air, water, soil, noise, biological and Socio cultural environment Public participation Resettlement and Rehabilitation Documentation of EIA.	9
V	**REGULATIONS FOR HEALTH, SAFETY AND ENVIRONMENT** Factories act and rules - Indian explosive act - Gas cylinder rules, Environmental pollution act, Indian petroleum act and rules, Oil industry safety directorate (OISD), Indian Electricity act and rules, Mines act and rules, Indian motor vehicles act and rules.	9
	Total Instructional Hours	**45**

Course Outcomes

At the end of the course, student shall be able to

CO1: Apply the philosophies behind industrial accidents
CO2: Apply the hierarchical levels in a safety organization
CO3: Understand the concept of industrial process safety
CO4: Understand the safety procedures for human and apply Industries.
CO5: Apply the types of industrial hazards and preventive measures.

TEXT BOOK:

T1- Handlin. W, "Industrial Hand Book",McGraw-Hill, 2019.
T2 - Anton. T.J, "Occupational Safety and Health Management", 2nd Edition, New York, McGraw Hill, 2016.

REFERENCES:

R1- Heinrich, H.W "Industrial Accident Prevention" McGraw-Hill, 1980. R2 -Canter.R.L, "Environment Impact Assesment", McGraw Hill,1988.
R3- Lees.FP, "Loss Prevention in Process Industries",Butterworths, New Delhi, 1986.
R4 -L M Deshmukh, "Industrial Safety Management", Tata McGraw-Hill Education, 2005.

PO& PSO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO 10	PO 11	PO 12	PSO 1	PSO 2
CO1	-	-	-	-	-	-	2	2	3	2	3	2	-	3
CO2	-	1	-	-	-	-	-	1	2	2	3	3	1	1
CO3	-	-	-	-	-	-	-	2	3	3	3	3	1	1
CO4	-	-	-	-	-	-	-	2	3	3	3	3	2	2
CO5	-	-	-	-	-	-	-	1	2	2	3	3	1	1
Avg	0	0.2	0	0	0	0	0.4	1.6	2.6	2.4	3	2.8	1	1.6

Chairman, Board of Studies

Chairman - BoS
MECH - HiCET

ACADEMIC COUNCIL
Chairman
HINDUSTHAN COLLEGE OF ENGG & TECH

Dean – Academics

Dean (Academics)
HiCET

Programme	Course code	Name of the course	L	T	P	C
B.E.	21ME7309	MAINTENANCE ENGINEERING	3	0	0	3

Course Objectives

1. To study the principles and functions of maintenance planning.
2. To learn the types of maintenance.
3. Gain knowledge about condition monitoring.
4. Understand the repair methods for machine elements.
5. Understand the repair methods for material handling equipments.

Unit	Description	Instructional Hours
I	**PRINCIPLES AND PRACTICES OF MAINTENANCE PLANNING** Basic Principles of maintenance planning – Objectives and principles of planned maintenance activity – Importance and benefits of sound Maintenance systems – Reliability and machine availability – MTBF, MTTR and MWT – Factors of availability – Maintenance organization – Maintenance economics.	9
II	**MAINTENANCE POLICIES – PREVENTIVE MAINTENANCE** Maintenance categories – Comparative merits of each category – Preventive maintenance, maintenance schedules, repair cycle - Principles and methods of lubrication – TPM.	9
III	**CONDITION MONITORING** Condition Monitoring – Cost comparison with and without CM – On-load testing and offload testing – Methods and instruments for CM – Temperature sensitive tapes – Pistol thermometers – wear- debris analysis.	9
IV	**REPAIR METHODS FOR BASIC MACHINE ELEMENTS** Repair methods for beds, slide ways, spindles, gears, lead screws and bearings – Failure analysis – Failures and their development – Logical fault location methods – Sequential fault location.	9
V	**REPAIR METHODS FOR MATERIAL HANDLING EQUIPMENT** Repair methods for Material handling equipment - Equipment records –Job order systems -Use of computers in maintenance	9
	Total Instructional Hours	**45**

Course Outcomes

At the end of the course, student shall be able to
CO1: Understand the maintenance planning functions.
CO2: Understand the maintenance policies and types.
CO3: Understand the methods and instruments for CM.
CO4: Analyze the failure of machine parts.
CO5: Analyze the failure analysis in material handling equipments

TEXT BOOK:

T1 - Srivastava S.K., "Industrial Maintenance Management", S. Chand and Co., 2016.
T2 - Venkataraman .K "Maintancence Engineering and Management", PHI Learning, Pvt. Ltd., 2017.

REFERENCES:

R1 - Bhattacharya S.N., "Installation, Servicing and Maintenance", S. Chand and Co., 1995.
R2 - White E.N., "Maintenance Planning", I Documentation, Gower Press, 1979.
R3 - Garg M.R., "Industrial Maintenance", S. Chand & Co., 1986.
R4 - L M Deshmukh, Industrial Safety Management, Tata McGraw-Hill Education, 2005.

PO& PSO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO 10	PO 11	PO 12	PSO 1	PSO 2
CO1	3	2							3			2	1	2
CO2	2		2						3			2		1
CO3	3		3	2					3				1	1
CO4	3				2				3					
CO5	3			2					3			2	1	
Avg	3	2	2.5	2	2				3			2	1	1.3

Chairman, Board of Studies

Chairman - BoS
MECH - HiCET

Dean– Academics

Dean (Academics)
HiCET

Programme	Course code	Name of the course	L	T	P	C
B.E.	21ME7310	METROLOGY AND NON DESTRUCTIVE TESTING	3	0	0	3

Course Objectives

1. To impart the knowledge of quality assurance and inspection techniques.
2. To familiarize with the various inspection and measurement techniques like contact and non-contact measurement by adapting Computer Aided Inspection.
3. To impart the knowledge of working principles and calibration of various Systems.
4. To study and understand the various non-destructive evaluation and testing methods, theory and their industrial applications.
5. To provide exposure to the students on various advanced measuring methods and nondestructive testing techniques.

Unit	Description	Instructional Hours
I	**MEASURING MACHINES** Tool Maker's microscope - Co-ordinate measuring machines - Universal measuring machine – Image shearing microscope -Laser viewers for production profile checks - Use of computers in metrology- Machine vision technology - Microprocessors in metrology.	9
II	**STATISTICAL QUALITY CONTROL** Data presentation - Statistical measures and tools - Process capability - Confidence and tolerance limits - Control charts for variables and for fraction defectives - Theory of probability - Sampling – ABC standard, Reliability and life testing	9
III	**LIQUID PENETRANT AND MAGNETIC PARTICLE TESTS** Non destructive testing: Visual inspection, principles and operation of Liquid penetration inspection, Characteristics of liquid Penetrants - Different washable systems - Developers - Applications – Methods of production of magnetic fields - Principles of operation of Magnetic particle test - Applications - Advantages and Limitations.	9
IV	**RADIO GRAPHY** Sources of x-ray production - properties of x rays - film characteristics – Exposure charts - contrasts - operational characteristics of x ray equipment - Applications.	9
V	**ULTRASONIC AND ACOUSTIC EMISSION TECHNIQUES** Production of ultrasonic waves - Types, characteristics of ultrasonic waves - pulse echo method - A, B, C scans - Principles of Acoustic emission techniques – Advantages and limitations –Instrumentation - Applications.	9
	Total Instructional Hours	**45**

Course Outcomes

At the end of the course, student shall be able to

CO1: Understand the concept of Laser Metrology and Computer Integrated Machining Machine.

CO2: Understand the techniques used in statistical quality control.

CO3: Analyse the materials characteristics through various non-destructive tests.

CO4: Understand the knowledge various radiography characteristics and operations.

CO5: Understand the knowledge of ultrasonic and Acoustic emission techniques.

TEXT BOOK:

T1. Jain, R.K. "Engineering Metrology ", Khanna Publishers, 2015.

T2. Barry Hull and Vernon John, "Non Destructive Testing ", MacMillan, 2018.

REFERENCES:

R1. American Society for Metals, "Metals Hand Book ", Vol.II, 1976.

R2. Progress in Acoustic Emission, "Proceedings of 10th International Acoustic Emission Symposium ", Japanese Society for NDI, 1990.

R3.Halmshaw, "Non-destructive testing", 2nd edition, Edward Arnold, 1991.

R4. Baldev Raj, T.Jayakumar, M.Thavasimuthu "Practical Non-Destructive Testing", Narosa Publishing House, 2009.

PO& PSO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO 10	PO 11	PO 12	PSO 1	PSO 2
CO1	3	1	1	1	1	-	-	-	-	1	-	1	-	1
CO2	3	1	1	2	1	-	-	-	-	1	-	1	-	1
CO3	3	2	2	2	1	-	-	-	-	1	-	1	-	1
CO4	3	1	1	1	2	-	-	-	-	2	-	1	3	1
CO5	3	1	2	1	2	-	-	-	-	2	-	1	3	1
Avg	3	1.2	1.4	1.4	1.4	0	0	0	0	1.4	0	1	3	1

Chairman, Board of Studies

Chairman - BoS
MECH - HiCET

ACADEMIC COUNCIL * MEENAKSHI COLLEGE OF ENGG & TECH * Chairman

Dean– Academics

Dean (Academics)
HiCET

160

OPEN ELECTIVE

Programme	Course code	Name of the course	L	T	P	C
B.E.	21ME7401	ADDITIVE MANUFACTURING TECHNIQUES	3	0	0	3

Course Objectives

1. To know the principle methods, areas of usage, possibilities and limitations as well as environmental effects of the Rapid Prototyping technologies.
2. To acquire knowledge of solid and liquid based Rapid prototyping system.
3. To provide information about Power based prototyping system.
4. To be familiar with the characteristics of the different materials those are used in lean Manufacturing.
5. To impart knowledge of characteristics and issues of Just in time.

Unit	Description	Instructional Hours
I	**INTRODUCTION** Need - Development of RP systems – RP process chain - Impact of Rapid Prototyping and Tooling on Product Development – Benefits- Applications – Digital prototyping – Virtual prototyping.	7
II	**REVERSE ENGINEERING AND CAD MODELING** Basic concept - Digitization techniques – Model Reconstruction – Data Processing for Rapid Prototyping: CAD model preparation, Data Requirements – Geometric modeling techniques: Wire frame, surface and solid modeling – Data formats - Data interfacing - Part orientation and support generation - Support structure design - Model Slicing and contour data organization - Direct and adaptive slicing - Tool path generation	10
III	**SOLID AND LIQUID BASED ADDITIVE MANUFACTURINGSYSTEMS** Stereo lithography Apparatus (SLA), Fused deposition Modeling (FDM), Laminated object manufacturing (LOM), three dimensional printing: Working Principles, details of processes, products, materials, advantages, limitations and applications - Case studies.	9
IV	**POWDER BASED ADDITIVE MANUFACTURING SYSTEMS** Selective Laser Sintering (SLS), Direct Metal Laser Sintering (DMLS), Three-Dimensional Printing, Laser Engineered Net Shaping (LENS), Processes, materials, products, advantages, applications and limitations – Case Studies.	9
V	**OTHER ADDITIVE MANUFACTURING SYSTEMS** Introduction - basic process of Shape Deposition Manufacturing (SDM) and its applications. Selective Laser Melting (SLM), Electron Beam Melting (EBM) – Rapid Manufacturing.	9
	Total Instructional Hours	**45**

Course Outcomes

At the end of the course, student shall be able to

CO1: Understand the basics of additive manufacturing techniques in manufacturing.

CO2: Understand the concepts of modeling, data processing and reverse engineering in additive Manufacturing.

CO3: Apply the liquid and solid based additive manufacturing system in suitable applications.

CO4: Apply powder based additive manufacturing system in suitable applications.

CO5: Apply the new technologies in additive manufacturing for various applications.

TEXT BOOK:

T1 Ian Gibson, David W. Rosen, Brent Stucker, Springer (2020). Additive Manufacturing Technologies Rapid prototyping: Direct Digital Manufacturing.

T2 Hopkinson, N., R. Hague and P. Dickens, (2018) Rapid Manufacturing: An Industrial Revolution for the Digital Age, John Wiley, New York.

REFERENCES:

R1 Chua C.K, Leong K.F and Lim C.S, "Rapid Prototyping: Principles and Applications", World Scientific, 2003.

R2 Rafiq I.Noorani, "Rapid Prototyping: Principles and Applications", Wiley & Sons, 2006.

R3 Wiley Gibson, "Advanced manufacturing technology for medical applications",2008.

R4 Liou, L.W. and Liou, F.W., "Rapid Prototyping and Engineering applications: A tool box for prototype development", CRC Press., United States, 2011.

PO& PSO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO 10	PO 11	PO 12	PSO 1	PSO 2
CO1	3	2	2	-	1	-	-	-	-	-	-	-	1	1
CO2	3	3	2	-	1	-	-	-	-	-	-	-	1	1
CO3	3	2	2	-	1	-	-	-	-	-	-	-	1	1
CO4	3	2	3	-	1	-	-	-	-	-	-	-	1	1
CO5	3	2	3	-	1	-	-	-	-	-	-	-	1	1
Avg	3	2.2	2.4	-	1	-	-	-	-	-	-	-	1	1

Chairman, Board of Studies

Chairman - BoS
MECH - HiCET

Dean– Academics

Dean (Academics)
HiCET

162

UG - DETAILS OF COURSE REVISIONS & NEW COURSES INTRODUCED

SYLLABUS REVISION DETAILS FOR THE REGULATION 2022 – SEMESTER I, III & V						
S.NO	**COURSE CODE/COURSE NAME**	**SUGGESTION BY EXPERTS**	**EXISTING CONTENT (IN THE AY 2023-24 ODD)**	**REVISED CONTENT (FOR AY 2024-25 ODD)**	**TYPE OF REVISION DELETION/ INSERTION/ MODIFICATION**	**PERCENT AGE OF REVISION**
1.	22HE1151 English for Engineers	New course being introduced in First Semester Syllabus (for the batch admitted during 2024 – 2025)				
2.	22PH1153 Physical Properties Of Materials	New course being introduced in First Semester Syllabus (for the batch admitted during 2024 – 2025)				
3	22IT1151 Python Programming and practices	New course being introduced in First Semester Syllabus (for the batch admitted during 2024 – 2025)				
4	22MA3105 Fourier Series and Transforms	New course being introduced in Seventh Semester Syllabus (for the batch admitted during 2023 – 2024)				
4.	22ME5251 Dynamics of Machines	New course being introduced in Seventh Semester Syllabus (for the batch admitted during 2022 – 2023)				
5.	22ME5301 Automobile Engineering	New course being introduced in Seventh Semester Syllabus (for the batch admitted during 2022 – 2023)				
6.	22ME5302 Internet of Things for Mechanical Engineers	New course being introduced in Seventh Semester Syllabus (for the batch admitted during 2022 – 2023)				
7.	22ME5303 Additive Manufacturing systems	New course being introduced in Seventh Semester Syllabus (for the batch admitted during 2022 – 2023)				
8.	22ME5231 Sem 5: EV and Sub Systems.	New course being introduced in Seventh Semester Syllabus (for the batch admitted during 2022 – 2023)				
9	22ME5072 Machine Drawing	Unit II SECTIONAL VIEWS	Sections- Hatching of Sections, Revolved or Removed Section, Sectional Views- Full Section, Half Sections and Auxiliary Sections.	Sections- Hatching of Sections, Cutting Planes, Revolved or Removed Section, Sectional Views- Full Section, Half Sections and Auxiliary Sections.	Deletion and inclusion of topics	5%
10	22ME5301	UNIT III	Clutch – Types and Construction, Gear Boxes – Types, Manual and	Clutch – Types and Construction, Gear Boxes – Types, Manual and Automatic,	Deletion and inclusion of topics	5%

	AUTOMOBILE ENGINEERING	TRANSMISSION SYSTEMS	Automatic, Selector mechanism - Over Drives – Transfer Box - Fluid flywheel – Torque converter – Propeller shaft – Slip Joint – Universal Joints – Differential unit. Rear Axle – Hotchkiss drive and Torque Tube drive.	Selector mechanism - Over Drives – Transfer Box - Fluid flywheel – Torque converter – Propeller shaft – Slip Joint – Universal Joints – Differential unit. Rear Axle – Hotchkiss drive and Torque Tube drive. Turbocharger and supercharger.		
11	22ME3251 FLUID MECHANICS AND MACHINERY	UNIT IV HYDRAULIC PUMPS	Classifications of pumps – Centrifugal pumps– work done by the impeller -Head and efficiencies performance curves-velocity triangles – cavitation-priming Reciprocating pump-slip, Indicator diagram, efficiency. Performance curves- theory of Air vessel.	Classifications of pumps –Centrifugal pumps– work done by the impeller -Head and efficiencies performance curves-velocity triangles – cavitation-priming Reciprocating pump-slip, Indicator diagram, efficiency. Performance curves- theory of Air vessel. Experimentation on centrifugal pump and reciprocating pump	Deletion and inclusion of topics	5%
12	22ME3204 MANUFACTURING TECHNOLOGY – I	UNIT V MANUFACTURE OF PLASTIC COMPONENTS	Types and characteristics of plastics –Thermoplastics and Thermosetting plastics – working principles and typical applications of Injection moulding, Plunger and screw machines – Compression moulding, Transfer Moulding – Blow moulding – Rotational moulding – Film blowing – Extrusion – Thermoforming	Types and characteristics of plastics – Thermoplastics and Thermosetting plastics – working principles and typical applications of Injection moulding, Plunger and screw machines – Compression moulding, Transfer Moulding – Blow moulding –Rotational moulding – Film blowing – Extrusion – Thermoforming – Bonding of Thermoplastics -industrial applications of plastics.	Deletion and inclusion of topics	5%

Chairman Bos

Chairman - BoS
MECH - HiCET

ACADEMIC COUNCIL * VINAYAKA MISSION'S KIRUPANANDHA VARIYAR ENGINEERING COLLEGE * Chairman

Dean Academics

Dean (Academics)
HiCET