R-21

CURRICULUM ESSENTIALS

Handbook on Outcome Based Education

MECHANICAL ENGINEERING

NARULA INSTITUTE OF TECHNOLOGY

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Institute Vision

To make the Institute excellent in technological education and research by imparting equitable, inclusive, ethical, flexible and multidisciplinary knowledge to budding technologists to serve the society.

Institute Mission

- To establish continuously improving academic ambience in the Institute in order to prepare the students with beyond curriculum knowledge, creativity, innovation, problem solving abilities, teamwork, communication skills etc. for their holistic development.
- To collaborate with Institutes of higher education, Professional Societies, R&D and Industrial organisations for continuous improvement of academic, research environment in the Institute and to build a strong Industry-Institute interface.
- To promote and nurture entrepreneurial and innovative quality of the students providing proper education, training and supportive facilities so that future entrepreneurs emerge with flying colors.
- To strengthen quality and knowledge-base of faculty through faculty development programmes for continuous upgradation to remain in tune with dynamically changing technology.
- To become a responsible contributor in the socio-economic development of the society through excellence in education and research.

Institute Quality Policy

- Adoption of appropriate standards and practices for good governance, to bring in transparency of all operations and thereby improve credibility at all levels.
- Industry-ready professionals to be developed through interactive teaching learning process involving state of the art class rooms, laboratories, libraries, corporate exposure and innovative project work.
- Higher studies/research for faculty & staff to be encouraged for up gradation of knowledge through participation in Quality Improvement Programs, Seminars, Workshops, Webinars etc.
- Laboratory facilities would be upgraded in emerging areas to promote R&D activities including participation in Govt. and Industry funded projects.
- Industrial consultancy to be carried out in an effective manner for developing sense of accomplishment.
- Interaction with Professional Societies would be encouraged for the professional growth and development of the students, faculties and staff for mutual benefit.
- NBA Accreditation for all AICTE approved programs to be obtained at the earliest and maintained on a long-term basis.
- The innovative and entrepreneurial skills of the students to be nurtured through Innovation & Incubation center, finally culminating in start-ups.

Department Vision

B. Tech in Mechanical Engineering

The Mechanical Engineering Department will mould their students into technically sound as well as ethically perfect professionals with innovative leadership qualities and a confident attitude for serving the society with global attention.

Department Mission

B. Tech in Mechanical Engineering

M1: To impart a thorough knowledge of various core engineering subjects to our entire undergraduate students for ascertaining their fundamental strength in mechanical engineering.

M2: To expose our students to a curriculum consisting of modern laboratories, interdisciplinary subjects and industrial trainings in such a way that they get international exposure in world class industries.

M3: To train our students with modern drafting & analysis software for developing their computational capabilities as well as promoting higher studies and research works.

M4: To strengthen our students with innovative ideas and build the potential of leadership & teamwork through various projects in their curriculum.

M5: To build strong ethical qualities in the students for lifelong learning and serving the society and nation as a whole.

Program Educational Objects (PEOs)

B. Tech in Mechanical Engineering

PEO 1: Graduates will serve as mechanical engineer in various fields towards designing of systems, operation and production.

PEO 2: Graduates will strengthen professional practice by solving different industrial problems employing proper techniques & tools with social responsibility to reach global standards.

PEO 3: Graduates will pursue higher study, research and lifelong learning.

Program outcomes (POs)

Engineering Graduate will able to:

PO1: Engineering knowledge: Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.

PO2: Problem analysis: Identify, formulate, review research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.

PO3: Design/development of solutions: Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.

PO4: Conduct investigations of complex problems: Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.

PO5: Modern tool usage: Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modeling to complex engineering activities with an understanding of the limitations.

PO6: The engineer and society: Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice.

PO7: Environment and sustainability: Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.

PO8: Ethics: Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.

PO9: Individual and team work: Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.

PO10: Communication: Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.

PO11: Project management and finance: Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects and in multidisciplinary environments.

PO12: Life-long learning: Recognize the need for, and have the preparation and ability to engage
in independent and life-long learning in the broadest context of technological change.

Program Specific Outcomes (PSOs)

B. Tech in Mechanical Engineering

PSO1: Ability to apply necessary advanced software tools for design, analysis and fabrication of components used in the field of mechanical engineering.

PSO2: Develop knowledge about engines, machineries and critical skills to analyze the cause and effect of complicated mechanical processes.

PSO3: Identify and select appropriate manufacturing processes, and apply quality control methods for production of various components and systems.

Curriculum Structure

Department of Mechanical Engineering

B. Tech First Semester Curriculum

Sl. No.	Category	Course Code	Course Title	Hours per week				Credits
	A. THEORY			L	T	P	Total	
1	Basic Science course	CH101	Chemistry-I	3	0	0	3	3
2	Basic Science course	M101	Mathematics –I	4	0	0	4	4
3	Engineering Science Courses	EE101	Basic Electrical Engineering	3	0	0	3	3
4	Humanities and Social Sciences including Management courses	HSMC101	Professional Communication	2	0	0	2	2
	B. PRACTICAL							
5	Basic Science course	CH191	Chemistry-I Lab	0	0	3	3	1.5
6	Engineering Science Courses	EE191	Basic Electrical Engineering Lab	0	0	3	3	1.5
7	Engineering Science Courses	ME191	Workshop & Manufacturing Practices Lab	0	0	3	3	1.5
8	PROJECT	PR191	Theme based Project I	0	0	1	1	0.5
9	PROJECT	PR192	Skill Development I: Soft Skill	0	0	1	1	0.5
	C. MANDATORY ACTIVITIES / COURSES*							
10	Mandatory Course	MC181	Induction Program	0	0	0	0	
	TOTAL CREDIT							17.5

B. Tech Second Semester Curriculum

Sl. No.	Category	Course Code	Course Title	Hours per week				Credits
	A. THEORY			L	T	P	Total	
1	Basic Science courses	PH 201	Physics-I	3	0	0	3	3
2	Basic Science courses	M 201	Mathematics –II	4	0	0	4	4
3	Engineering Science Courses	CS 201	Programming for Problem Solving	3	0	0	3	3
	B. PRACTICAL							
4	Basic Science course	PH 291	Physics-I Lab	0	0	3	3	1.5
5	Humanities and Social Sciences including Management courses	HSMC291	Professional Communication LAB	0	0	3	3	1
6	Engineering Science Courses	ME 292	Engineering Graphics & Design Lab	0	0	3	3	1.5
7	Engineering Science Courses	CS 291	Programming for Problem Solving Lab	0	0	3	3	1.5
8	PROJECT	PR291	Theme based Project II	0	0	1	1	0.5
9	PROJECT	PR292	Skill Development II: Life Skill	1	0	0	1	0.5
	C. MANDATORY ACTIVITIES / COURSES*							
10	Mandatory Course	MC281	NSS/ Physical Activities / Meditation &Yoga / Photography/ Nature Club	0	0	3	3	0
	TOTAL CREDIT							16.5

B. Tech Third Semester Curriculum

Sl. No.	Category	Course Code	Course Title	Hours per week				Credits
				L	T	P	Total	
A. THEORY								
1	BS	PH(ME) 301	Physics-II	3	0	0	3	3
2	PC	ME 301	Engineering Thermodynamics	3	0	0	3	3
3	PC	ME 302	Manufacturing Process	3	0	0	3	3
4	PC	ME303	Fluid Mechanics	3	0	0	3	3
5	ES	ME304	Engineering Mechanics	3	0	0	3	3
6	ES	ME 305	Data Structure	2	0	0	2	2
B. PRACTICAL								
7	BS	PH(ME)391	Physics-II lab	0	0	2	2	1.0
8	ES	ME 391	Machine Drawing	0	0	3	3	1.5
9	PC	ME392	Manufacturing Process Lab	0	0	3	3	1.5
10	PROJECT	PR391	Theme based Project III	0	0	1	1	0.5
11	PROJECT	PR392	Skill Development III: Technical Seminar Presentation	1	0	0	1	0.5
C. MANDATORY ACTIVITIES / COURSES*								
12	MC	MC 381	Learning an Art Form [vocal or instrumental, dance, painting, clay modeling, etc.] OR Environmental Protection Initiatives	0	0	0	3	0
	TOTAL CREDIT WITHOUT MOOCS COURSES							22
D.MOOCS COURSES**								
13	MOOCS COURSES	HM301	MOOCS COURSE-I	1	3	1	4	4
TOTAL CREDIT WITH MOOCS COURSES								26

B. Tech Fourth Semester Curriculum

Sl. No	Category	Course Code	Course Title	Hours per week				Credits
				L	T	P	Total	
A. THEORY								
1	HSMC (Humanities and Social Sciences including Management courses)	HSMC 402	Gender Culture and Development	3	0	0	3	3
2	BS	M 401	Mathematics III	3	0	0	3	3
3	ES	ME 401	Materials Engineering	3	0	0	3	3
4	PC	ME 402	Fluid Machinery	3	0	0	3	3
5	PC	ME 403	Strength of Material	3	0	0	3	3
6	PC	ME 404	Applied Thermodynamics	3	0	0	3	3
B. PRACTICAL								
7	ES	ES 491	Numerical Methods Lab	0	0	2	2	1
8	PC	ME491	Material Testing Lab	0	0	3	3	1.5
9	PC	ME492	Fluid Mechanics & Fluid Machines Lab	0	0	3	3	1.5
10	PROJECT	PR491	Theme based Project IV	0	0	1	1	0.5
11	PROJECT	PR492	Skill Development IV: Soft Skill & Aptitude-I	1	0	0	1	0.5
C. MANDATORY ACTIVITIES / COURSES								
12	MC	MC 401	Environmental Science	0	0	3	3	0
	TOTAL CREDIT WITHOUT MOOCS COURSES							23
D.MOOCS COURSES*								
13	MOOCS COURSES	HM401	MOOCS COURSE-II	3	1	0	4	4
TOTAL CREDIT WITH MOOCS COURSES								27

B. Tech Fifth Semester Curriculum

Sl. No.	Category	Course Code	Course Title	Hours per week				Credits
				L	T	P	Total	
A. THEORY								
1	HSMC	HSMC 503	Universal Human Values 2: Understanding Harmony	2	0	0	2	2
2	PC	ME501	Heat Transfer	3	0	0	3	3
3	PC	ME502	Manufacturing Technology	3	0	0	3	3
4	PC	ME503	IC Engine & Hybrid Vehicles	3	0	0	3	3
5	PC	ME504	Kinematics & Dynamics of Machines	3	0	0	3	3
6	PE	ME 505	Professional Elective-I A. Refrigeration and Air Conditioning B. Composite Materials C. Finite Element Analysis	3	0	0	3	3
B. PRACTICAL								
7	PC	ME 591	Heat Transfer Lab	0	0	3	3	1.5
8	PC	ME 592	Manufacturing Technology Lab	0	0	3	3	1.5
9	PC	ME 593	Thermal Engineering Lab	0	0	3	3	1.5
10	PE	PEC-M E591	Professional Elective-I Lab A.Refrigeration and Air Conditioning Lab B. Composite Materials Lab C. Finite Element Analysis Lab	0	0	3	3	1.5
11	PROJECT	PR 591	Minor Project I	0	0	3	3	1
12	PROJECT	PR 592	Skill Development V: Soft Skill & Aptitude-II	1	0	0	1	0.5
C. MANDATORY ACTIVITIES / COURSES								
13	MC	MC 501	Intellectual Property Right	2	0	0	2	0
	TOTAL CREDIT WITHOUT MOOCS COURSES							24.5
D. MOOCS COURSES**								
14	MOOCS COURSES	HM501	MOOCS COURSE-III	3	1	0	4	4
TOTAL CREDIT WITH MOOCS COURSES								28.5

B. Tech Sixth Semester Curriculum

Sl.	Category	Course Code	Course Title	Hours per week				Credits
				L	T	P	Total	
A. THEORY								
1	HSMC	HSMC 604	Economics for Engineers	2	0	0	2	2
2	PC	ME601	Design of Machine Elements	3	0	0	3	3
3	PC	ME602	Power Plant Engineering	3	0	0	3	3
4	PE	PEC-ME 601	Professional Elective-II A. Robotics B. Computational Fluid Dynamics C. Fluid Power control	3	0	0	3	3
5	PE	PEC-ME 602	Professional Elective-III A. Materials Handling B. Computer Aided Design C. Nuclear Power Generation & Supply	3	0	0	3	3
6	OE	OEC-ME 601	Open Elective-I A. Mechatronics Systems B. Data Base Management System C. Electrical Machines	3	0	0	3	3
B. PRACTICAL								
7	PC	ME691	Design Lab	0	0	3	3	1.5
8	PE	PEC-ME 691	Professional Elective-II Lab A. Robotics Lab B. Computational Fluid Dynamics Lab C. Fluid Power control Lab	0	0	3	3	1.5
9	OE	OEC-ME 691	Open Elective-I Lab A. Mechatronics Systems Lab B. Data Base Management System Lab C. Electrical Machines Lab	0	0	3	3	1.5
10	PROJECT	PR 691	Minor Project II	0	0	3	2	1
11	PROJECT	PR 692	Skill Development VI: Soft Skill & Aptitude-III	1	0	0	1	0.5
C. MANDATORY ACTIVITIES / COURSES								
12	MC	MC601	Constitution of India	3	0	0	3	0
	TOTAL CREDIT WITHOUT MOOCS COURSES							23.0
D.MOOCS COURSES**								
13	MOOCS COURSES	HM601	MOOCS COURSE-IV	3	1	0	4	4
TOTAL CREDIT WITH MOOCS COURSES								27.0

B. Tech Seventh Semester Curriculum

Sl No	Course Code	Paper Code	Theory	Contact Hours/Week				Credit Points
				L	T	P	Total	
A. THEORY								
1	HSMC	HSMC705	Industrial Management	2	0	0	2	2
2	PC	ME701	Advanced Manufacturing Technology	3	0	0	3	3
3	PE	PEC-ME702	Professional Elective-IV A. Automobile Engineering B. Tribology C. Maintenance Engineering D. Turbomachinery	3	0	0	3	3
4	OE	OEC-ME701	Open Elective-II A. 3D Printing and Design B. Internet Of Things C. Biomechanics & Biomaterials D. Microprocessor in Automation	3	0	0	3	3
5	OE	OEC-ME702	Open Elective-III A. Electric Vehicles B. Industrial Instrumentation C. Operation Research D Cyber Security	3	0	0	3	3
B. PRACTICAL								
6	PC	PC 791	Advanced Manufacturing Lab	0	0	0	3	1.5
7	OE	OEC 791	Open Elective-I Lab	0	0	3	3	1.5
8	PROJECT	PR 791	Major Project-I	0	0	0	4	2
9	PROJECT	PR 792*	Industrial Training / Internship	0	0	0	0	1
10	PROJECT	PR 793	Skill Development VII: Seminar & Group Discussion	1	0	0	1	0.5
C. MANDATORY ACTIVITIES / COURSES								
11	MC	MC 701	Entrepreneurship & Innovation Skill	2	0	0	2	0
TOTAL CREDIT WITHOUT MOOCS COURSES								20.5
D.MOOCS COURSES**								
12	MOOCS COURSES	HM701	MOOCS COURSE-V	3	1	0	4	4
TOTAL CREDIT WITH MOOCS COURSES								24.5

B. Tech Eighth Semester Curriculum

Sl No	Course Code	Course Code	Theory	Contact Hours/Week				Credit Points
				L	T	P	Total	
A. THEORY								
1	PE	PEC801	**Professional Elective-V** A. Renewable Energy System B. Micro and Nano Manufacturing C. Gas Dynamics & Jet Propulsion D. Design of Transmission System	3	0	0	3	3
2	OE	OEC801	**Open Elective-IV** A. Energy Conservation & Management B. Artificial Intelligence C. Block Chain D. Nanotechnology	3	0	0	3	3
3	OE	OEC802	**Open Elective-V** A. Total Quality Management B. Safety & Occupational Health C. Industrial Pollution and Control D. Big Data Analytics	3	0	0	3	3
B. PRACTICAL								
4	PROJECT	PR 891	Major Project-II	0	0	0	12	6
5	PROJECT	PR 892	Grand Viva	0	0	0	0	1
C. MANDATORY ACTIVITIES / COURSES								
6	MC	MC 881	Essence of Indian Knowledge Tradition	0	0	3	3	3 Units
TOTAL CREDIT								16

Total Credit:

Semester	Without MOOCS	With MOOCS
1st	17.5	17.5
2nd	16.5	16.5
3rd	22	26
4th	23	27
5th	24.5	28.5
6th	23	27
7th	20.5	24.5
8th	16	16
TOTAL	163	183 (for Honors/minor)

COURSE NAME: CHEMISTRY
COURSE CODE: CH 101
CONTACT: 3:0:0
TOTAL CONTACT HOURS: 36
CREDITS: 3
Pre requisites: A basic knowledge in 10+2 science with chemistry

Course Outcomes: After successful completion of this course learners will be able to

CO1: Able to describe the fundamental properties of atoms & molecules, atomic structure and the periodicity of elements in the periodic table

CO2: Able to apply fundamental concepts of thermodynamics in different engineering applications.

CO3: Able to apply the knowledge of water quality parameters, corrosion control & polymers to different industries.

CO4: Able to determine the structure of organic molecules using different spectroscopic techniques.

CO5: Capable to evaluate theoretical and practical aspects relating to the transfer of the production of chemical products from laboratories to the industrial scale, in accordance with environmental considerations.

CO-PO/PSO Mapping:

CO codes	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CH101.1	3	2	2	2								2			
CH101.2	3	3	3	3								2			
CH101.3	3	3	2	2								2			
CH101.4	3	2	3	2								2			
CH101.5	3	3	3	3								2		2	2

COURSE NAME: MATHEMATICS-I
COURSE CODE: M 101
CONTACT: 3:1:0
TOTAL CONTACT HOURS: 48
CREDITS: 4
Prerequisite: The students to whom this course will be offered must have the concept of (10+2) standard matrix algebra, calculus and vector algebra.

Course Outcomes:

CO1	Understand and recall the properties and formulas related to matrix algebra, differential calculus, integral calculus and vector algebra. multivariable calculus, vector calculus and infinite series
CO2	Determine the solutions of the problems related to matrix algebra, differential calculus, multivariable calculus, vector calculus and infinite series.
CO3	Apply the appropriate mathematical tools of matrix algebra, differential calculus, Integral Calculus, multivariable calculus, vector calculus and infinite series for the solutions of the related problems.
CO4	Analyze different engineering problems linked with matrix algebra, differential calculus, Integral Calculus, multivariable calculus, vector calculus,
CO5	Apply different engineering problems linked with matrix algebra, differential calculus, Integral Calculus, multivariable calculus, vector calculus.

CO-PO/PSO Mapping:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	P10	P11	P12	PSO1	PSO2	PSO3
CO1	3	3	2	-								2	2	2	2
CO2	3	3	3	3								2	2	2	2
CO3	3	3	3	3								2	2	2	2
CO4	3	3	3	3								2	2	2	2
CO5	3	3	3	3								2	2	2	2

COURSE NAME: BASIC ELECTRICAL ENGINEERING
COURSE CODE: EE101

Course Outcome: After completion of this course student will be able to

EE201.1:	Understand the behavior of any electrical and magnetic circuits.
EE201.2:	Formulate and solve complex AC, DC circuits.
EE201.3:	Identify the type of electrical machine used for that particular application.

CO-PO/PSO Mapping:

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
EE 101.1	3	3	3			3			3		2	3	2	2	
EE 101.2	3	3	2			2			3		1	3	1	2	
EE 101.3	3	3	3			1			3		1	3	3	3	

COURSE NAME: PROFESSIONAL COMMUNICATION
COURSE CODE: HSMC 101

After completion of the course students would be able to

CO1: Understand and communicate in English through exposure to communication skills theory and practice.

CO2: Understand and apply the basic grammatical skills of the English language and develop reading and comprehension skills.

CO3: Understand and know about and apply the basic formats, templates of business and official communication.

CO4: Understand and know about and employ formal communication modes in meetings and reports.

CO5: Understand and know about and use objective and culturally neutral language in interpersonal and business communication.

CO-PO/PSO Mapping:

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1							2		3	3		3			
CO2							2		3	3		3	2	2	2
CO3							2		3	3		3			
CO4							2		3	3		3			
CO5							2		3	3		3			

COURSE NAME: CHEMISTRY LAB
COURSE CODE: CH 191

Course Outcomes (COs):

After completion of the course students would be able to

CO1	Understand different types of instruments for estimation of small quantities chemicals used in industries, scientific and technical fields.
CO2	Analyze and determine the composition of liquid and solid samples working as an individual and also as a team member.
CO3	Analyze different water quality parameters considering public health and environment
CO4	Synthesize drug and polymer materials considering public health and environmental safety
CO5	Design innovative experiments applying the fundamental theory of chemistry.

CO-PO/PSO Mapping:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CH191.1	2	2	3	2		2						2			
CH191.2	2	2	3	2		2						2			
CH191.3	2	2	3	2		2						2			
CH191.4	2	2	3	2		2						2			
CH191.5	3	3	3	3		2						2		2	2

COURSE NAME: BASIC ELECTRICAL ENGINEERING LABORATORY
COURSE CODE: EE191

Course Outcome: After completion of this course student will be able to

EE291.1:	Understand the response of any electrical circuit and network
EE291.2:	Apply the operation of an electrical apparatus
EE291.3:	Analyse a suitable measuring instrument for a given application and Evaluate the various parts and test of DC machine and transformer

CO-PO/PSO Mapping:

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
EE 191.1	2	2	3	3					3	3		2	2	2
EE 191.2	3	3	2	3					3	3		3	2	2
EE 191.3	2	3	3	2					2	3		2	2	2

COURSE NAME: WORKSHOP/MANUFACTURING PRACTICES
COURSE CODE: ME191

Course Outcome: Upon successful completion of this course, the student will be able to:

1. Gain basic knowledge of Workshop Practice and Safety useful for our daily living.
2. Understand the use of Instruments of a pattern shop like Hand Saw, Jack Plain, Chisels etc.
3. Apply and performing operations like such as Marking, Cutting etc used in manufacturing processes.
4. Analyse the various operations in the Fitting Shop using Hack Saw, various files, Scriber, etc to understand the concept of tolerances applicable in all kind of manufacturing.
5. Get hands on practice of in Welding and apply various machining processes which give a lot of confidence to manufacture physical prototypes in project works.

CO-PO/PSO Mapping:

CO Codes	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO1 0	PO1 1	PO1 2	PSO1	PSO2	PSO3
ME 191.1	3						2		2	2					
ME 191.2	3						2		2	2					
ME 191.3	3						2		2	2			2		2
ME 191.4	3						2		2	2			2		2
ME 191.5	3	2	2				2		2	2					

First Year 2nd Semester

COURSE NAME: PHYSICS –I
COURSE CODE: PH 201

Course Outcomes:

CO1: Describe various types mechanical resonance and its electrical equivalence
CO2: Explain basic principles of Laser, Optical fibers and various types of semiconductors
CO3: Apply superposition to explain interference and diffraction as well as apply wave mechanics to attainment of Heisenberg's uncertainty principle
CO4: Analyze importance of light as a carrier of information and examine different crystallographic structures according to their co-ordination number and packing factors
CO5: Justify the need of a quantum mechanics as remedy to overcome limitations imposed by classical physics

CO-PO/PSO Mapping:

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	2	3	2	3	3									2	2
CO2	2	3	2	3	3									2	2
CO3	2	3	2	3	3									2	2
CO4	2	3	2	3	3									2	2
CO5	2	3	2	3	2									2	2

COURSE NAME: MATHEMATICS-II
COURSE CODE: M 201

Course Outcomes:

Course outcomes:

CO1: Determine and recall the properties and formula related to Ordinary differential equations, Basic Graph Theory and Laplace transform.

CO2: Determine the solutions of the problems related to Ordinary differential equations, Basic Graph Theory and Laplace transform.

CO3: Apply appropriate mathematical tools of Ordinary differential equations, Basic Graph Theory and Laplace transform.

CO4: Analyze Engineering problems on Ordinary Differential Equations, Basic Graph Theory and Laplace transform.

CO5: Apply engineering solutions by using Ordinary differential equations, Basic Graph Theory and Laplace transform.

CO-PO/PSO Mapping:

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3
CO1	3	3	2	-								2			
CO2	3	3	3	3								2			
CO3	3	3	3	3								2	2	2	2
CO4	3	3	3	3								2	2	2	2
CO5	3	3	3	3								2	2	2	2

COURSE NAME: PROGRAMMING FOR PROBLEM SOLVING
COURSE CODE: CS 201

Course Outcomes:

CO1	Understand and differentiate among different programming languages for problem solving.
CO2	Describe the way of execution and debug programs in C language.
CO3	Define, select, and compare data types, loops, functions to solve mathematical and scientific problem.
CO4	Understand the dynamic behavior of memory by the use of pointers.
CO5	Design and develop modular programs using control structure, selection structure and file.

CO–PO/PSO Mapping:

PO CO	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3
CO1	3	3	3	2	2								**3**	**3**	**3**
CO2	3	2	2	2	2								3	3	3
CO3	3	3	3	2	2								3	3	3
CO4	3	3	3	2	2								3	3	3
CO5	3	3	3	2	2								3	3	3

COURSE NAME: PHYSICS- I LAB
COURSE CODE: PH 291

Course Outcomes (COs):

After completion of the course students would be able to

CO1	Demonstrate experiments allied to their theoretical concepts
CO2	Conduct experiments using LASER, Optical fiber, Torsional pendulum, Spectrometer
CO3	Analyze and participate as an individual and as a member or leader in groups in laboratory sessions actively.
CO4	Analyze experimental data from graphical representations, and to communicate effectively them in Laboratory reports including innovative experiments.
CO5	Develop critical thinking skills to solve real life challenges.

CO-PO/PSO Mapping:

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3
CO1	2	3	2	3	3										
CO2	2	3	2	3	3										
CO3	2	3	2	3	3										
CO4	2	3	2	3	3									2	2
CO5	2	3	2	3	2										

COURSE NAME: PROFESSIONAL COMMUNICATION LAB
COURSE CODE: HSMC291
CONTACT: 0:0:3

Course Outcomes:

CO1: Able to understand advanced skills of Technical Communication in English through Language Laboratory.
CO2: Able to apply listening, speaking, reading and writing skills in societal and professional life.
CO3: Able to demonstrate the skills necessary to be a competent Interpersonal communicator.
CO4: Able to analyze communication behaviors.
CO5: Able to adapt to multifarious socio-economical and professional arenas with the help of effective communication and interpersonal skills.

CO-PO/PSO Mapping

PO CO	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3
CO1							2		3	3		2	2	2	3
CO2							2		3	3		2	2	3	2
CO3							2		3	3		2	1	1	3
CO4							2		3	3		2	-	1	2
CO5							2		3	3		2			

COURSE NAME: ENGINEERING GRAPHICS & DESIGN
COURSE CODE: ME292

Course Outcomes: Upon successful completion of this course, the student will be able to:

1. Learn the basics of drafting
2. Understand the use of drafting tools which develops the fundamental skills of industrial drawings.
3. Apply the concept of engineering scales, dimensioning and various geometric curves necessary to understand design of machine elements.
4. Analyse the concept of projection of line, surface and solids to create the knowledge base of orthographic and isometric view of structures and machine parts.
5. Evaluate the design model to different sections of industries as well as for research & development.

CO-PO/PSO Mapping:

COs	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3
CO1	2			2									2	2	2
CO2	2			2									2	2	2
CO3	3			2									2	2	2
CO4	3			3									3	3	2
CO5	3	2		3	2								3	3	2

COURSENAME: PROGRAMMING FOR PROBLEM SOLVING LAB
COURSE CODE: CS 291

Course Outcomes (COs):

After completion of the course students would be able to,

CO1: Understand and propose appropriate command or function in the running system or developing program for engineering and mathematical problems depending on the platform used even in a changed environment leading to their lifelong learning.

CO2: Identify and propose appropriate data type, arithmetic operators, input/output functions and also conditional statements in designing effective programs to solve complex engineering problem using modern tools.

CO3: Design and develop effective programs for engineering and mathematical problems using iterative statements as well as recursive functions using modular programming approach possibly as a team maintaining proper ethics of collaboration.

CO4: Explain and organize data in arrays, strings and structures and manipulate them through programs and also define pointers of different types and use them in defining self-referential structures and also to construct and use files for reading and writing to and from leading to solution of engineering and mathematical problem.

CO5: Prepare laboratory reports on interpretation of experimental results and analyse it for validating the same maintaining proper ethics of collaboration.

CO-PO/PSO Mapping:

CO PO	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3
CO1	3	3	3	3	3								3	3	3
CO2	3	3	2	3	3								3	3	3
CO3	3	3	3	3	3								3	3	3
CO4	3	3	3	3	3								3	3	3
CO5	3	3	3	3	3								3	3	3

2nd Year 1st Semester

COURSE NAME: PHYSICS-II
COURSE CODE: PH (ME) 301

Course Outcome:
After successful completion of this course learners will be able to
CO.1: explain electron transport in semiconductors using energy Band theory.
CO.2: apply Schrödinger equation in variety of atomic scale problems including nanomaterials.
CO.3: analyze the physics of various kinds of electric and magnetic materials
CO.4: justify the importance of Fermi energy level in turning electronic properties of various semiconductors

CO-PO/PSO Mapping:

COs	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3
CO 1	**3**	-	-	-	-	-	-	-	-	-	-	-	2	-	-
CO 2	**3**	**2**	-	-	-	-	-	-	-	-	-	-	2	-	-
CO 3	-	**2**	**3**	-	-	-	-	-	-	-	-	-	2	-	-
CO 4	**2**	**2**		-	-	-	-	-	-	-	-	-	2	-	-
Avg	**2**	**1.5**	0.75	-	-	-	-	-	-	-	-	-	2	-	-

COURSENAME: ENGINEERING THERMODYNAMICS
COURSE CODE:ME301

Course Outcomes:

CO1: Learn about the interrelationship of heat and work to draw an energy balance between a system and its surroundings.

CO2: Understand the second law limitation of energy conversion and differentiate realistic and unrealistic thermodynamic systems.

CO3: Carry out Entropy and Exergy analysis of thermal systems to evaluate sustainability of practical equipment in industries.

CO4: Evaluate the performance of energy conversion devices using utility thermodynamic cycles.

CO-PO/PSO Mapping:

COs	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3
CO1	2	2	2	-	-	-	1	-	-	-	-	1	-	2	-
CO2	3	2	2	1	-	-	2	-	-	-	-	-	-	1	-
CO3	3	3	3	1	-	-	3	-	-	-	-	1	-	3	-
CO4	2	1	2	-	-	-	-	-	-	-	-	-	-	2	-
Avg	2.5	2	2.25	0.5	-	-	1.5	-	-	-	-	0.5	-	2	-

COURSE NAME: MANUFACTURING PROCESSES
COURSE CODE:ME302
Course Outcomes:

CO1: Understand the basics of manufacturing processes and concerned behavior of material properties.

CO2: Explain various casting processes for different molding designs and forming techniques for metal works.

CO3: Understand welding methods and analyze solid or liquid state joining

CO4: Analyze the principle of cutting tools and practice machining processes

CO – PO/PSO Mapping:

COs	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3
CO1	3	-	2	-	-	-	-	-	-	-	1	-	1	-	1
CO2	3	3	3	2	-	-	-	-	-	-	-	-	2	-	2
CO3	3	2	3	2	-	-	-	-	-	-	-	-	3	-	2
CO4	3	2	3	2	-	-	-	-	-	-	1	-	2	-	3
Avg	3	1.75	2.75	1.5	-	-	-	-	-	-	0.5	-	2	-	2

COURSE NAME: FLUID MECHANICS
COURSE CODE: ME303

Course Objectives: To introduce and explain fundamentals of Fluid Mechanics which is useful in the applications of Aerodynamics, Hydraulics, Marine Engineering, Gas dynamics, Heat Transfer, Power Plant etc.

Course Outcomes:

CO1: Get knowledge about fluid flow properties and analyze hydrostatic forces on flat or curved surfaces.

CO2: Explore the detailed analysis of kinematics and dynamics of fluid for laminar and turbulent flow and exploit the conservation equations for the flow regimes of practical interest.

CO3: Learn about boundary layer theory for a variety of constraints and understand the basics of a turbulent flow.

CO4: Explain the basics of compressible flow and apply for dimensional analysis for practical prototyping.

CO – PO/PSO Mapping:

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	2	2	1	1	-	-	1	-	-	-	-	-	3	2	-
CO2	3	3	2	2	-	-	1	-	-	-	-	1	2	3	-
CO3	3	2	1	2	-	-	1	-	-	-	-	1	3	2	-
CO4	2	2	1	1	-	-	1	-	-	-	-	1	1	3	-
Avg	2.5	1.75	1.25	1.5	-	-	1	-	-	-	-	0.75	2.25	2.75	-

COURSE NAME: ENGINEERING MECHANICS
COURSE CODE: ME 304
Course Outcomes:

CO1: To understand representation of force, moments for drawing free-body diagrams and analyze friction-based systems in static condition

CO2: To locate the centroid of an area and calculate the moment of inertia of a section.

CO3: Apply of conservation of momentum & energy principle for particle dynamics and rigid body kinetics

CO4: Understand and apply the concept of virtual work, rigid body dynamics and systems under vibration.

CO – PO/PSO Mapping:

CO	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3
CO1	3	3	2	2	-	-	-	-	-	-	-	-	1	-	-
CO2	3	3	2	2	-	-	-	-	-	-	-	-	2	1	-
CO3	3	2	3	2	-	-	-	-	-	-	-	-	2	1	-
CO4	3	3	3	3	-	-	-	-	-	-	-	-	1	2	-
Avg	3	2.75	2.5	1.75	-	-	-	-	-	-	-	-	1.5	1	-

COURSE NAME: DATA STRUCTURE
COURSE CODE: ME 305

Course outcomes:

CO1: For a given algorithm student will able to analyze the algorithms to determine the time and computation complexity and justify the correctness.

CO2: For a given Search problem (Linear Search and Binary Search) student will able to implement it.

CO3: For a given problem of Stacks, Queues and linked list student will able to implement it and analyze the same to determine the time and computation complexity.

CO4: Students will able to write algorithms and practice programming in C++.

CO – PO/PSO Mapping:

COs	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3
CO1	2	1	1	-	-	-	-	-	-	1	1	1	-	-	-
CO2	1	1	-	-	-	-	-	-	-	1	1	2	-	1	-
CO3	1	1	-	-	-	-	-	-	-	1	1	1	2	-	2
CO4	2	1	1	2	-	-	-	-	-	1	2	1	2	1	-
Avg	1.5	1	0.5	0.5	-	-	-	-	-	1	1.25	1.25	1	0.5	0.5

COURSE NAME: PHYSICS-II LAB
COURSE CODE: PH (ME) 391

Course Outcome: At the end of the course students' will be able to
CO1: demonstrate experiments allied to their theoretical concepts
CO2: conduct experiments using semiconductors, dielectric and ferroelectrics, ultrasounds
CO3: classify various types of magnetic materials
CO4: participate as an individual, and as a member or leader in groups in laboratory sessions actively and analyze experimental data from graphical representations, and to communicate effectively them in Laboratory reports including innovative experiments

CO-PO/PSO Mapping:

CO	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3
CO1	2	-	-	-	-	-	-	-	-	-	-	-	-	-	-
CO2	2	2		-	-	-	-	-	-	-	-	-	-	-	-
CO3	-	-	2	-	-	-	-	-	-	-	-	-	2	-	-
CO4	-	-	-	-	-	-	-	-	-	-	-	-	2	-	-
Avg	1	0.5	0.5	-	-	-	-	-	-	-	-	-	1	-	-

COURSE NAME: MACHINE DRAWING
COURSE CODE: ME 391
Course Outcomes:
CO1: Gain knowledge about the isometric views of a given three-dimensional object/part.
CO2: Understand and draw the orthogonal projection of a solid body and assemble drawing using part drawings.
CO3: Learn and practice 3D modeling of machine parts using AutoCAD / SOLIDWORKS / CATIA
CO4: Draft the shape and structure of different types of screws, keys and Couplings

CO-PO Mapping:

COs	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3
CO1	1	2	2	-	-	-	-	-	-	-	-	-	2	-	1
CO2	1	2	2	-	-	-	-	-	-	-	-	-	1	-	-
CO3	1	3	2	-	-	-	-	-	-	-	-	-	1	-	1
CO4	2	2	1	-	-	-	-	-	-	-	-	-	1	-	1
Avg	1.25	2.25	1.75	-	-	-	-	-	-	-	-	-	1.25	-	0.75

COURSE NAME: MANUFACTURING PROCESS LAB
COURSE CODE: ME392
Course Outcomes:

CO1: Fabricate basic parts and assemblies using machine shop equipment
CO2: Ascertain product and process quality levels through the use of precision measurement tools and statistical quality control charts.
CO3: Practice basic welding and forming techniques and modern improvements for sophisticated metal works.

CO – PO/PSO Mapping:

COs	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3
CO1	1	1	2	-	-	-	1	-	1	-	1	-	1	-	2
CO2	1	3	3	2	-	-	1	-	1	-	1	-	2	-	3
CO3	1	2	3	2	-	-	2	-	2	-	2	-	2	-	3
CO4	1	3	3	2	-	-	1	-	1	-	1	-	2	-	3
Avg	1	2.25	2.75	1.5	-	-	1.25	-	1.25	-	1.25	-	1.75	-	2.75

Detailed Curriculum & Syllabus

2nd Year 2nd Semester

COURSE NAME: GENDER, CULTURE AND DEVELOPMENT
COURSE CODE: HSMC402

Course Outcomes: On successful completion of the learning sessions of the course, the learner will be able to:
CO1: Provide an analysis of the location of women in the processes of economic development; to understand what economic development is, the scales or levels at which it occurs, and the centrality of gender at every level.
CO2: Examine theoretical and conceptual frameworks for that analysis.
CO3: Reflect upon linkages between the global economy and the gendered macro and micro process of development and transitions from ‘government’ to ‘governance.’
CO4: Explain the usefulness of a rights-based approach to gender justice and Provide basis for research, practical action and policy formulation and or evaluating for evaluating directions and strategies for social change from a gender perspective.

CO-PO/PSO Mapping:

CO	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3
CO1	3	2	1	-	2	1	-	-	-	2	3	3	1	-	2
CO2	3	2	-	1	3	2	-	1	2	-	3	3	2	-	1
CO3	3	2	2	-	2	3	1	-	2	1	3	3	3	1	-
CO4	3	1	-	2	-	-	-	2	-	3	3	3	2	-	2
Avg	3	1.75	0.75	0.75	1.75	1.5	0.25	0.75	1	1.5	3	3	2	0.25	1.25

COURSE NAME: MATHEMATICS- III
COURSE CODE: M401

Course Outcomes (COs):
On successful completion of the learning sessions of the course, the learner will be able to:

CODES	BLOOM'S TAXONOMY	DESCRIPTIONS
CO1	Remembering	Recall the underlying principle and properties of Fourier series, Fourier transform, probability distribution of a random variable, calculus of complex variable, and partial differential equation.
CO2	Understanding	Exemplify the variables, functions, probability distribution and differential equations and find their distinctive measures using the underlying concept of Fourier series, Fourier transform, probability distribution of a random variable, calculus of complex variable, and partial differential equation.
CO3	Applying	Apply Cauchy's integral theorem and the residue theorem to find the value of complex integration, and compute the probability of real-world uncertain phenomena by identifying probability distribution that fits the phenomena.
CO4	Applying and Analyzing	Solve partial differential equations using the method of separation of variables and Find the Fourier series and Fourier transform of functions by organizing understandings of underlying principles and also evaluate the integral using Parseval's identity.

CO-PO/PSO Mapping:

PO / CO	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3
CO1	3	1	1	1	-	-	-	-	-	-	-	1	1	-	-
CO2	3	2	1	2	-	-	-	-	-	-	-	1	2	-	-
CO3	3	2	2	2	-	-	-	-	-	-	-	1	3	-	-
CO4	3	2	2	2	-	-	-	-	-	-	-	1	2	-	-
Avg	3	1.75	1.5	1.75	-	-	-	-	-	-	-	1	2	-	-

COURSE NAME: MATERIALS ENGINEERING
COURSE CODE:ME401

Course Outcomes:

CO1: Identify crystal structures for various materials and understand the defects in such structures
CO2: Analyze the effect of heat treatment of mechanical properties of a material
CO3: Understand how to tailor material properties of ferrous and non-ferrous alloys
CO4: Learn about advanced materials useful in modern industrial application.

CO – PO/PSO Mapping:

COs	PO 2	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3
CO1	2	2	2	2	1	-	-	-	-	-	-	1	-	3	2
CO2	2	2	3	2	1	-	-	-	-	-	-	2	-	3	2
CO3	3	3	3	2	1	-	-	-	-	-	-	2	-	2	2
CO4	2	1	3	2	1	-	-	-	-	-	-	2	-	2	2
Avg	2.25	2	2.75	2	1	-	-	-	-	-	-	1.75	-	2.5	2

Course Name: Fluid Machinery
Course Code: ME402

Course Outcomes: At the end of the course the students will be able to
1. Discuss the characteristics of centrifugal pump and reciprocating pumps
2. Calculate forces and work done by a jet on fixed or moving plate and curved plates
3. Analyze the working of turbines and select the type of turbine for an application.
4. Evaluate hydraulic machines and select the suitable one for a specific application

CO – PO/PSO Mapping:

COs	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3
CO1	3	2	3	1	-	1	3	-	2	-	-	-	2	3	-
CO2	3	3	2	2	-	1	1	-	1	-	-	-	2	2	-
CO3	2	2	2	2	-	1	2	-	3	-	-	-	2	3	-
CO4	2	3	2	-	1	1	1	-	1	-	-	-	2	2	-
Avg	2.5	2.5	2.25	1.25	0.25	1	1.75	-	1.75	-	-	-	2	2.5	-

COURSE NAME: STRENGTH OF MATERIALS
COURSE CODE: ME 403

Course Outcomes:

CO1: Recognize various types loads applied on machine components of simple geometry and understand the nature of internal stresses that will develop within the components
CO2: Evaluate the strains and deformation in materials that will result due to the elastic stresses developed within the materials for simple types of loading.
CO3: Quantify mechanical integrity and failure in materials
CO4: Analyze application of materials with respect to their strength and weakness.

CO – PO/PSO Mapping:

CO	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3
CO1	3	2	2	2	2	-	-	-	-		-	2	2	-	-
CO2	3	2	2	2	2	-	-	-	-		-	2	-	-	-
CO3	2	3	3	-	3	-	-	-	-		-	2	2	-	-
CO4	2	2	3	2	2	-	-	-	-		-	2	2	-	-
Avg	2.5	2.5	2.5	2	2.25	-	-	-	-		-	2	2	-	-

COURSE NAME: APPLIED THERMODYNAMICS
COURSE CODE:ME404
Course Outcomes:
CO1: Get a good understanding of various practical power cycles and heat pump cycles.
CO2: Analyze energy conversion in various thermal devices such as combustors, air coolers, nozzles, diffusers.
CO3: Understand phenomena occurring in high-speed compressible flows and study the functioning and application of compressors.
CO4: Learn the concepts, types and working principles and define their different types of efficiencies

CO – PO/PSO Mapping:

COs	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3
CO1	3	2	2	2	-	-	2	-	-	-	-	2	3	-	-
CO2	2	2	2	3	-	-	2	-	-	-	-	2	2	-	-
CO3	3	3	2	3	-	-	2	-	-	-	-	2	2	-	-
CO4	2	3	2	2	-	-	2	-	-	-	-	2	2	-	-
Avg	2.5	2.5	2	2.5	-	-	2	-	-	-	-	2	1.75	-	-

SUBJECT NAME: NUMERICAL METHODS LAB
CODE: M(ME)491

Course Outcomes (COs):
On successful completion of the learning sessions of the course, the learner will be able to:

CODES	BLOOM'S TAXONOMY	DESCRIPTIONS
CO1	Understand	Understand the theoretical workings of numerical techniques with the help of C/Matlab
CO2	Apply	Execute basic command and scripts in a mathematical programming language
CO3	Apply	Apply the programming skills to solve the problems using multiple numerical approaches.
CO4	Analyze	Analyze if the results are reasonable, and then interpret and clearly communicate the results.

CO-PO/PSO Mapping:

PO CO	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3
CO1	-	2	3	-	-	-	-	-	-	-	-	2	2	-	2
CO2	-	2	2	-	-	-	-	-	-	-	-	2	3	-	2
CO3	-	2	2	-	-	-	-	-	-	-	-	2	2	-	2
CO4	-	3	2	-	-	-	-	-	-	-	-	2	2	-	3
Avg	-	2.25	2.25	-	-	-	-	-	-	-	-	2	2.25	-	2.25

COURSE NAME: MATERIALS TESTING LABORATORY
COURSE CODE: ME 491

Course Outcomes:

1. Acquire experimentation skills in the field of material testing.
2. Apply the knowledge to analyse a material failure and determine the failure inducing agent/s.
3. Apply the knowledge of testing methods in related areas.
4. Understand how to improve structure/behavior of materials for various industrial applications.

CO – PO/PSO Mapping:

COs	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3
CO1	3	2	2	-	-	-	-	-	-	-	-	2	3	2	2
CO2	2	2	2	-	-	-	-	-	-	-	-	2	2	2	2
CO3	2	3	2	-	-	-	2	-	-	-	-	2	2	2	2
CO4	3	3	3	-	-	-	2	-	-	-	-	2	2	2	2
Avg	2.5	2.5	2.25	-	-	-	2	-	-	-	-	2	2.25	2	2

COURSE NAME: MANUFACTURING PROCESS LAB
COURSE CODE: ME492
Course Outcomes:

CO1: Learn about patterns and casting of metals
CO2: Practice forming techniques and modern improvements for sophisticated metal works.
CO3: Apply the knowledge of welding technology and they can perform arc and gas welding to join the material.
CO3: Appreciate the role of powder metallurgy component in various field

CO-PO/PSO Mapping

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3
CO1	3	2	3	2	-	-	2	-	-	-	-	-	2	-	-
CO2	2	2	2	2	-	-	-	-	2	-	-	-	2	-	2
CO3	2	2	3	2	-	-	2	-	-	-	2	-	2	-	2
CO4	2	2	2	2	-	-	-	-	2	-	2	-	2	-	

COURSE NAME: ENVIRONMENTAL SCIENCE
COURSE CODE:MC401
Course Outcomes
CO1: Able to understand the natural environment and its relationships with human activities.
CO2: To apply the fundamental knowledge of science and engineering to assess environmental and health risk.
CO3: To develop guidelines and procedures for health and safety issues obeying the environmental laws and regulations.
CO4: Acquire skills for scientific problem-solving related to air, water, noise & land pollution.

CO – PO/PSO Mapping:

COs	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3
CO1	2	2	3	-	-	-	3	3	-	2	-	-	-	1	-
CO2	3	3	2	-	-	-	3	3	-	3	-	-	-	-	-
CO3	3	3	3	-	-	-	3	3	-	3	-	-	-	1	-
CO4	2	2	2	-	-	-	3	3	-	2	-	-	-	-	-
Avg	2.5	2.5	2.5	-	-	-	3	3	-	2.5	-	-	-	0.5	

3rd Year 1st Semester

COURSE NAME: UNIVERSAL HUMAN VALUES 2: UNDERSTANDING HARMONY
COURSE CODE: HSMC 503

Course Outcomes: On successful completion of the course, the learner will be able to
CO1: Develop holistic perspective based on self-exploration about themselves (human being), family, society and nature/existence.
CO2: Cultivate the harmony in the human being, family, society and nature/existenc.
CO3: Strengthen self-reflection.
CO4: Build commitment and courage to act.

CO-PO/PSO Mapping:

CO	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3
CO1	3	2	1	-	2	1	-	-	-	2	3	3	1	-	2
CO2	3	2	-	1	3	2	-	1	2	-	3	3	2	-	1
CO3	3	2	2	-	2	3	1	-	2	1	3	3	3	1	-
CO4	3	1	-	2	-	-	-	2	-	3	3	3	2	-	2
Avg	3	1.75	**.75**	0.75	**1.75**	**1.5**	**0.25**	0.75	**1**	1.5	3	3	2	**0.25**	1.25

COURSE NAME: HEAT TRANSFER
COURSE CODE: ME 501

Course Outcomes:
CO1: Understand the basic laws & constraints of heat transfer to analyze problems involving steady state or transient heat conduction in simple geometries.
CO2: Survey the analytical solutions of free and forced convection problems to apply in modern research sectors of heat and mass transfer.
CO3: Evaluate the radiation heat transfer between black body and gray body surfaces and obtain numerical solutions of combined mode heat transfer problems in practice.
CO4: Analyze the effectiveness of several type of heat exchanger and develop skills for industrial design solutions regarding boiling and condensation.

CO – PO/PSO Mapping:

COs	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3
CO1	3	3	2	3	-	-	-	-	-	-	-	1	3	2	-
CO2	3	3	2	3	-	-	-	-	-	-	-	2	3	2	-
CO3	2	2	2	2	-	-	-	-	-	-	-	1	3	2	-
CO4	3	2	2	3	-	-	-	-	-	-	-	2	3	2	-
Avg	2.75	2.5	2	2.75	-	-	-	-	-	-	-	1.5	3	2	-

COURSE NAME: MANUFACTURING TECHNOLOGY
COURSE CODE: ME 502

Course Outcomes: After successful completion of this course, the learner will be able to:
CO1: Understand the cutting tool geometry, mechanism and mechanics of machining, cutting temperature and application of cutting fluids, tool life and tool materials.
CO2: Understand the basic operations and kinematic structure of machine tools needed for manufacturing.
CO3: Judge the surface texture, flatness, roughness, dimensions, etc. of a given specimen and products with the help of knowledge of metrology for checking the quality of manufactured products.
CO4: Explore and use the knowledge of the assembly of different components in practical projects.

CO – PO/PSO Mapping:

COs	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3
CO1	3	3	3	2			2	-	2		-		3		2
CO2	3	2	2	2			2	-	2		-		2		2
CO3	3	3	2	2			2	-	2		-		3		2
CO4	3	2	-	-			-	-	3		2		3		2

COURSENAME: INTERNAL COMBUSTION ENGINE AND HYBRID VEHICLES
COURSE CODE: ME 503
CONTACT: 3:0:0
TOTAL CONTACT HOURS:36
CREDITS:3

Prerequisite: Applied Thermodynamics, Fluid mechanics

Course Outcomes:

CO1: Get the knowledge of engine nomenclature, performance parameters and characteristics of different fuels to differentiate several types of I C engine designs.

CO2: Understand several losses in an engine Understand several losses in an engine to predict performance and fuel economy trends with good accuracy,

CO3: Identify modern injection systems, cooling & lubrication systems and supercharging to optimize the thermal efficiency and emission standards.

CO4: Explore new generation hybrid engines and basics of electric vehicles to acquire modern industry standards.

CO – PO/PSO Mapping:

COs	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3
CO1	3	2	2	2	-	-	2	-	-	-	-	2	2	3	-
CO2	2	2	3	2	-	-	2	-	-	-	-	2	2	2	-
CO3	3	3	3	3	-	-	2	-	-	-	-	3	2	2	-
CO4	2	2	2	2	-	-	3	-	-	-	-	3	2	3	-
	2.5	2.25	2.5	2.25	-	-	2.25	-	-	-	-	2.5	2	2.5	-

COURSE NAME: KINEMATICS & DYNAMICS OF MACHINES
CODE: ME 504
CONTACT: 3:0:0
TOTAL CONTACT HOURS:36
CREDITS:3
Prerequisite: Physics

Course Outcomes:

CO1: Understand the kinematics and rigid- body dynamics of kinematically driven machine components

CO2: Understand the motion of linked mechanisms in terms of the displacement, velocity and acceleration at any point in a rigid link

CO3: Design and analyse cam and gear based mechanisms to generate specified output motion

CO4: Explore the mechanism of bearings and understand vibration-based systems

CO – PO/PSO Mapping:

COs	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3
CO1	3	3	2	2	-	-	-	-	-	-	-	-	3	2	2
CO2	3	2	3	3	-	-	-	-	-	-	-	-	2	3	2
CO3	2	2	2	-	-	-	-	-	-	-	-	-	2	2	2
CO4	3	3	2	-	-	-	-	-	-	-	-	-	3	2	2
Avrg	2.75	2.5	2.25	2.5	-	-	-	-	-	-	-	-	2.5	2.25	2

COURSE NAME: REFRIGERATION & AIR CONDITIONING
COURSE CODE: PEC(ME)501A
CONTACT: 3:0:0
TOTAL CONTACT HOURS:36
CREDITS:3

Prerequisite: Applied Thermodynamics

Course Outcomes:

CO1: Explain different types of Refrigeration cycles and its applications in multi compressor and multi evaporator systems.

CO2: Evaluate the selection and design of different components of Refrigeration systems

CO3: Interpret the knowledge of psychometric processes and air conditioning systems.

CO4: Design the air-conditioning system for a given conditions including refrigerating equipment as well as ducting systems.

CO – PO/PSO Mapping:

COs	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3
CO1	3	3	2	2	-	-	2	-	-	-	2	-	-	-	-
CO2	2	1	2	2	-	-	3	-	-	-	2	2	2	-	-
CO3	2	2	2	-	-	-	2	-	-	-	2	-	2	-	-
CO4	3	2	3	-	-	-	2	-	-	-	2	2	2	-	-
	2.25	2	2.25	2	-	-	2.25	-	-	-	2	2	2	-	-

COURSE NAME: COMPOSITE MATERIALS
COURSE CODE: PEC(ME)501B
CONTACT: 3:0:0
TOTAL CONTACT HOURS:36
CREDITS:3
Prerequisite: Engineering Materials

Course Outcomes:

CO1: Know the structure and basic properties of composite and nano-composite materials.
CO2: Explore and understand the several methods of composite fabrication.
CO3: Predict the characteristics and performance of composite materials.
CO4: Apply varying composite materials in automotive, aerospace and other applications.

CO – PO/PSO Mapping:

COs	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3
CO1	3	2	2	1	-	-	-	-	-	1	-	-	2	-	2
CO2	2	-	1	2	1	-	-	1	-	1	2	1	2	-	2
CO3	2	2	2	1	1	1	-	-	-	1	1	1	2	-	2
CO4	2	1	2	2	1	1	-	1	-	1	2	3	2	-	2

COURSE NAME: FINITE ELEMENT ANALYSIS
COURSE CODE: PEC(ME)501C
CONTACT: 3:0:0
TOTAL CONTACT HOURS:36
CREDIT: 3
PREREQUISITE: MATHEMATICS III

Course Outcomes:
CO1: Understand the fundamental theory of the FEA method.
CO2: Develop the ability to generate the governing FE equations for systems governed by partial differential equations.
CO3: Apply the basic finite element methods for structural applications using truss, beam, frame, and plane elements.
CO4: Analyze the FE method and compare the results with FEA package like ANSYS.

CO – PO/PSO Mapping:

CO	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3
CO1	2	-	2	2	3	-	-	1	-	-	-	3	3	-	-
CO2	2	3	-	3	2	-	-	1	-	-	-	2	3	-	-
CO3	3	3	-	2	2	-	-	1	-	-	-	2	3	-	-
CO4	-	-	-	1	2	-	-	1	-	-	-	2	3	-	2

COURSE NAME: HEAT TRANSFER LAB
COURSE CODE: ME591
CONTACT: 0: 0: 3
CREDITS:1.5

Course Outcomes:

CO1: Evaluate the problems involving steady state conduction in simple geometries.
CO2: Determine the convective heat transfer for free and forced convection related problems.
CO3: Differentiate radiation capabilities of black and grey surfaces by practical observation
CO4: Analyze the effectiveness of heat exchanger and develop skills for industrial design solutions.

CO – PO/PSO Mapping:

COs	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3
CO1	2	3	3	2	-	-	2	-	-	-	-	2	2	-	-
CO2	2	2	3	2	-	-	2	-	-	-	-	2	2	2	-
CO3	2	3	3	2	-	-	2	-	-	-	-	2	2	2	-
CO4	2	2	3	2	-	-	2	-	-	-	-	2	2	2	-
Avrg.	2	2.5	3	2	-	-	2	-	-	-	-	2	2	2	-

COURSENAME: MANUFACTURING TECHNOLOGY LAB
COURSE CODE:ME592
CONTACTS: 0: 0: 3
CREDITS:1.5
Prerequisite: Manufacturing Technology

Course Outcomes:

CO1: Demonstrate operation such as Turning, Facing, Threading, gear cutting on Centre Lathe and milling.
CO2: Analyze the cutting forces during metal cutting.
CO3: Understand principle of engineering metrology, measurement standards and instruments
CO4: Perform the job of an inspector and help the industries to produce quality products.

CO – PO/PSO Mapping:

COs	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3
CO1	2	2	3	2	-	-	2	-	1	-	3	-	2	-	2
CO2	3	3	2	2	-	-	2	-	-	-	3	-	2	-	2
CO3	3	2	2	2	-	-	2	-	-	-	3	-	2	-	2
CO4	3	3	2	2	-	-	2	-	1	-	3	-	2	-	2
Avrg.	2.75	2.5	2.25	2	-	-		-		-	3	-	2	-	2

COURSE NAME: THERMAL ENGINEERING LAB
COURSE CODE: ME 593
CONTACTS: 0: 0: 3
CREDITS: 1.5

Prerequisite: Applied Thermodynamics, Internal Combustion Engine

Course Outcomes:

CO1: Understand the practical operation of 2 stroke and 4 stroke I.C engines using valve timing diagram

CO2: Analyze the performance of multi cylinder engines with the variation of various performances like load and speed.

CO3: Determine the quality of Engine fuels by analyzing its calorific value.

CO4: Analyze the constituents of combustion products for emission characteristics related to public safety.

CO – PO/PSO Mapping:

CO	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3
CO1	2	-	2	-	-	-	-	-	2	1	3	2	2	2	-
CO2	2	-	3	2	-	1	-	-	3	1	3	2	2	2	-
CO3	-	-	2	-	-	2	2	-	3	1	3	3	2	2	-
CO4	-	3	2	-	-	2	3	2	3	1	3	3	2	2	-

COURSE NAME: REFRIGERATION & AIR CONDITIONING LAB
COURSE CODE: PEC(ME)591A
CONTACTS: 0: 0: 3
CREDITS: 1.5

Prerequisite: Applied Thermodynamics, Refrigeration & Air Conditioning.

Course Outcomes: On successful completion of the course, the learner will be able to,

CO1. Demonstrate a domestic refrigerator and identify its important components.

CO 2. Analyze the performance parameters of a vapor compression-based refrigeration system

CO 3. Observe the components of a basic air conditioning setup and operate it to analyze its performance index.

CO 4. Recognize the components of a thermoelectric refrigeration setup and measure its coefficient of performance useful in future project applications.

CO – PO/PSO Mapping:

COs	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3
CO1	3	2	3	2	-	-	3	-	-	-	3	2	2	2	-
CO2	3	2	3	3	-	-	-	-	-	-	3	3	3	2	-
CO3	3	2	3	2	-	-	2	-	-	-	3	2	2	2	-
CO4	2	2	3	3	-	-	2	-	-	-	3	3	3	2	-
	2.75	2	3	2.5	-	-	2.33	-	-	-	3	2.5	2.5	2	-

.

COURSE NAME: COMPOSITE MATERIALS LAB
COURSE CODE: PEC-ME591B
CONTACTS: 0: 0: 3
CREDITS: 1.5

Prerequisite: Composite Materials Theory Course

Course Outcomes: Upon successful completion of this course, students will be able to
1) Learn to manufacture Fiber reinforced Polymer Composites.
2) Measure mechanical Properties of Fiber reinforced Polymer Composites
3) Fiber reinforced Polymer Composites
4) Analyze the FE method and compare result with FEA package like-ANSYS.

CO – PO/PSO Mapping:

CO	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3
CO1	2	-	2	2	-	-	-	1	1	2	3	1	3-	-	2
CO2	2	3	-	3	2	-	-	1	1	2	3	1	2	-	3
CO3	3	3	2	2	2	-	-	1	1	2	3	3	2	-	2
CO4	-	-	3	1	3	-	-	1	1	2	3	3	2	-	3

COURSE NAME: FINITE ELEMENT ANALYSIS LAB
COURSE CODE: PEC-ME591C
CONTACTS: 0: 0: 3
CREDITS: 1.5
Prerequisite: Mathematics I & II
Course Outcomes: Upon successful completion of this course, students will be able to

1) Understand the fundamental theory of the FEA.
2) Generate the governing FE equations for systems governed by partial differential equations.
3) Use the finite element methods for structural applications using truss, beam frame, and plane elements.
4) Analyze the FE method and compare result with FEA package like-ANSYS.

CO – PO/PSO Mapping:

CO	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3
CO1	2	-	2	2	-	-	-	1	1	2	3	1	2	-	-
CO2	2	3	-	3	2	-	-	1	2	2	3	1	2	2	-
CO3	3	3	2	2	2	-	-	1	1	2	3	3	-	3	-
CO4	-	-	3	1	3	-	-	1	2	2	3	3	2	-	2

COURSE NAME: INTELLECTUAL PROPERTY RIGHT
COURSE CODE: MC 501
CONTACTS: 2L:0T:0P
TOTAL CONTACT HOURS: 24
CREDIT: 0

Prerequisite*:* None

Course Outcomes: On successful completion of the course, the learner will be able to:
CO1: Explain fundamental aspects of Intellectual property Rights to students
CO2: To disseminate knowledge on patents, patent regime in India and abroad and registration aspects
CO3: To disseminate knowledge on copyrights and its related rights and registration aspects
CO4: To disseminate knowledge on trademarks and registration aspects
CO5: To disseminate knowledge on Design, Geographical Indication (GI), Plant Variety and Layout Design Protection and their registration aspects
CO6: To aware about current trends in IPR and Govt. steps in fostering IPR

CO-PO Mapping:

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	-	1	2	3	-	-	2	-	2	3	3	1	2	3
CO2	3	1	-	1	-	-	1	-	1	-	3	3	-	1	-
CO3	3	-	1	2	3	-	-	2	-	2	3	3	1	2	3
CO4	3	1	-	1	-	-	1	-	1	-	3	3	-	1	-
CO5	3	-	2	-	2	3	-	-	-	2	3	3	2	-	2
CO6	3	2	-	1	-	-	-	2	2	-	3	3	-	1	-

3rd Year 2nd Semester

Sl.	Category	Course Code	Course Title	Hours per week				Credits
				L	**T**	**P**	**Total**	
A. THEORY								
1	HSMC	HSMC 604	Economics for Engineers	2	0	0	2	2
2	PC	ME 601	Design of Machine Elements	3	0	0	3	3
3	PC	ME 602	Power Plant Engineering	3	0	0	3	3
4	PE	PEC-ME601	Professional Elective-II A. Robotics B. Computational Fluid Dynamics C. Fluid Power control	3	0	0	3	3
5	PE	PEC-ME602	Professional Elective-III A. Materials Handling B. Computer Aided Design C. Nuclear Power Generation & Supply	3	0	0	3	3
6	OE	OEC-ME 601	Open Elective-I A. Mechatronics Systems B. Data Base Management System C. Electrical Machines	3	0	0	3	3
B. PRACTICAL								
7	PC	ME 691	Design Lab	0	0	3	3	1.5
8	PE	PEC-ME691	Professional Elective-II Lab A. Robotics Lab B. Computational Fluid Dynamics Lab C. Fluid Power control Lab	0	0	3	3	1.5
9	OE	OEC-ME 691	Open Elective-I Lab A. Mechatronics Systems Lab B. Data Base Management System Lab C. Electrical Machines Lab	0	0	3	3	1.5
10	PROJECT	PR 691	Minor Project II	0	0	3	2	1
11	PROJECT	PR 692	Skill Development VI: Soft Skill & Aptitude-III	1	0	0	1	0.5
C. MANDATORY ACTIVITIES / COURSES								
12	MC	MC 601	Constitution of India	3	0	0	3	0
	TOTAL CREDIT WITHOUT MOOCS COURSES							**23.0**
D.MOOCS COURSES**								
13	MOOCS COURSES	HM601	MOOCS COURSE-IV	3	1	0	4	4
TOTAL CREDIT WITH MOOCS COURSES								**27.0**

*After successful completion of MC601 a student will acquire 3Units of mandatory course knowledge as mandated by AICTE.

** MOOCS COURSES for HONOURS/MINOR Degree are Program specific and to be taken from MOOCS BASKET

COURSE NAME: ECONOMICS FOR ENGINEERS
COURSE CODE: HSMC 604
CONTACT: 2:0:0
TOTAL CONTACT HOURS: 24
CREDITS: 2
Pre-requisites: MATH – College Algebra, Pre-Calculus Algebra and Trigonometry.

Course Outcome(s):
CO1: Apply the appropriate engineering economics analysis method(s) for problem solving: present worth, annual cost, rate-of-return, payback, break-even, benefit-cost ratio.
CO2: Evaluate the cost effectiveness of individual engineering projects using the methods learned and draw inferences for the investment decisions.
CO3: Compare the life cycle cost of multiple projects using the methods learned, and make a quantitative decision between alternate facilities and/or systems.
CO4: Evaluate the profit of a firm, carry out the break even analysis and employ this tool to make production decision.
CO5: Discuss and solve advanced economic engineering analysis problems including taxation and inflation.

CO-PO MAPPING:

COs	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3
CO1	-	-	-	-	-	-	-	-	-	2	1	1	-	-	1
CO2	-	-	-	3	-	-	-	-	-	-	-	-	-	-	1
CO3	-	-	-	-	-	-	-	-	3	-	-	-	-	-	1
CO4	-	-	-	-	-	-	-	-	-	-	2	2	-	-	1

COURSE NAME: DESIGN OF MACHINE ELEMENTS
COURSE CODE: ME 601
CONTACT: 3:0:0
TOTAL CONTACT HOURS: 36
CREDITS: 3
PREREQUISITE: Rigid body Mechanics, Strength of Materials, Theory of Machine
Course Outcomes:
C01: Understand the use of codes, standards for designing.
CO1: Able to prevent failure under static and fluctuating load.
C03: Able to analyze the different kind of stresses, which generates due to the loading in different mechanical element.
CO2: Able to design different mechanical elements
CO – PO/PSO Mapping:

COs	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3
CO1	2	3	3	2	2	-	-	-	-	-	3	3	2	3	2
CO2	2	2	2	2	-	-	-	-	-	-	2	2	2	2	2
CO3	2	2	3	2	2	-	-	-	-	-	2	3	2	3	2
CO4	2	2	2	2	2	-	-	-	-	-	2	2	2	2	2
Avrg.	2	2.25	2.5	2	2						2.25	2.5	2	2.5	2

COURSE NAME: POWER PLANT ENGINEERING
COURSE CODE: ME 602
CONTACT: 3:0:0
TOTAL CONTACT HOURS: 36
CREDITS:3
Prerequisite: Applied Thermodynamics

Course Outcomes:
CO1: Explore minute details of all components of coal-based power plant including steam generation, fuel and ash handling equipment.
CO2: Understand the principle of steam and gas-based turbines to analyze their performance for a variety of design conditions.
CO3: Describe brief functionalities of Nuclear, Hydel and other renewable energy-based power plants.
CO4: Evaluate plant performance with the knowledge of plant economics.

CO– PO Mapping:

CO	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3
CO1	3	3	2	-	-	3	2	-	-	-	-	-	2	2	-
CO2	2	2	3	-	-	2	2	-	-	-	-	-	3	2	-
CO3	2	2	2	-	-	2	2	-	-	-	-	-	2	2	-
CO4	3	3	3	-	-	3	2	-	-	-	-	-	3	2	-
Avrg.	2.5	2.5	2.5	-	-	2.5	2	-	-	-	-	-	2.5	2	-

COURSE NAME: ROBOTICS
COURSE CODE: PEC(ME)601A
CONTACT: 3:0:0
TOTAL CONTACT HOURS:36
CREDITS:3
Prerequisite: Basic Electronics, mechanism, manufacturing technology.

Course Outcomes: Upon successful completion of this course, students will be able to
CO1: Understand the various robot structures and their workspace.
CO2: Learn about robot kinematics.
CO3: Analyze the different control drives in robot operation system.
CO4: Apply programming for controlling the robotic operation.

CO – PO/PSO Mapping:

COs	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3
CO1	3	2	2	1	-	-	-	-	1	1	-	2	2	1	2
CO2	2	1	1	2	1	-	-	1	-	1	2	3	2	2	3
CO3	2	2	2	1	1	1	-	-	-	-	1	3	2	1	2
CO4	2	1	2	2	1	1	-	1	-	-	2	3	2	2	3

COURSE NAME: COMPUTATIONAL FLUID DYNAMICS
COURSE CODE: PEC-ME601B
CONTACT: 3:0:0
TOTAL CONTACT HOURS: 36
CREDITS: 3
Prerequisite: Fluid mechanics, Thermodynamics, Heat Transfer

Course Objectives:

1. To introduce Governing Equations of viscous fluid flows
2. To introduce numerical modeling and its role in the field of fluid flow and heat transfer
3. To enable the students to understand the various discretization methods, solution procedures and turbulence modeling.
4. To create confidence to solve complex problems in the field of fluid flow and heat transfer by using high speed computers.

Course Outcomes:

CO1. To create numerical modeling and its role in the field of fluid flow
CO2. To use the various discretization methods, solution procedures and
CO3. To solve turbulence modeling flow and heat transfer problems.

CO – PO/PSO Mapping:

COs	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3
CO1	3	2	2	2	1	-	-	1	2	1	1	**2**	2	1	2
CO2	3	2	3	1	1	-	1	2	-	1	-	**3**	2	2	3
CO3	3	3	3	3	1	1	-	1	-	1	-	**2**	2	1	2
CO4	3	2	2	2	1	-	-	1	2	1	1	**3**	2	2	3

COURSE NAME : FLUID POWER CONTROL
COURSE CODE : PEC-ME601C
CONTACT: 3:0:0
TOTAL CONTACTHOURS:36
CREDITS:3

Prerequisite: Fluid Mechanics, Basic Electronics
Course Outcomes:
CO1: Understand the working principle of hydraulic and pneumatic systems.
CO2: Analyze the performance of pumps and actuators used in control devices.
CO3: Apply hydraulic valves in different industrial application.
CO4: Design and evaluate fluid powered control circuits and express through proper drawing.

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CO – PO/PSO Mapping:

COs	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3
CO1	3	2	2	1	-	-	-	-	-	1	1	-	-	1	-
CO2	2	-	1	2	1	-	-	1	-	1	2	1	2	2	1
CO3	2	2	2	1	1	1	-	-	-	1	1	1	-	1	1
CO4	2	1	2	2	1	1	-	1	-	1	2	3	2	2	-

COURSE NAME MATERIALS HANDLING
COURSE CODE: PEC-ME602A
CONTACT: 3:0:0
TOTAL CONTACT HOURS:36
CREDITS:3
Prerequisite: Manufacturing Technology, Kinematics & Dynamics of Machines.

Course Outcomes:
CO1: Understand the importance of material handling and plant layout.
CO2: Study the design procedures of various material handling equipment & component.
CO3: Analyze the variety of load & selection of material handling system based on application through general analysis procedure.
CO4: Apply the fundamentals of load lifting, automation and auxiliary equipment in material handling with proper design consideration.

CO – PO/PSO Mapping:

COs	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3
CO1	3	1	3	1	1	-	2	2	2	-	1	1	1	-	2
CO2	3	2	1	-	-	1	-	1	-	-	1	2	2	-	1
CO3	3	2	3	2	1	2	1	1	-	-	1	2	1	-	1
CO4	3	1	3	2	1	2	1	1	1	-	1	3	2	-	2

COURSE NAME: COMPUTER AIDED DESIGN
COURSE CODE: PEC-ME602B
CONTACT HOUR: 3:0:0
CREDITS: 3
TOTAL LECTURES: 36L
Prerequisite: Engineering Drawing, Mathematics

Course Outcome: At the end of the course, the student shall be able to:
PEC602B.1. Apply geometric transformations and projection methods in CAD.
PEC602B.2. Develop geometric models to represent curves.
PEC602B.3. Develop surface models for engineering design.
PEC602B.4. Model engineering components using solid modelling techniques for design.

CO– PO Mapping:

COs	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3
CO1	3	1	3	1	2	-	2	2	2	1	1	2	1	-	2
CO2	3	2	1	-	2	1	-	1	-	1	1	2	2	-	2
CO3	3	2	3	2	3	2	1	1	-	1	1	2	1	-	2
CO4	3	1	3	2	3	2	1	1	1	1	1	3	2	-	2

COURSE NAME: NUCLEAR POWER GENERATION AND SUPPLY
COURSE CODE: PEC-ME602C
CONTACT: 3:0:0
CONTACT HOURS: 36
CREDIT: 3
Prerequisite: Physics, Chemistry, Heat Transfer, Power plant Engineering.

Course Outcomes:
1. Detailed knowledge of nuclear reactor types and associated systems
2. Analyze variety of nuclear power plants based on fission and fusion.
3. Evaluate the safety assessments and waste management.
4. Design and simulate equivalent conditions for practical problem solving.

CO – PO/PSO Mapping:

COs	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3
CO1	3	2	2	1	-	2	2	-	-	1	1	3	1	-	2
CO2	2	1	1	2	-	2	2	-	-	1	1	2	2	-	1
CO3	2	2	3	1	-	3	3	-	-	1	1	3	1	-	1
CO4	1	1	1	1	-	3	3	-	-	1	1	3	2	-	2

COURSE NAME: MECHATRONIC SYSTEMS
COURSE CODE: OEC-ME601A
CONTACT: 3:0:0
TOTAL CONTACT HOURS: 36L
CREDIT: 3
Prerequisite: Fluid Mechanics, Basic Electronics

Course Outcomes
CO1: Describe Mechatronics systems and have an overview of the types of actuators.
CO2: Distinguish between various sensors, transducers, actuators and their applications.
CO3: Understand the basic concept of microprocessor.
CO4: Interpret various signal conditioning units, amplifiers, logic gates and their role in Programmable logic controllers.

CO-PO MAPPING:

COs	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3
CO1	2	-	-	-	1	-	-	-	-	-	-	1	1	1	2
CO2	3	1	2	-	2	-	1	-	-	-	1	2	2	1	1
CO3	2	-	1	-	2	-	-	-	-	-	-	2	3	2	2
CO4	3	2	2	-	3	-	1	-	-	-	3	2	3	2	1

COURSE NAME: DATABASE MANAGEMENT SYSTEM
COURSE CODE: OEC-ME601B
CONTACT: 3:0:0
TOTAL CONTACT HOURS: 36
CREDITS: 3

Prerequisites:
1. Logic of programming language
2. Basic concepts of data structure and algorithms

Course Outcomes:
CO1. Apply geometric transformations and projection methods in CAD.
CO2. Develop geometric models to represent curves.
CO3. Develop surface models for engineering design.
CO4. Model engineering components using solid modelling techniques for design.

CO-PO MAPPING:

COs	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3
CO1	2	-	-	-	3	-	-	-	-	-	3	3	1	1	2
CO2	-	3	3	3	3	-	3	3	-	-	3	3	2	1	1
CO3	3	-	-	-	-	2	2	2	3	3	3	3	3	2	2
CO4	3	3	2	2	2	-	-	2	2	2	-	3	3	2	1

Course Name	**Electrical Machine**
Course Code	**OEC-ME601C**
Course Credit	**3:0:0**
Contact Hours	**36 L**
Credit: 3	
Pre-requisite	Basic Electrical Engineering

Course Outcome

CO1: Formulate and then analyze the working of any electrical machine under loaded and unloaded conditions.

CO2: Understand and explain the principle of operation and performance of DC machine, Three Phase Induction Motor, Synchronous Machine and Fractional kW Motors.

CO3: Analyze the response of DC machine, Three Phase Induction Motor, Synchronous Machine and Fractional kW Motors.

CO4: Troubleshoot the operation of DC machine, Three Phase Induction Motor, Synchronous Machine and Fractional kW Motors.

CO5: Analyze given require specification of electrical machine and select a suitable measuring instrument for a given application.

CO – PO/PSO Mapping:

COs	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3
CO1	2	-	1	1	-	-	-	-	-	1	-	-	1	1	2
CO2	2	2	2	2	-	-	-	-	-	1	-	1	2	1	1
CO3	2	2	1	2	-	-	-	-	-	1	-	1	3	2	2
CO4	2	-	1	1	-	-	-	-	-	-	-	1	3	2	1

COURSE NAME: DESIGN LAB
COURSE CODE: ME-691
CONTACTS: 3P
CREDITS: 2
Prerequisite: Theory of machines, Dynamics of Machine Theory, Strength of Material, Design of Machine element.

Course Outcomes: After taking this course the students should be able to:

1. Identify different mechanical elements and the uses of those elements.
2. Analyze existing mechanical elements under static as well as dynamic loading.
3. Determine the endurance limit of rotating beam specimen, stress concentration factors by FEA
4. Design a mechanical element by using standards, codes

Course Articulation Matrix:

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

COURSE NAME: ROBOTICS LAB
COURSE CODE: PEC-ME691A
CONTACTS: 0: 0: 3
CREDITS:1.5
Prerequisite: Basic of robotics and electronics

Course Outcomes:
CO1: Describe the configuration of a robotic system from its motion.
CO2: Analyze the control of robotic systems with the help of programs.
CO3: Apply different operation in robot.
CO4: Evaluate different application in industry.

CO – PO/PSO Mapping:

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

COURSE NAME: COMPUTATIONAL FLUID DYNAMICS LAB
COURSE CODE: PEC-ME691B
CONTACT: 3:0:0
TOTAL CONTACT HOURS:36
CREDITS: 3
Prerequisite: Fluid mechanics, Thermodynamics, Heat Transfer

Course Outcomes:
CO1. To create numerical modeling and its role in the field of fluid flow
CO2. To use the various discretization methods, solution procedures and
CO3. To solve turbulence modeling flow and heat transfer problems.

CO – PO/PSO Mapping:

COs	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3
CO1	**3**	**2**	**2**	**2**	**1**	-	-	-	-	**2**	**2**	**3**	1	1	2
CO2	**3**	**2**	**3**	**1**	**1**	-	-	-	-	**1**	**3**	**3**	2	1	1
CO3	**3**	**3**	**3**	**3**	**1**	-	-	-	-	**2**	**2**	**2**	3	2	2

COURSE NAME: FLUID POWER CONTROL LAB
COURSE CODE: PEC-ME691C
CONTACTS: 0: 0: 3
CREDITS: 1.5
Prerequisite: Fluid Power Control
Course Outcomes:
CO1: Demonstrate the devices such as pumps, compressor, valves, actuators and sensors etc.
CO2: Differentiate hydraulic and pneumatic circuits.
CO3: Apply fluid control valves in different industrial application.
CO4: Design and evaluate fluid powered control circuits and express through proper drawing.

CO – PO/PSO Mapping:

CO Codes	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3
CO1	3	1	2	-	2	-	-	-	-	-	-	-	1	1	2
CO2	2	-	1	-	1	-	-	1	-	1	2	1	2	1	1
CO3	2	1	3	-	1	1	-	-	-	-	1	1	3	2	2
CO4	2	1	2	-	1	-	-	1	-	-	2	3	2	1	2

COURSE NAME: MECHATRONICS LAB
COURSE CODE: OEC-ME691A
CONTACTS: 0: 0: 3
CREDITS:2
Prerequisite: Fluid Mechanics, Basic Electronics, Mechatronics Theory

Course Outcomes:
CO1: Describe and demonstrate Mechatronics systems and overview of control systems & actuators.
CO2: Distinguish between various sensors, transducers and actuators and their applications.
CO3: To understand the basic concept of microprocessor and perform simple operations on it.
CO4: Identify various signal conditioning units, amplifiers, logic gates and their role in programmable logic controllers

List of Experiments
1. Open loop position control;
2. Closed loop position control using positional and velocity feedback;
3. Use of analog and digital servosystems,
4. Use of PID control;
5. Experiments on pneumatic drives and actuators;
6. Experiments on hydraulic drives and actuators;
7. Use of logic gates;
8. Programming on a 8085 Microprocessor training kit.
9. Programming on a PLC for simple control operations.

CO PO Mapping

CO Codes	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3
CO1	1	-	2	-	1	-	-	-	2	1	2	-	-	-	-
CO2	1	-	2	-	1	-	-	-	-	1	3	1	2	-	1
CO3	1	-	2	-	2	-	-	-	-	1	2	-	-	-	-
CO4	2	-	3	-	1	-	-	-	-	1	3	-	1	-	1

COURSE NAME: DATABASE MANAGEMENT SYSTEM LAB
COURSE CODE: OEC-ME691B
CONTACT: 3P/WEEK
CREDITS: 1.5
Prerequisite:
1. Logic of programming language
2. Basic concepts of data structure and algorithms

Course Outcome(s): On completion of the course students will be able to
CO1: Understand the database management system and database language
CO2: Understand and apply the SQL queries related to management of data and transaction processing.
CO3: Explain about query processing techniques involved in query optimization
CO4: Understand PL/SQL programming, the concept of Cursor Management, Error Handling, Package and Triggers
CO5: Design and build the commercial database systems.

CO PO Mapping

CO Codes	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3
CO1	3	3	3	3	1	2	-	-	2	1	2	-	-	-	-
CO2	3	3	3	3	1	1	-	-	-	1	3	1	2	-	1
CO3	3	3	2	2	2	2	-	-	-	1	2	-	-	-	-
CO4	3	3	3	3	1	1	-	-	-	1	3	-	1	-	1
CO5	3	3	3	3	3	2	1	1	1						

COURSE NAME: ELECTRICAL MACHINES LAB
COURSE CODE: OEC-ME691C
CONTACT HOUR: 3 HR./WEEK
SEMESTER: 3
Prerequisite: Electrical Machines Theory

Course Outcome: On completion of the course students will be able to
1. Formulate and then analyze the working of any electrical machine under loaded and unloaded conditions.
2. Analyze the response of DC machine, Three Phase Induction Motor, Synchronous Machine and Fractional kW Motors.
3. Troubleshoot the operation of DC machine, Three Phase Induction Motor, Synchronous Machine and Fractional kW Motors.

CO PO Mapping

CO Codes	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3
CO1	2	-	1	1	-	-	-	-	-	1	3	3	-	1	-
CO2	2	2	2	2	-	-	-	-	-	1	2	2	2	-	1
CO3	2	2	1	2	-	-	-	-	-	1	3	2	1	1	2

COURSE NAME: CONSTITUTION OF INDIA
COURSE CODE: MC 501
CONTACTS: 2L:0T:0P
TOTAL CONTACT HOURS: 24
CREDIT: 0
PREREQUISITE: NONE

Course Outcomes:
CO1: Identify and explore the basic features and modalities of Indian constitution.
CO2: Differentiate and relate the functioning of Indian parliamentary system at the centre and state level.
CO3: Differentiate the various aspects of Indian Legal System and its related bodies.

CO-PO Mapping:

CO Codes	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3
CO1	3	-	2	2	-	2	-	3		1	3	3	2	3	
CO2	3	2		1	--	1	-	2	2	3	3	3	-	2	2
CO3	3	-	1		-	3	-	2		1	3	3	3	-	1

COURSE NAME: INDUSTRIAL MANAGEMENT
COURSE CODE: HSMC705
CONTACT HOUR: 2:0:0
TOTAL CONTACT HOUR- 24
CREDITS: 2

Prerequisites: NIL

Course outcome: On successful completion of the course learners will be able to
CO1: To recall and identify the relevance of management concepts.
CO2: To apply management techniques for meeting current and future management challenges faced by the organization
CO3: To compare the management theories and models critically to solve real-life problems in an organization.
CO4: To apply principles of management in order to execute the role as a manager in an organization.

CO – PO/PSO Mapping:

CO	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3
CO1	-	-	-	-	-	-	-	-	3	-	3	-	1	-	-
CO2	-	-	-	-	-	2	-	3	3	-	3	3	-	3	-
CO3	-	-	-	-	-	-	-	-	2	-	3	3	-	2	-
CO4	-	-	-	-	-	2	-	-	3	-	3	-	-	-	3

COURSE NAME: ADVANCED MANUFACTURING TECHNOLOGY
COURSE CODE: ME 701
CONTACT: 3:0:0
TOTAL CONTACT HOURS: 36
CREDIT: 3

Prerequisite: Manufacturing Process.

Course Outcomes: On successful completion of the course learners will be able to
CO1: Learn the basics of automation and its application in flexible manufacturing systems.
CO2: Understand the principle of CNC machines and learn their programming language.
CO3: Evaluate the process parameters involved in machining process and analyze their effect on surface finish achieved in various nonconventional processes.
CO4: Get an overview of rapid prototyping and use of 3D printing.

CO – PO/PSO Mapping:

CO	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3
CO1	3	-	2	-	2	-	3	-	-	-	1	2	2	-	-
CO2	3	2	2	-	2	-	2	-	-	-	2	2	-	3	-
CO3	2	1	1	-	2	-	2	-	-	-	1	1	-	-	3
CO4	2	2	2	-	3	-	2	-	-	-	2	2	-	2	3

COURSE NAME: AUTOMOBILE ENGINEERING
COURSE CODE: PEC702A
CONTACT: 3:0:0
TOTAL CONTACT HOURS: 36
CREDITS: 3

Course Outcomes: On successful completion of the course learners will be able to
CO1: Understand the basic layout of an automobile.
CO2: Explain the operation of engine cooling, lubrication, ignition, electrical and air conditioning systems.
CO3: Analyze the principles of transmission, suspension, steering and braking systems.
CO4: Study latest developments in automobiles.

CO – PO/PSO Mapping:

COs	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3
CO1	3	1	2	-	-	2	2	-	-	-	-	-	2	-	-
CO2	2	1	1	-	-	3	2	-	-	-	-	-	2	2	-
CO3	3	2	2	-	-	2	3	-	-	-	-	-	3	-	-
CO4	2	1	3	-	-	2	2	-	-	-	-	-	2	2	-

COURSE NAME: TRIBOLOGY
COURSE CODE: PEC-ME702B
CONTACT: 3:0:0
TOTAL CONTACT HOURS: 36
CREDIT: 3

Prerequisites: Machine Design

Course Outcomes: On successful completion of the course, the learner will be able to
CO1: Become familiar with mathematical tools used to analyze Tribological processes.
CO2: Have awareness of Tribological issues in the design of machine components, such as rolling element bearings, journal bearings, thrust bearings, seals, and braking systems.
CO3: Become familiar with common anti-friction and anti-wear components.
CO4: Design a Tribological system for optimal performance.

CO – PO/PSO Mapping:

CO	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3
CO1	3	2	2	1	-	-	-	-	-	1	-	1	-	2	-
CO2	2	1	1	1	-	-	-	-	-	1	-	2	3	-	-
CO3	3	2	1	2	-	-	-	-	-	1	-	1	-	2	-
CO4	2	1	2	1	-	-	-	-	-	1	-	2	-	2	3

COURSE NAME: MAINTENANCE ENGINEERING
COURSE CODE: PEC-ME702C
CONTACT: 3:0:0
TOTAL CONTACT HOURS: 36
CREDIT: 3

Prerequisite: Strength of Material, Machine Design, Measurement and Instrumentation

Course Outcomes: On successful completion of the course learners will be able to
CO1: Get basic knowledge about types and procedure of maintenance, instruments and tools.
CO2: Understand organizational and economic structure of maintenance.
CO3: Evaluate of performance of tools associated with maintenance and lubrication.
CO4: Design maintenance tools for various applications like bearings, drives, pumps, piping etc.

CO – PO/PSO Mapping:

CO	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3
CO1	3	-	1	-	-	3	-	-	-	--	1	-	-	2	3
CO2	2	-	1	-	-	2	-	-	-	-	2	-	-	3	-
CO3	1	-	2	-	-	1	-	-	-	-	1	-	-	3	3
CO4	1	-	3	-	-	1	-	-	-	-	2	-	-	3	3

COURSE NAME: TURBOMACHINERY
COURSE CODE: PEC-ME702D
CONTACT: 3:0:0
TOTAL CONTACT HOURS: 36
Credit: 3

Prerequisite: Fluid Mechanics and Fluid machinery

Course Outcomes: Upon successful completion of this course, students will be able to
CO1: Get Basic knowledge about rotary machines, nozzle, diffuser etc.
CO2: Understand about the calculation of efficiency, power etc. of steam turbines and hydraulic turbine.
CO3: Evaluate of efficiency, power required etc. of pumps and compressor
CO4: Design of various incompressible and compressible flow machines.

CO – PO/PSO Mapping:

CO	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3
CO1	3	-	-	-	-	2	1	-	-	-	1	3	2		
CO2	3	2	-	-	-	-	-	-	1	-	1	3		2	
CO3	3	2	-	-	-	-	-	-	2	-	1	3		1	3
CO4	3	3	3	3	1	2	1	-	1	-	2	3	2		2

COURSE NAME: 3D PRINTING AND DESIGN
COURSE CODE: OEC-ME701A
CONTACT: 3:0:0
TOTAL CONTACT HOURS: 36
CREDITS: 3

Prerequisite: Computer Aided Design & Drafting, Engineering Materials

Course Outcomes: On successful completion of the course, the learner will be able to
CO1: Develop CAD models for 3D printing and Import and Export CAD data.
CO2: Select a specific material for the given application.
CO3: Select a 3D printing process for an application.
CO4: Apply in product manufaturing using 3D Printing or Additive Manufacturing (AM).

CO – PO/PSO Mapping:

COs	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3
CO1	2	2	3	-	3	-	-	-	-	1	2	2	1	-	3
CO2	2	2	3	-	3	-	-	-	-	1	2	3	2	2	2
CO3	2	2	3	-	3	2	2	-	-	1	2	2	2	-	3
CO4	3	2	3	2	3	-	2	-	-	1	2	3	3	-	2

COURSE NAME: INTERNET OF THINGS
COURSE CODE: OEC-ME701B
CONTACT: 3:0:0
TOTAL CONTACT HOURS: 36L
CREDIT: 3

Prerequisites: Fundamental knowledge in computer networking and wireless sensor network.

Course Outcome:
CO1: To understand the concepts of Internet of Things.
CO2: To analyse basic protocols in wireless sensor network.
CO3: To design IoT applications in different domain and be able to analyse their performance.
CO4: To implement basic IoT applications on embedded platform.

CO-PO MAPPING:

COs	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3
CO 1	2	-	-	-	3	-	-	-	-	-	1	2	-	2	-
CO 2	2	3	3	3	3	-	3	3	-	-	1	2	3	-	-
CO 3	1	-	-	-	-	2	2	2	3	3	1	2	-	-	2
CO 4	1	3	2	2	2	-	-	2	2	2	-	2	-	3	-

COURSE NAME: BIOMECHANICS & BIOMATERIALS
COURSE CODE: OEC-ME701C
CONTACT: 3:0:0
CONTACT HOURS: 36
CREDIT: 3
Prerequisite: Engineering Mechanics, Materials engineering
Course Outcomes: On successful completion of the course, the learner will be able to
CO1: Understand the fundamentals of biomechanics and its relation with human motion.
CO2: Apply a broad knowledge of different types of biomaterials including metals, polymers, ceramics and composites and their use in typical biomedical devices and clinical applications.
CO3: Design an implant using fundamental concept and modern engineering tools to develop hard tissue and soft tissue replacement materials by suitable material selection.
CO4: Analyze the design of various biocompatible implants and artificial organ to develop and improve Health Care Service to serve mankind and society.

CO – PO/PSO Mapping:

CO	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3
CO1	3	1	1	-	-	-	-	-	-	-	-	2	-	3	-
CO2	2	2	1	1	-	-	-	-	1	-	-	3	-	-	3
CO3	1	2	2	1	2	-	-	-	2	-	-	3	3	-	-
CO4	1	3	3	2	1	2	1	-	1	-	2	3	-	2	3

COURSE NAME: MICROPROCESSOR IN AUTOMATION
COURSE CODE: OEC-ME701D
CONTACT: 3:0:0
CONTACT HOURS: 36
CREDITS: 3

Prerequisite: knowledge of digital electronics, knowledge of 8085 microprocessor

Course Outcomes: On successful completion of the course, the learner will be able to
CO1: Use data transfer techniques, describe architecture and operation of microcontroller 8051.
CO2: Develop assembly language programs using instruction set of 8051.
CO3: Design and develop microcontroller-based systems.
CO4: Explain various applications of microcontrollers.

CO – PO/PSO Mapping:

COs	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3
CO1	3	1	2	1	-	-	-	-	-	-	1	1	-	-	3
CO2	2	1	1	-	-	1	-	1	-	-	1	1	2	-	-
CO3	3	2	2	-	2	2	1	1	-	-	1	1	-	3	-
CO4	2	1	3	1	1	2	1	1	-	-	2	3	-	2	-

COURSE NAME: ELECTRIC VEHICLES
COURSE CODE: OEC-ME702A
CONTACT: 3:0:0
CONTACT HOURS: 36
CREDITS: 3

Prerequisite: Knowledge of digital electronics, knowledge of 8085 microprocessor

Course Outcomes: On successful completion of the course, the learner will be able to:
CO1: Design and develop environment friendly electric Vehicle
CO2: Introduce application of smart grid and electric vehicle for conversion, control and automation
CO3: Understand controlling strategies of electrical vehicles.
CO4: Design and model electric vehicle systems and analyze the energy management strategies.

CO – PO/PSO Mapping:

COs	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3
CO1	3	2	2	-	3	2	3	1	-	-	1	2	2	3	-
CO2	2	1	2	-	3	2	3	1	-	-	1	2	-	-	2
CO3	3	2	2	-	3	2	3	1	-	-	1	2	2	-	2
CO4	2	1	3	-	3	3	3	1	-	-	1	3	-	2	-

COURSE NAME: INDUSTRIAL INSTRUMENTATION
COURSE CODE: OEC-ME702B
CONTACT: 3:0:0
CONTACT HOURS: 36
CREDIT: 3
Prerequisite: Metrology and control system

Course Outcomes: Upon successful completion of this course, students will be able to
CO1: Obtain knowledge about different instruments used to measure pressure, temperature, flow, level of liquids and data acquisition etc.
CO2: Elucidate the construction and working of various industrial devices used to measure pressure, sound and flow
CO3: Explicate the construction and working of various industrial devices used to measure temperature, level, vibration, viscosity and humidity
CO4: Ability to analyze, formulate and select suitable sensor for the given industrial applications

CO – PO/PSO Mapping:

COs	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3
CO1	1	2	-	2	1	-	2	2	-	2	-	-	2	-	3
CO2	2	1	2	-	-	1	2	1	1	1	-	-	-	3	-
CO3	3	2	-	2	1	-	2	2	-	1	-	-	3	-	-
CO4	3	-	2	-	-	2	-	3	-	2	-	-	-	2	-

COURSE NAME: OPERATIONS RESEARCH
COURSE CODE: OEC-ME702C
CONTACT: 3:0:0
CONTACT HOURS: 36
CREDIT: 3
Prerequisite: Mathematics, LPP

Course Outcomes: On successful completion of the course, the learner will be able to

CODE	DESCRIPTION
CO1	Understand the characteristics of different types of decision-making environments to formulate and solve a real-world problem as a mathematical programming model.
CO2	Understand the theoretical workings of appropriate decision making approaches and tools to identify the optimal strategy in competitive world.
CO3	Solve network models like the shortest path, minimum spanning tree, and maximum flow problems
CO4	Create Model of a dynamic system as a queuing model and compute important performance measures.

CO-PO MAPPING:

POs COs	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO1	PSO2	PSO3
CO1	3	1	2	-	3	2	3	1	-	-	-	2	2	-	3
CO2	3	1	2	-	3	2	3	1	-	-	-	2	-	2	-
CO3	1	2	-	-	3	2	3	1	-	-	-	2	-	3	-
CO4	1	2	2	-	3	3	3	1	-	-	-	2	-	-	3

COURSE NAME: CYBER SECURITY
COURSE CODE: OEC-ME702D
CONTACT: 3:0:0
TOTAL CONTACT HOURS: 36
CREDITS: 3

Prerequisite:

1. Familiarity in computer Networking.
2. Basic concepts about network security.

Course Outcome(s): On successful completion of the course, the learner will be able to

CO1 To understand the importance of professional practice, Law and Ethics in their personal lives and professional careers.

CO2 To acquire in depth knowledge of information technology act, security policies, and legal framework of right to privacy, data security and data protection

CO3 To develop the understanding of relationship between commerce and cyberspace

CO4 To be familiar with network security threats and countermeasures

CO PO Mapping

CO	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3
CO1	3	3	-	3	-	-	2	-	-	3	-	3	-	-	-
CO2	-	3	-	2	-	3	-	-	-	-	-	2	-	-	2
CO3	-	-	-	2	-	-	-	-	-	-	-	-	-	-	-
CO4	3	2	-	-	2	-	-	-	-	-	-	-	-	-	2

COURSE NAME: ADVANCED MANUFACTURING LAB
COURSE CODE: PC 791
CONTACT: 0:0:3
CREDIT: 1.5

Prerequisite: Advanced Manufacturing

Course Outcomes: After successful completion of the course, the student would be able to
CO1: Program a CNC turning or milling machine for preparing a job.
CO2: Evaluate the process parameters involved in CNC machining
CO3: Analyze the principles of Robot programming and carryout hands-on practice
CO4: Study any nonconventional machining process and 3D printing.

CO – PO Mapping

CO	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3
CO1	3	-	2	-	2	-	3	-	-	-	2	2	-	-	3
CO2	3	2	2	-	2	-	2	-	-	-	2	2	3	-	-
CO3	2	1	1	-	2	-	2	-	-	-	3	1	-	-	3
CO4	2	2	2	-	3	-	2	-	-	-	3	2	-	2	-

COURSE NAME: 3D PRINTING AND DESIGN LAB
COURSE CODE: OEC-ME791A
CONTACT: 0:0:3
CREDIT: 1.5
Prerequisite: 3D Printing Theory

Course Outcomes: On successful completion of the course, the learner will be able to
CO1: Develop CAD models for 3D printing and Import and Export CAD data.
CO2: Explore a 3D Printer and Setup a specific material for the given application.
CO3: 3D Print a product and measure its mechanical properties
CO4: Analyze defects and compare with conventional products

CO – PO/PSO Mapping:

COs	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3
CO1	2	2	3	-	3	-	-	-	-	1	2	2	1	-	3
CO2	2	2	3	-	3	-	-	-	-	1	2	3	2	2	2
CO3	2	2	3	-	3	2	2	-	-	1	2	2	2	-	3
CO4	3	2	3	2	3	-	2	-	-	1	2	3	3	-	2

COURSE NAME: INTERNET OF THINGS (IOT) LAB
COURSE CODE: OEC-ME791B
WEEKLY CONTACT HOURS: 0:0:3
CREDIT: 1.5
Prerequisite: INTERNET OF THINGS

Course Outcomes: After completion of the course student will be able to
CO1. Use microcontroller based embedded platforms in IOT
CO2. Use microprocessor based embedded platforms in IOT
CO3. Use wireless peripherals for exchange of data.
CO4. Use of Devices, Gateways and Data Management in IoT.

CO-PO MAPPING:

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

COURSE NAME: BIOMECHANICS AND BIOMATERIALS LAB
COURSE CODE: OEC-ME791C
WEEKLY CONTACT HOURS: 0:0:3
CREDIT: 1.5

Prerequisite: BIOMECHANICS AND BIOMATERIALS Theory

Course Outcomes: After completion of the course student will be able to
CO1. Understand the fundamentals of biomechanics and its relation with human motion.
CO2. Apply a broad knowledge of different types of biomaterials including metals, polymers, ceramics and composites and their use in typical biomedical devices and clinical applications.
CO3. Design an implant using fundamental concept and modern engineering tools to develop hard tissue and soft tissue replacement materials by suitable material selection.
CO4. Analyze the design of various biocompatible implants and artificial organ to develop and improve Health Care Service to serve mankind and society.

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CO – PO/PSO Mapping:

CO	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3
CO1	3	1	1	-	2	-	-	-	-	1	3	2	-	1	-
CO2	2	2	1	1	3	-	-	-	1	1	3	3	2	-	3
CO3	1	2	2	1	2	-	-	-	2	2	3	3	3	-	2
CO4	1	3	3	2	2	2	1	-	1	2	3	3	-	2	3

COURSE NAME: SENSOR LAB
COURSE CODE: OEC-ME701D
CONTACT: 3:0:0
CONTACT HOURS: 36
CREDITS: 3

Prerequisite: knowledge of digital electronics, knowledge of 8085 microprocessor

Course Outcomes: On successful completion of the course, the learner will be able to
CO1: Use data transfer techniques, describe architecture and operation of microcontroller 8051.
CO2: Develop assembly language programs using instruction set of 8051.
CO3: Design and develop microcontroller-based systems.
CO4: Explain various applications of microcontrollers.

CO – PO/PSO Mapping:

COs	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3
CO1	3	1	2	1	-	-	-	-	-	-	1	1	-	-	3
CO2	2	1	1	-	-	1	-	1	-	-	1	1	2	-	-
CO3	3	2	2	-	2	2	1	1	-	-	1	1	-	3	-
CO4	2	1	3	1	1	2	1	1	-	-	2	3	-	2	-

COURSE NAME: ENTREPRENEURSHIP & INNOVATION SKILL
COURSE CODE: MC701
CONTACTS: 2:0:0
TOTAL CONTACT HOURS: 24
CREDIT: 0

Prerequisite: None

Course Outcomes: After the completion of the course, the students will be able to
CO1: Comprehend the role of bounded rationality, framing, causation and effectuation in entrepreneurial decision making.
CO2: Demonstrate an ability to design a business model canvas.
CO3: Evaluate the various sources of raising finance for startup ventures.
CO4: Explain the fundamentals of developing and presenting business pitching to potential investors.

CO-PO Mapping:

CO	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3
CO1	3	-	1	2	3	-	-	2	-	2	3	3	1	2	3
CO2	3	1	-	1	-	-	1	-	1	-	3	3	-	1	2
CO3	3	-	2	-	2	3	-	-	-	2	3	3	2	1	2
CO4	3	2	-	1	-	-	-	2	2	-	3	3	-	1	2

COURSE NAME : RENEWABLE ENERGY SYSTEMS
COURSE CODE : PEC-ME801A
CONTACT 3:0:0
TOTAL CONTACT HOURS : 36
CREDITS : 3

Prerequisite: Thermodynamics, Power Plant Engineering

Course Outcomes: On successful completion of the course, the learner will be able to
1.Create awareness among students about renewable sources of energy and application of renewable technologies in different areas of country.
2. Understand the working principle of various renewable energy technologies and systems like solar, wind, tidal and geothermal resources.
3. Explain the knowledge of Storage technologies from renewable energy sources.
4. Recognize the need and application of alternative biofuels in the field of power production.

CO – PO/PSO Mapping:

CO	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3
CO1	2	2	2	2	-	2	3	-	-	-	-	3	1	1	1
CO2	2	-	2	-	-	2	3	-	-	-	-	2	2	1	1
CO3	2	-	1	-	-	2	3	-	-	-	-	2	1	1	2
CO4	-	-	-	-	-	2	3	-	-	-	-	3	2	1	2

COURSE NAME: MICRO AND NANO MANUFACTURING
COURSE CODE: PEC801B
CONTACT: 3:0:0
CREDITS: 3
TOTAL LECTURES: 36L
Prerequisite: Traditional and Advanced Micromachining Processes

Course Outcome: On successful completion of the course, the learner will be able to
CO1. Understand different techniques for the synthesis and characterization of nanomaterials.
CO2. Design and analyze methods and tools for micro and nano-manufacturing.
CO3. Select micro and nano-manufacturing methods and identify key variables to improve quality of MEMS.
CO4. Choose appropriate industrially viable process, equipment and tools for a specific product.

CO – PO/PSO Mapping:

CO Codes	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3
CO1	-	-	2	-	-	-	-	-	-	1	-	1	2	-	2
CO2	2	-	3	2	-	-	-	-	-	1	-	2	2	2	3
CO3	2	-	3	2	2	-	-	-	-	1	-	2	1	-	2
CO4	3	-	2	2	2	-	-	-	-	1	-	2	2	2	3

COURSE NAME: GAS DYNAMICS & JET PROPULSION
COURSE CODE: PEC801C
CONTACT: 3:0:0
CONTACT HOURS: 36
CREDITS: 3

Prerequisite: Fluid Mechanics, Thermodynamics.

Course Outcomes: On successful completion of the course, the learner will be able to
CO1. Understand the basics of compressible flow.
CO2. Analyze compressible flow characteristics in constant and variable area ducts.
CO3. Apply the knowledge of shock theories in complex engineering situations.
CO4. Evaluate jet and rocket propulsion techniques applicable in aerospace industries.

CO – PO/PSO Mapping:

CO	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3
CO1	3	2	2	2	2	2	3	1	1	1	1	3	2	3	1
CO2	2	1	2	1	2	2	3	1	1	1	1	2	1	2	2
CO3	2	1	1	1	2	2	3	1	1	1	1	2	1	2	3
CO4	1	1	1	1	3	2	3	1	2	1	2	3	1	2	3

COURSE NAME: DESIGN OF TRANSMISSION SYSTEMS
COURSE CODE: PEC-ME801D
CONTACT: 3:0:0
TOTAL CONTACT HOURS: 36
CREDITS: 3
Prerequisite: Rigid body Mechanics, Strength of Materials, Theory of Machine, Design of machine elements

Course Outcomes: On successful completion of the course, the learner will be able to
CO1: Learn the concepts of design to belts, chains and rope drives.
CO2: Understand the concepts of design to spur, helical gears, worm, bevel gears
CO3: Apply the concepts of design to gear boxes
CO4: Design cams, brakes and clutches.

CO – PO/PSO Mapping:

CO	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3
CO1	1	-	2	-	2	-	-	-	1	1	2	1	2	2	1
CO2	2	3	1	2	-	-	-	-	-	1	3	2	1	3	1
CO3	1	3	3	2	-	-	1	-	-	1	2	2	2	2	2
CO4	2	3	3	3	2	1	-	1	-	1	2	3	1	2	3

COURSE NAME: ENERGY CONSERVATION & MANAGEMENT
COURSE CODE: OEC-ME801A
TOTAL LECTURES: 36L
CREDIT: 3
CONTACT HOUR/WEEK (L:T:P) : 3:0:0

Prerequisite: Engineering Thermodynamics, Power Plant Engineering

Course Outcomes: On successful completion of the course, the learner will be able to

CO 1: Obtain knowledge about energy conservation policy, regulations and business practices

CO 2: Design to improve the thermal efficiency by designing suitable systems for heat recovery and co-generation

CO 3: Analyze the energy audit methods learnt to identify the areas deserving tighter control to save energy expenditure

CO 4: Evaluate the cost- benefit analysis of various investment alternatives for meeting the energy needs of the organization

CO-PO Mapping

CO	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3
CO1	3	2	-	2	1		2	3	-	2	1	2	2	2	1
CO2	3	2	2	-		1	2	1	1	1	1	2	1	3	1
CO3	2	3	-	2	1		2	2	1	1	1	2	2	2	2
CO4	3	1	2	-		2		3	-	2	1	2	1	2	3

COURSE NAME: ARTIFICIAL INTELLIGENCE
COURSE CODE: OEC-ME801B
CONTACT HOURS: 36L
CREDIT: 3
Prerequisite: Probability, Matrix operations, Basic programming
Course Outcomes: Upon successful completion of this course, students will be able to achieve:
1. advanced Data Analysis skills
2. Create AI/ML solutions for various business problems.
3. Build and deploy production grade AI/ML applications.
4. Apply AI/ML methods, techniques and tools immediate.

CO-PO Mapping

CO	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3
CO1	1	-	1	-	-	3	1	-	-	2	1	1	2	-	1
CO2	2	1	-	-	-	3	1	-	2	1	2	2	1	-	1
CO3	2	-	-	1	-	3	-	-	1	1	2	2	2	-	1
CO4	1	-	1	-	-	3	-	-	-	2	1	2	2	-	1

COURSE NAME: BLOCK CHAIN
COURSE CODE: OEC-ME801 C
CONTACT: 3:0:0
CONTACT HOURS:36
CREDITS:3
Prerequisite: Basic mathematics.
Course Outcomes:
CO1: To understand the blockchain system by sending and reading transactions.
CO2: To explain the design principles of cryptocurrency.
CO3: To design, build, and deploy a distributed application.
CO4: To evaluate security, privacy, and efficiency of a given blockchain system.

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CO – PO/PSO Mapping:

CO	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3
CO1	3	2	2	1	-	-	-	-	1	1	-	-	2	-	-
CO2	2	1	1	2	1	-	-	1	-	1	2	1	1	-	1
CO3	2	2	2	1	1	1	-	-	-	-	1	1	2	-	-
CO4	2	1	2	2	1	1	-	1	-	-	2	3	1	-	1

COURSE NAME: NANOTECHNOLOGY
COURSE CODE: OEC-ME801D
CONTACT: 3:0:0
CONTACT HOURS: 36
CREDIT: 3
Prerequisite: Material science

Course Outcomes: Upon successful completion of this course, students will be able to
CO 1: Identify 0D,1D,2D and 3D nanomaterials.
CO 2: Gain knowledge the optical and mechanical properties
CO 3: Interpret the magnetic and electrical properties.
CO 4: Illustrate the use of nanomaterials for different applications

CO – PO/PSO Mapping:

CO	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3
CO1	1	2	-	3	1	-	1	2	-	2	-	2	2	-	-
CO2	2	1	2	-	-	1	2	1	1	1	-	2	1	-	1
CO3	2	3	-	2	1	-	3	2	-	2	-	2	2	-	-
CO4	1	-	2	-	-	2	-	2	-	2	-	2	1	-	1

COURSE NAME: TOTAL QUALITY MANAGEMENT
COURSE CODE: OEC-ME802A
CONTACT: 3:0:0
TOTAL CONTACT HOURS: 36
CREDITS: 3
Prerequisite: The behavioural sciences, Supply Chain and Process analysis.

Course Outcomes:
CO1: Understand the concept of Quality
CO2: Operate the methodologies, methods, and tools of lean manufacturing system.
CO3: Identify requirements of quality improvement programs.
CO4: Organize for quality and development of quality culture through small group activities.
CO – PO/PSO Mapping:

CO	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3
CO1	3	3	3	3	2	2	3	3	3	3	3	1	2	-	-
CO2	3	3	3	3	3	2	1	1	1	1	3	2	1	-	1
CO3	3	3	3	1	1	2	1	3	3	3	3	1	2	-	-
CO4	3	3	3	2	3	3	3	2	2	3	3	1	1	-	1

COURSE NAME: SAFETY & OCCUPATIONAL HEALTH
COURSE CODE: OEC-ME802B
CONTACT HOURS: 36L
CREDIT: 3
Prerequisite: Strength of Material, Machine Design, Measurement and Instrumentation

Course Outcomes: Upon successful completion of this course, students will be able to achieve:
1. Primary knowledge of industrial and occupational safety and accident prevention
2. Understand occupational health and safety rules and regulations.
3. Analyze the safety management issues along with accident compensation acts.
4. Manage real life problems in the industries related to accident prevention and safety.

CO – PO/PSO Mapping:

CO	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3
CO1	1	-	1	-	-	3	2	-	-	-	1	1	2	-	-
CO2	2	-	-	-	-	3	2	-	-	-	2	2	1	-	1
CO3	2	-	-	-	-	3	2	-	-	-	2	2	2	-	-
CO4	1	-	1	-	-	3	2	-	-	-	1	2	1	-	1

COURSE NAME: INDUSTRIAL POLLUTION AND CONTROL
COURSE CODE: OEC-ME802C
CONTACT: 3:0:0
TOTAL CONTACT HOURS: 36
CREDITS: 3
Prerequisite: ENGINEERING CHEMISTRY

Course Outcomes: On successful completion of the course, the learner will be able to
CO1. Gain an understanding of strategies, legal requirements and appropriate mitigation and treatment technologies for industrial pollution control.
CO2. Promote the solution of open-ended, multi-disciplinary problems typically found in industrial settings.
CO3. Explain principles of physical/chemical/biological treatment processes
CO4. Apply such knowledge to perform engineering calculations for simple systems

CO – PO/PSO Mapping:

CO	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3
CO1	3	2	2	-	-	1	3	1	1	1	-	3	2	3	1
CO2	2	1	2	-	-	1	3	1	1	1	-	2	2	2	2
CO3	2	1	1	-	-	1	3	1	1	1	-	2	1	2	3
CO4	1	1	1	-	-	1	3	1	2	1	-	3	2	2	3

COURSE NAME: BIG DATA ANALYTICS
COURSE CODE: OEC-ME802D
CONTACT: 3:0:0
TOTAL CONTACT HOURS: 36
CREDITS: 3

Prerequisites: Data Structure, Design and Analysis of Algorithms, Database Management Systems, Statistics, Artificial Intelligence, Programming skills of Python.

Course Outcome(s): On successful completion of the course, the learner will be able to
CO1: Understand and explain the fundamental concepts of the Big Data Analytics which are primarily explored for making automated decisions using machine learning strategies on analyzing large scale structured as well as unstructured data distributed across multiple locations (Map Reduce, Hadoop and NoSQL Framework) underscoring the utilitarian importance in current technological context for further exploration leading towards lifelong learning.
CO2: Identify and formulate an engineering problem of analyzing large scale data distributed across multiple locations to make automated meaningful decisions within the scope of Big Data Analytics Frameworks.
CO3: Explore relevant literature and apply the concepts of Big Data Analytics to solve problems of making automated decisions dealing with large scale structured as well as unstructured data using Map Reduce, Hadoop and advanced SQL Frameworks.
CO4: Excogitate ideas for proposing solutions to the challenging problems of Big Data Analytics.
CO5: Implement ideas of Big Data Analytics through developing feasible algorithms or frameworks and investigate their effectiveness in solving the relevant problems by analyzing the performances using proper techniques.

CO–PO Mapping:

CO	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3
CO1	3	2	-	-	-	-	-	-	-	-	-	-	-	-	3
CO2	2	3	-	-	-	-	-	-	-	-	-	-	-	-	-
CO3	2	2	3	2	-	-	-	-	-	-	-	1	-	-	-
CO4	2	2	2	3	-	-	-	-	-	-	-	1	-	-	2
CO5	2	-	2	3	2	2	2	-	-	-	-	1	-	-	2

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