



SSM INSTITUTE OF ENGINEERING AND TECHNOLOGY

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Dindigul – Palani Highway, Dindigul 624 002

CRITERIA – 2 TEACHING - LEARNING AND EVALUATION

2.6 Students Performance and Learning Outcome

2.6.1 Programme Outcomes (POs) and Course Outcomes (COs) for all Programmes offered by the institution are stated and displayed on website		
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Principal

Dr.D.SENTHIL KUMARAN, M.E., Ph.D., (MUS)

Principal

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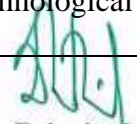
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PROGRAMME OUTCOMES (Pos)

PO	GRADUATE ATTRIBUTE
1	Engineering knowledge: Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.
2	Problem analysis: Identify, formulate, review research literature, and analyse complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.
3	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.
4	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
5	Modern tool usage: Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modelling to complex engineering activities with an understanding of the limitations.
6	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.
7	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.
8	Ethics: Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.
9	Individual and teamwork: Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.
10	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
11	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.
12	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.


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PROGRAMME SPECIFIC OUTCOMES (PSOs) (Mechanical Engineering)

On successful completion of the Mechanical Engineering Degree programme, the Graduates shall exhibit the following:

- 1. Research oriented:** Comprehend journal literature, do research on new mechanical engineering problems and publish the results through patents, journals, conferences and symposium.
- 2. Industry oriented:** Realize professional experience through industry-interaction activities, internships, and in-plant training.
- 3. Start-up & Entrepreneur oriented:** Recognize and implement new ideas on new product design and development with the help of modern engineering tools, while ensuring the best manufacturing practices.



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Department of Mechanical Engineering Anna University Regulations 2017 Batch - (2019-2023)

List of Course Names

S. No	Sem	Course Number	Course Code	Course Name
1	I	C101	HS8151	Communicative English
2	I	C102	MA8151	Engineering Mathematics - I
3	I	C103	PH8151	Engineering Physics
4	I	C104	CY8151	Engineering Chemistry
5	I	C105	GE8151	Problem Solving and Python Programming
6	I	C106	GE8152	Engineering Graphics
7	I	C107	GE8161	Problem Solving and Python Programming Laboratory
8	I	C108	BS8161	Physics and Chemistry Laboratory
9	II	C109	HS8251	Technical English
10	II	C110	MA8251	Engineering Mathematics - II
11	II	C111	PH8251	Materials Science
12	II	C112	BE8253	Basic Electrical, Electronics and Instrumentation Engineering
13	II	C113	GE8291	Environmental Science and Engineering
14	II	C114	GE8292	Engineering Mechanics
15	II	C115	GE8261	Engineering Practices Laboratory
16	II	C116	BE8261	Basic Electrical, Electronics and Instrumentation Engineering Laboratory
17	III	C201	MA8353	Transforms and Partial Differential Equations
18	III	C202	ME8391	Engineering Thermodynamics
19	III	C203	CE8394	Fluid Mechanics and Machinery
20	III	C204	ME8351	Manufacturing Technology - I
21	III	C205	EE8353	Electrical Drives and Controls
22	III	C206	ME8353	Manufacturing Technology Laboratory - I
23	III	C207	ME8381	Computer Aided Machine Drawing
24	III	C208	EE8361	Electrical Engineering Laboratory
25	III	C209	HS8381	Interpersonal Skills / Listening & Speaking
26	IV	C210	MA8452	Statistics and Numerical Methods
27	IV	C211	ME8492	Kinematics of Machinery
28	IV	C212	ME8451	Manufacturing Technology – II
29	IV	C213	ME8491	Engineering Metallurgy
30	IV	C214	CE8395	Strength of Materials for Mechanical Engineers



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31	IV	C215	ME8493	Thermal Engineering- I
32	IV	C216	ME8462	Manufacturing Technology Laboratory – II
33	IV	C217	CE8381	Strength of Materials and Fluid Mechanics and Machinery Laboratory
34	IV	C218	HS8461	Advanced Reading and Writing
35	V	C301	ME8595	Thermal Engineering- II
36	V	C302	ME8593	Design of Machine Elements
37	V	C303	ME8501	Metrology and Measurements
38	V	C304	ME8594	Dynamics of Machines
39	V	C305 (OE I-1)	OCE551	Air Pollution and Control Engineering
40	V	C305 (OE I-2)	OAT551	Automotive Systems
41	V	C305 (OE I-3)	OIC551	Biomedical Instrumentation
42	V	C305 (OE I-4)	OIT552	Cloud Computing
43	V	C305 (OE I-5)	OIT551	Database Management Systems
44	V	C305 (OE I-6)	OAI551	Environment and Agriculture
45	V	C305 (OE I-7)	OPT551	Fibre Reinforced Plastics
46	V	C305 (OE I-8)	OCE552	Geographic Information System
47	V	C305 (OE I-9)	OAT552	Internal Combustion Engines
48	V	C305 (OE I-10)	OML551	Introduction To Nanotechnology
49	V	C305 (OE I-11)	OIM552	Lean Manufacturing
50	V	C305 (OE I-12)	OBM552	Medical Physics
51	V	C305 (OE I-13)	OML552	Microscopy
52	V	C305 (OE I-14)	OAI552	Participatory Water Resources Management
53	V	C305 (OE I-15)	OCH552	Principles of Chemical Engineering
54	V	C305 (OE I-16)	OBT554	Principles of Food Preservation



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55	V	C305 (OE I-17)	OMF551	Product Design and Development
56	V	C305 (OE I-18)	OAI553	Production Technology of Agricultural machinery
57	V	C305 (OE I-19)	ORO551	Renewable Energy Sources
58	V	C305 (OE I-20)	OAN551	Sensors and Transducers
59	V	C305 (OE I-21)	OIC552	State Variable Analysis and Design
60	V	C305 (OE I-22)	OTL553	Telecommunication Network Management
61	V	C305 (OE I-23)	OIM551	World Class Manufacturing
62	V	C306	ME8511	Kinematics and Dynamics Laboratory
63	V	C307	ME8512	Thermal Engineering Laboratory
64	V	C308	ME8513	Metrology and Measurements Laboratory
65	VI	C309	ME8651	Design of Transmission Systems
66	VI	C310	ME8691	Computer Aided Design and Manufacturing
67	VI	C311	ME8693	Heat and Mass Transfer
68	VI	C312	ME8692	Finite Element Analysis
69	VI	C313	ME8694	Hydraulics and Pneumatics
70	VI	C314 (PE I- 1)	ME8091	Automobile Engineering
71	VI	C314 (PE I- 2)	PR8592	Welding Technology
72	VI	C314 (PE I- 3)	ME8096	Gas Dynamics and Jet Propulsion
73	VI	C314 (PE I- 4)	GE8075	Intellectual Property Rights
74	VI	C314 (PE I- 5)	GE8073	Fundamentals of Nano Science
75	VI	C315	ME8681	CAD / CAM Laboratory
76	VI	C316	ME8682	Design and Fabrication Project
77	VI	C317	HS8581	Professional Communication



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78	VII	C401	ME8792	Power Plant Engineering
79	VII	C402	ME8793	Process Planning and Cost Estimation
80	VII	C403	ME8791	Mechatronics
81	VII	C404 (OE II- 1)	OAI751	Agricultural Finance, Banking and Co-operation
82	VII	C404 (OE II- 2)	OEE751	Basic Circuit Theory
83	VII	C404 (OE II- 3)	OGI751	Climate Change and its Impact
84	VII	C404 (OE II- 4)	OCS751	Data Structures and Algorithms
85	VII	C404 (OE II- 5)	OML752	Electronic Materials
86	VII	C404 (OE II- 6)	OCE751	Environmental and Social Impact Assessment
87	VII	C404 (OE II- 7)	OAE751	Fundamentals of Combustion
88	VII	C404 (OE II- 8)	OGI752	Fundamentals of Planetary Remote Sensing
89	VII	C404 (OE II- 9)	OEN751	Green Building Design
90	VII	C404 (OE II- 10)	OAI752	Integrated Water Resources Management
91	VII	C404 (OE II- 11)	OEI 751	Introduction to Embedded Systems
92	VII	C404 (OE II- 12)	OMF751	Lean Six Sigma
93	VII	C404 (OE II- 13)	OAN751	Low-Cost Automation
94	VII	C404 (OE II- 14)	OMT751	MEMS and NEMS
95	VII	C404 (OE II- 15)	ORO751	Nano Computing
96	VII	C404 (OE II- 16)	OAE752	Principles of Flight Mechanics
97	VII	C404 (OE II- 17)	OCH751	Process Modeling and Simulation
98	VII	C404 (OE II- 18)	OAT751	Production of Automotive Components



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99	VII	C404 (OE II- 19)	OIE751	Robotics
100	VII	C404 (OE II- 20)	OML753	Selection of Materials
101	VII	C404 (OE II- 21)	OML751	Testing of Materials
102	VII	C404 (OE II- 22)	OAT752	Vehicle Styling and Design
103	VII	C404 (OE II- 23)	OTT751	Weaving Mechanisms
104	VII	C404 (OE II- 23)	OMV751	Marine Vehicles
105	VII	C405 (PE II- 1)	ME8071	Refrigeration and Air conditioning
106	VII	C405 (PE II- 2)	ME8072	Renewable Sources of Energy
107	VII	C405 (PE II- 3)	ME8098	Quality Control and Reliability Engineering
108	VII	C405 (PE II- 4)	ME8073	Unconventional Machining Processes
109	VII	C405 (PE II- 5)	MG8491	Operations Research
110	VII	C405 (PE II- 6)	MF8071	Additive Manufacturing
111	VII	C405 (PE II- 7)	GE8077	Total Quality Management
112	VII	C406 (PE III- 1)	ME8099	Robotics
113	VII	C406 (PE III- 2)	ME8095	Design of Jigs, Fixtures and Press Tools
114	VII	C406 (PE III- 3)	ME8093	Computational Fluid Dynamics
115	VII	C406 (PE III- 4)	ME8097	Non-Destructive Testing and Evaluation
116	VII	C406 (PE III- 5)	ME8092	Composite Materials and Mechanics
117	VII	C406 (PE III- 6)	GE8072	Foundation Skills in Integrated Product Development
118	VII	C406 (PE III- 7)	GE8074	Human Rights
119	VII	C406	GE8071	Disaster Management



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		(PE III- 8)		
120	VII	C407	ME8711	Simulation and Analysis Laboratory
121	VII	C408	ME8781	Mechatronics Laboratory
122	VII	C409	ME8712	Technical Seminar
123	VIII	C410	MG8591	Principles of Management
124	VIII	C411 (PE IV- 1)	IE8693	Production Planning and Control
125	VIII	C411 (PE IV- 2)	MG8091	Entrepreneurship Development
126	VIII	C411 (PE IV- 3)	ME8094	Computer Integrated Manufacturing Systems
127	VIII	C411 (PE IV- 4)	ME8074	Vibration and Noise Control
128	VIII	C411 (PE IV- 5)	EE8091	Micro Electromechanical Systems
129	VIII	C411 (PE IV- 6)	GE8076	Professional Ethics in Engineering
130	VIII	C412	ME8811	Project Work



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Department of Mechanical Engineering

Anna University Regulations 2017

First Year Courses (I & II Semester)

Course Outcomes (COs)

C101	HS8151	COMMUNICATIVE ENGLISH
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Course Outcomes (Cos)

C101.1	Students will be able to read articles of a general kind in magazines and newspapers.
C101.2	Students will be able to participate effectively in informal conversations; introduce themselves and their friends and express opinions in English
C101.3	Students will be able to comprehend conversations and short talks delivered in English
C101.4	Students will be able to listen to dialogues and conversations and to complete exercises based on them.
C101.5	Students will be able to write short essays of a general kind and personal letters and emails in English.

C102	MA8151	ENGINEERING MATHEMATICS – I
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Course Outcomes (Cos)

C102.1	Students will be able to use both the limit definition and rules of differentiation to differentiate functions and Apply differentiation to solve maxima and minima problems.
C102.2	Students will be able to evaluate integrals both by using Riemann sums and by using the Fundamental Theorem of Calculus
C102.3	Students will be able to evaluate integrals using techniques of integration, such as substitution, partial fractions and integration by parts and Apply integration to compute multiple integrals, area, volume, integrals in polar coordinates, in addition to change of order and change of variables.
C102.4	Students will be able to determine convergence/divergence of improper integrals and evaluate convergent improper integrals
C102.5	Students will be able to apply various techniques in solving differential equations




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C103	PH8151	ENGINEERING PHYSICS
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Course Outcomes (Cos)

C103.1	The students will gain knowledge on the basics of properties of matter and its applications,
C103.2	The students will acquire knowledge on the concepts of waves and optical devices and their applications in fibre optics,
C103.3	The students will have adequate knowledge on the concepts of thermal properties of materials and their applications in expansion joints and heat exchangers,
C103.4	The students will get knowledge on advanced physics concepts of quantum theory and its applications in tunnelling microscopes
C103.5	The students will understand the basics of crystals, their structures and different crystal growth techniques.

C104	CY8151	ENGINEERING CHEMISTRY
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Course Outcomes (Cos)

C104.1	To make the students conversant with boiler feed water requirements, related problems and water treatment techniques.
C104.2	To develop an understanding of the basic concepts of phase rule and its applications to single and two component systems and appreciate the purpose and significance of alloys.
C104.3	To know the Preparation, properties and applications of engineering materials.
C104.4	To know the types of fuels, calorific value calculations, manufacture of solid, liquid and gaseous fuels.
C104.5	To apply the Principles and generation of energy in batteries, nuclear reactors, solar cells, wind mills and fuel cells.



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C105	GE8151	PROBLEM SOLVING AND PYTHON PROGRAMMING
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Course Outcomes (Cos)

C105.1	Students will be able to develop algorithmic solutions to simple computational problems
C105.2	Students will be able to read, write, execute by hand simple python programs
C105.3	Students will be able to decompose a python program into functions
C105.4	Students will be able to represent compound data using python lists, tuples, dictionaries.
C105.5	Students will be able to read and write data from/to files in python programs.

C106	GE8152	ENGINEERING GRAPHICS
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Course Outcomes (Cos)

C106.1	Students will be able to familiarize with the fundamentals and standards of engineering graphics
C106.2	Students will be able to perform freehand sketching of basic geometrical constructions and multiple views of objects.
C106.3	Students will be able to project orthographic projections of lines and plane surfaces.
C106.4	Students will be able to draw projections and solids and development of surfaces.
C106.5	Students will be able to visualize and to project isometric and perspective sections of simple solids.



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C107	GE8161	PROBLEM SOLVING AND PYTHON PROGRAMMING LABORATORY
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Course Outcomes (Cos)

C107.1	Students will be able to write, test, and debug simple python programs.
C107.2	Students will be able to implement python programs with conditionals and loops.
C107.3	Students will be able to develop python programs stepwise by defining functions and calling them.
C107.4	Students will be able to use python lists, tuples, dictionaries for representing compound data.
C107.5	Students will be able to read and write data from/to files in python.

C108	BS8161	PHYSICS AND CHEMISTRY LABORATORY
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Course Outcomes (Cos)

C108.1	Apply principles of elasticity, optics and thermal properties for engineering applications
C108.2	Analyze young's modulus, rigidity modulus, wavelength of different colors and particle size of minute particles
C108.3	Construct the circuits, assemble the apparatus, tabulate the readings and calculate the answers using appropriate formulae.
C108.4	Compare and conclude the calculated values with the standard values and justify their



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C109	HS8251	TECHNICAL ENGLISH
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Course Outcomes (Cos)

C109.1	Students will be able to read technical texts and write area- specific texts effortlessly.
C109.2	Students will be able to listen and comprehend lectures and talks in their area of specialisation successfully.
C109.3	Students will be able to speak appropriately and effectively in varied formal and informal contexts.
C109.4	Students will be able to write reports and winning job applications.
C109.5	Students will be able to participate effectively in public speaking and group discussion.

C110	MA8251	ENGINEERING MATHEMATICS – II
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Course Outcomes (Cos)

C110.1	Students will have good understanding of eigen values and eigenvectors, diagonalization of a matrix, symmetric matrices, positive definite matrices and similar matrices.
C110.2	Students will have good understanding of gradient, divergence and curl of a vector point function and related identities.
C110.3	Students will have good understanding of evaluation of line, surface and volume integrals using gauss, stokes and green's theorems and their verification.
C110.4	Students will have good understanding of analytic functions, conformal mapping and complex integration.
C110.5	Students will have good understanding of laplace transform and inverse transform of simple functions, properties, various related theorems and application to differential equations with constant coefficients

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C111	PH8251	MATERIALS SCIENCE
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Course Outcomes (Cos)

C111.1	The students will have knowledge on the various phase diagrams and their applications
C111.2	The students will acquire knowledge on Fe-Fe ₃ C phase diagram, various microstructures and alloys
C111.3	The students will get knowledge on mechanical properties of materials and their measurement
C111.4	The students will gain knowledge on magnetic, dielectric and superconducting properties of materials
C111.5	The students will understand the basics of ceramics, composites and nanomaterials.

C112	BE8253	BASIC ELECTRICAL, ELECTRONICS AND INSTRUMENTATION ENGINEERING
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Course Outcomes (Cos)

C112.1	Students will be able to understand electric circuits.
C112.2	Students will be able to determine the regulation and efficiency of transformers.
C112.3	Students will be able to describe the construction and working principle of electrical machines.
C112.4	Students will be able to understand the concepts of various electronic devices.
C112.5	Students will be able to choose appropriate instruments for electrical measurement for a specific application




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C113	GE8291	ENVIRONMENTAL SCIENCE AND ENGINEERING
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Course Outcomes (Cos)

C113.1	Define Environment, ecosystem and biodiversity, classify types of ecosystems and outline the impacts to biodiversity.
C113.2	Define pollution, classify its types, analyze the causes and suggest control measures for Pollution.
C113.3	Outline various natural resources; explain causes and impacts of destruction of resources.
C113.4	List various social issues related to land, water and energy; summarize the concerning government acts and rules to overcome these problems.
C113.5	Interpret population explosion and variation among nations, show the impacts of over population and illustrate the methods to mitigate the same.

C114	GE8292	ENGINEERING MECHANICS
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Course Outcomes (Cos)

C114.1	Students will be able to illustrate the vectorial and scalar representation of forces and moments
C114.2	Students will be able to analyse the rigid body in equilibrium
C114.3	Students will be able to evaluate the properties of surfaces and solids
C114.4	Students will be able to calculate dynamic forces exerted in rigid body
C114.5	Students will be able to determine the friction and the effects by the laws of friction

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C115	GE8261	ENGINEERING PRACTICES LABORATORY
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Course Outcomes (Cos)

C115.1	Students will be able to fabricate welding equipment's to join the structures and also carpentry components and pipe connections including plumbing works.
C115.2	Students will be able to carry out the basic machining operations and able to make the models using sheet metal works.
C115.3	Students will be able to illustrate on centrifugal pump, air conditioner, operations of smithy, foundry and fittings.
C115.4	Students will be able to carry out basic home electrical works and appliances and able to measure the electrical quantities.
C115.5	Students will be able to elaborate on the components, gates, soldering practices.

C116	BE8261	BASIC ELECTRICAL, ELECTRONICS AND INSTRUMENTATION ENGINEERING LABORATORY
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Course Outcomes (Cos)

C116.1	Students will be able to determine the speed characteristic of different electrical machines
C116.2	Students will be able to design simple circuits involving diodes and transistors
C116.3	Students will be able to use operational amplifiers



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Department of Mechanical Engineering Anna University Regulations 2017 Second Year Courses (III & IV Semester) Course Outcomes (COs)

C201	MA8353	TRANSFORMS AND PARTIAL DIFFERENTIAL EQUATIONS
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Course Outcomes (Cos)

C201.1	Students will be able to understand how to solve the given standard partial differential equations.
C201.2	Students will be able to solve differential equations using Fourier series analysis which plays a vital role in engineering applications.
C201.3	Students will be able to appreciate the physical significance of Fourier series techniques in solving one- and two-dimensional heat flow problems and one-dimensional wave equations.
C201.4	Students will be able to understand the mathematical principles on transforms and partial differential equations would provide them the ability to formulate and solve some of the physical problems of engineering.
C201.5	Students will be able to use the effective mathematical tools for the solutions of partial differential equations by using z transform techniques for discrete time systems.

C202	ME8391	ENGINEERING THERMODYNAMICS
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Course Outcomes (Cos)

C202.1	Students will be able to apply the first law of thermodynamics for simple open and closed systems under steady and unsteady conditions.
C202.2	Students will be able to apply second law of thermodynamics to open and closed systems and calculate entropy and availability.
C202.3	Students will be able to apply Rankine cycle to steam power plant and compare few cycle improvement methods.
C202.4	Students will be able to derive simple thermodynamic relations of ideal and real gases.



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C202.5	Students will be able to calculate the properties of gas mixtures and moist air and its use in psychometric processes
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C203	CE8394	FLUID MECHANICS AND MACHINERY
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Course Outcomes (Cos)

C203.1	Students will be able to apply mathematical knowledge to predict the properties and characteristics of a fluid.
C203.2	Students can analyze and calculate major and minor losses associated with pipe flow in piping networks.
C203.3	Students Can mathematically predict the nature of physical quantities.
C203.4	Students Can critically analyze the performance of pumps.
C203.5	Students Can critically analyze the performance of turbines.

C204	ME8351	MANUFACTURING TECHNOLOGY – I
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Course Outcomes (Cos)

C204.1	Students will be able to explain different metal casting processes, associated defects, merits and demerits
C204.2	Students will be able to compare different metal joining processes.
C204.3	Students will be able to summarize various hot working and cold working methods of metals.
C204.4	Students will be able to explain various sheet metal making processes.
C204.5	Students will be able to distinguish various methods of manufacturing plastic components.

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C205	EE8353	ELECTRICAL DRIVES AND CONTROLS
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Course Outcomes (Cos)

C205.1	Select the appropriate power rating of the motors based on the duty cycle and thermal loading.
C205.2	Choose a motor to match the speed-torque characteristics of the mechanical load system and apply electrical braking.
C205.3	Identify the suitable starter for starting of DC and Induction motors based on the power rating.
C205.4	Compute the parameters for controlling the speed of DC motor by both conventional and solid state methods.
C205.5	Select the suitable speed control technique by conventional and solid state control for three phase induction motors

C206	ME8361	MANUFACTURING TECHNOLOGY LABORATORY – I
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Course Outcomes (Cos)

C206.1	Students will be able to demonstrate the safety precautions exercised in the mechanical workshop.
C206.2	Students will be able to make the workpiece as per given shape and size using lathe.
C206.3	Students will be able to join two metals using arc welding.
C206.4	Students will be able to use sheet metal fabrication tools and make simple tray and funnel.
C206.5	Students will be able to use different moulding tools, patterns and prepare sand moulds.




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C207	ME8381	COMPUTER AIDED MACHINE DRAWING
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Course Outcomes (Cos)

C207.1	Students will be able to follow the drawing standards, Fits and Tolerances
C207.2	Students will be able to understand and interpret drawings of machine components.
C207.3	Students will be able to Re-create part drawings, sectional views and assembly drawings as per standards.
C207.4	Students will be able to handle 2D drafting and 3D modeling software systems.

C208	EE8361	ELECTRICAL ENGINEERING LABORATORY
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Course Outcomes (Cos)

C208.1	Demonstrate the working of electric machines and measure the electrical parameters.
C208.2	Compute the performance parameters of DC motors, AC motors, synchronous motor and transformer at various loading conditions.
C208.3	Infer the internal and external characteristics of shunt and series generator for various loading conditions
C208.4	Analyze the starting and speed control methods for DC and AC motors.



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C209	HS8381	INTERPERSONAL SKILLS/LISTENING & SPEAKING
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Course Outcomes (Cos)

C209.1	Students will be able to listen and respond appropriately
C209.2	Students will be able to listen and respond appropriately
C209.3	Students will be able to make effective presentations
C209.4	Students will be able to participate confidently and appropriately in conversations both formal and informal

C210	MA8452	STATISTICS AND NUMERICAL METHODS
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Course Outcomes (Cos)

C210.1	Students will be able to apply the concept of testing of hypothesis for small and large samples in real life problems.
C210.2	Students will be able to apply the basic concepts of classifications of design of experiments in the field of agriculture.
C210.3	Students will be able to appreciate the numerical techniques of interpolation in various intervals and apply the numerical techniques of differentiation and integration for engineering problems.
C210.4	Students will be able to understand the knowledge of various techniques and methods for solving first and second order ordinary differential equations.
C210.5	Students will be able to solve the partial and ordinary differential equations with initial and boundary conditions by using certain techniques with engineering applications.




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C211	ME8492	KINEMATICS OF MACHINERY
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Course Outcomes (Cos)

C211.1	Students will be able to discuss the basics of mechanism
C211.2	Students will be able to calculate velocity and acceleration in simple mechanisms
C211.3	Students will be able to develop cam profiles
C211.4	Students will be able to solve problems on gears and gear trains
C211.5	Students will be able to examine friction in machine elements

C212	ME8451	MANUFACTURING TECHNOLOGY – II
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Course Outcomes (Cos)

C212.1	Students will be able to explain the mechanism of material removal processes.
C212.2	Students will be able to describe the constructional and operational features of center lathe and other special purpose lathes.
C212.3	Students will be able to describe the constructional and operational features of shaper, planner, milling, drilling, sawing and broaching machines.
C212.4	Students will be able to explain the types of grinding and other super finishing processes apart from gear manufacturing processes.
C212.5	Students will be able to summarize numerical control of machine tools and write a part program.



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C213	ME8491	ENGINEERING METALLURGY
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Course Outcomes (Cos)

C213.1	Students will be able to explain alloys and phase diagram, iron-iron carbon diagram and steel classification.
C213.2	Students will be able to explain isothermal transformation, continuous cooling diagrams and different heat treatment processes.
C213.3	Students will be able to clarify the effect of alloying elements on ferrous and non-ferrous metals.
C213.4	Students will be able to summarize the properties and applications of non metallic materials.
C213.5	Students will be able to explain the testing of mechanical properties. .

C214	CE8395	STRENGTH OF MATERIALS FOR MECHANICAL ENGINEERS
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Course Outcomes (Cos)

C214.1	Students will be able to understand the concepts of stress and strain in simple and compound bars, the importance of principal stresses and principal planes
C214.2	Students will be able to understand the load transferring mechanism in beams and stress distribution due to shearing force and bending moment.
C214.3	Students will be able to apply basic equation of simple torsion in designing of shafts and helical spring.
C214.4	Students will be able to calculate the slope and deflection in beams using different methods.
C214.5	Students will be able to analyze and design thin and thick shells for the applied internal and external pressures.




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C215	ME8493	THERMAL ENGINEERING - I
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Course Outcomes (Cos)

C215.1	Students will be able to apply thermodynamic concepts to different air standard cycles and solve problems.
C215.2	Students will be able to solve problems in single stage and multistage air compressors.
C215.3	Students will be able to explain the functioning and features of IC engines, components and auxiliaries.
C215.4	Students will be able to calculate performance parameters of IC engines.
C215.5	Students will be able to explain the flow in gas turbines and solve problems.

C216	ME8462	MANUFACTURING TECHNOLOGY LABORATORY – II
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Course Outcomes (Cos)

C216.1	Students will be able to use different machine tools to manufacturing gears.
C216.2	Students will be able to use different machine tools for finishing operations
C216.3	Students will be able to manufacture tools using cutter grinder
C216.4	Students will be able to measure cutting forces milling and Turning process.
C216.5	Students will be able to develop cnc part programming.



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C217	CE8381	STRENGTH OF MATERIALS AND FLUID MECHANICS AND MACHINERY LABORATORY
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Course Outcomes (Cos)

C217.1	Compute the surface hardness and impact strength of the given material.
C217.2	Calculate the stresses induced in material due to tension, torsion and compression experimentally and interpret the values.
C217.3	Estimate the parameters like coefficient of discharge, error percentage in flow meters and compute the friction factor for different types of pipes.
C217.4	Calculate the performance parameters of different types of pumps and hydraulic turbines and plot the characteristic curves.

C218	HS8461	ADVANCED READING AND WRITING
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Course Outcomes (Cos)

C218.1	Students will be able to write different types of essays.
C218.2	Students will be able to write winning job applications.
C218.3	Students will be able to read and evaluate texts critically.
C218.4	Students will be able to display critical thinking in various professional contexts.




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Department of Mechanical Engineering

Anna University Regulations 2017

Third Year Courses (V & VI Semester)

Course Outcomes (COs)

C301	ME8595	THERMAL ENGINEERING – II
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Course Outcomes (Cos)


C301.1	Students will be able to solve problems in Steam Nozzle
C301.2	Students will be able to explain the functioning and features of different types of Boilers and auxiliaries and calculate performance parameters.
C301.3	Students will be able to explain the flow in steam turbines, draw velocity diagrams for steam turbines and solve problems.
C301.4	Students will be able to summarize the concept of Cogeneration, Working features of Heat pumps and Heat Exchangers.
C301.5	Students will be able to solve problems using refrigerant table / charts and psychrometric charts

C302	ME8593	DESIGN OF MACHINE ELEMENTS
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Course Outcomes (Cos)

C302.1	Students will be able to explain the influence of steady and variable stresses in machine component design.
C302.2	Students will be able to apply the concepts of design to shafts, keys and couplings.
C302.3	Students will be able to apply the concepts of design to temporary and permanent joints.
C302.4	Students will be able to apply the concepts of design to energy absorbing members, connecting rod and crank shaft.
C302.5	Apply the concepts of design to bearings.




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C303	ME8501	METROLOGY AND MEASUREMENTS
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Course Outcomes (Cos)

C303.1	Students will be able to describe the concepts of measurements to apply in various metrological instruments.
C303.2	Students will be able to outline the principles of linear and angular measurement tools used for industrial applications.
C303.3	Students will be able to explain the procedure for conducting computer aided inspection.
C303.4	Students will be able to demonstrate the techniques of form measurement used for industrial components.
C303.5	Students will be able to discuss various measuring techniques of mechanical properties in industrial applications.

C304	ME8594	DYNAMICS OF MACHINES
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Course Outcomes (Cos)

C304.1	Students will be able to calculate static and dynamic forces of mechanisms. Compute the frequency of free vibration.
C304.2	Students will be able to calculate the balancing masses and their locations of reciprocating and rotating masses.
C304.3	Students will be able to compute the frequency of forced vibration and damping coefficient.
C304.4	Students will be able to demonstrate the techniques of form measurement used for industrial components.
C304.5	Students will be able to calculate the speed and lift of the governor and estimate the gyroscopic effect on automobiles, ships and airplanes.




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C305 (OE I – 11)	OIM552	LEAN MANUFACTURING
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Course Outcomes (Cos)

C305.1	Students will be able to gain knowledge about basic elements of lean manufacturing and its tools.
C305.2	Students will be able to gain knowledge on principles of various lean manufacturing tools.
C305.3	Students will be able to gain knowledge on various procedures, approaches and concepts of quality management.
C305.4	Students will be able to demonstrate the techniques of form measurement used for industrial components. understand the concepts of six sigma.
C305.5	Students will be able to analyze and evaluate the implementation of lean manufacturing concepts.

C306	ME8511	KINEMATICS AND DYNAMICS LABORATORY
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Course Outcomes (Cos)

C306.1	Explain gear parameters, kinematics of mechanisms, gyroscopic effect and working of lab equipment's.
C306.2	Determine mass moment of inertia of mechanical element, governor effort and range sensitivity, natural frequency and damping coefficient, torsional frequency, critical speeds of shafts, balancing mass of rotating and reciprocating masses, and transmissibility ratio.




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C307	ME8512	THERMAL ENGINEERING LABORATORY
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Course Outcomes (Cos)

C307.1	Students will be able to conduct tests on heat conduction apparatus and evaluate thermal conductivity of materials.
C307.2	Students will be able to conduct tests on natural and forced convective heat transfer apparatus and evaluate heat transfer coefficient.
C307.3	Students will be able to conduct tests on radiative heat transfer apparatus and evaluate Stefan Boltzmann constant and emissivity.
C307.4	Students will be able to conduct tests to evaluate the performance of parallel/counter flow heat exchanger apparatus and reciprocating air compressor.
C307.5	Students will be able to conduct tests to evaluate the performance of refrigeration and air conditioning test rigs

C308	ME8513	METROLOGY AND MEASUREMENTS LABORATORY
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Course Outcomes (Cos)

C308.1	Measure the gear tooth dimensions, angle using sine bar, straightness and flatness, thread parameters, temperature using thermocouple, force, displacement, torque and vibration.
C308.2	Calibrate the vernier, micrometer and slip gauges and setting up the comparator for the inspection.




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C309	ME8651	DESIGN OF TRANSMISSION SYSTEMS
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Course Outcomes (Cos)

C309.1	Students will be able to apply the concepts of design to belts, chains and rope drives.
C309.2	Students will be able to apply the concepts of design to spur, helical gears.
C309.3	Students will be able to apply the concepts of design to worm and bevel gears.
C309.4	Students will be able to calibrate the Vernier, micrometer and slip gauges.
C309.5	Students will be able to apply the concepts of design to cams, brakes and clutches.

C310	ME8691	COMPUTER AIDED DESIGN AND MANUFACTURING
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Course Outcomes (Cos)

C310.1	Students will be able to explain the 2D and 3D transformations, clipping algorithm, Manufacturing models and Metrics
C310.2	Students will be able to explain the fundamentals of parametric curves, surfaces and Solids.
C310.3	Students will be able to summarize the different types of Standard systems used in CAD.
C310.4	Students will be able to apply NC & CNC programming concepts to develop part Programme for Lathe & Milling Machines.
C310.5	Students will be able to summarize the different types of techniques used in Cellular Manufacturing and FMS.




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C311	ME8693	HEAT AND MASS TRANSFER
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Course Outcomes (Cos)

C311.1	Students will be able to explain Apply heat conduction equations to different surface configurations under steady state and transient conditions and solve problem.
C311.2	Students will be able to apply free and forced convective heat transfer correlations to internal and external flows through/over various surface configurations and solve problems.
C311.3	Students will be able to explain the phenomena of boiling and condensation, apply LMTD and NTU methods of thermal analysis to different types of heat exchanger configurations and solve problems.
C311.4	Students will be able to Explain basic laws for radiation and apply these principles to radiative heat transfer between different types of surfaces to solve problems.
C311.5	Students will be able to Apply diffusive and convective mass transfer equations and correlations to solve problems for different applications.

C312	ME8692	FINITE ELEMENT ANALYSIS
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Course Outcomes (Cos)

C312.1	Students will be able to summarize the basics of finite element formulation.
C312.2	Students will be able to apply finite element formulations to solve one dimensional Problems.
C312.3	Students will be able to apply finite element formulations to solve two dimensional scalar Problems.
C312.4	Students will be able to apply finite element method to solve two-dimensional Vector problems.
C312.5	Students will be able to apply finite element method to solve problems on iso parametric element and dynamic Problems.

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C313	ME8694	HYDRAULICS AND PNEUMATICS
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Course Outcomes (Cos)

C313.1	Students will be able to explain the fluid power and operation of different types of pumps.
C313.2	Students will be able to summarize the features and functions of hydraulic motors, actuators and flow control valves
C313.3	Students will be able to explain the different types of hydraulic circuits and systems
C313.4	Students will be able to explain the working of different pneumatic circuits and systems
C313.5	Students will be able to summarize the various trouble shooting methods and applications of hydraulic and pneumatic systems.

C314 (PE I- 2)	PR8592	WELDING TECHNOLOGY
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Course Outcomes (Cos)

C314.1	Students will be able to understand the construction and working principles of gas and arc welding process.
C314.2	Students will be able to understand the construction and working principles of resistance welding process.
C314.3	Students will be able to understand the construction and working principles of various solid state welding process.
C314.4	Students will be able to understand the construction and working principles of various special welding processes.
C314.5	Students will be able to understand the concepts on weld joint design, weldability and testing of weldments.




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C315	ME8681	CAD / CAM LABORATORY
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Course Outcomes (Cos)

C315.1	Draw 3D and Assembly drawing using CAD software.
C315.2	Demonstrate manual part programming with G and M codes using CAM,

C316	ME8681	DESIGN AND FABRICATION PROJECT
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Course Outcomes (Cos)

C316.1	Use design principles and develop conceptual and engineering design of component/system.
C316.2	Fabricate components using appropriate manufacturing processes and assemble as a system.
C316.3	Test the system for the required outcomes using relevant standards.

C317	HS8581	PROFESSIONAL COMMUNICATION
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Course Outcomes (Cos)

C317.1	Students will be able to make effective presentations.
C317.2	Students will be able to participate confidently in group discussions.
C317.3	Students will be able to attend job interviews and be successful in them.
C317.4	Students will be able to develop adequate soft skills required for the workplace.




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Department of Mechanical Engineering Anna University Regulations 2017 Final Year Courses (VII & VIII Semester) Course Outcomes (COs)

C401	ME8792	POWER PLANT ENGINEERING
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Course Outcomes (Cos)

C401.1	Students will be able to explain the layout, construction and working of the components inside a thermal power plant.
C401.2	Students will be able to explain the layout, construction and working of the components inside a diesel, gas and combined cycle power plants.
C401.3	Students will be able to explain the layout, construction and working of the components inside nuclear power plants.
C401.4	Students will be able to explain the layout, construction and working of the components inside renewable energy power plants.
C401.5	Students will be able to explain the applications of power plants while extend their knowledge to power plant economics and environmental hazards and estimate the costs of electrical energy production.

C402	ME8793	PROCESS PLANNING AND COST ESTIMATION
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Course Outcomes (Cos)

C402.1	Students will be able to select the process, equipment and tools for various industrial products.
C402.2	Students will be able to prepare process planning activity chart.
C402.3	Students will be able to explain the concept of cost estimation.
C402.4	Students will be able to compute the job order cost for different type of shop floor.
C402.5	Students will be able to calculate the machining time for various machining operations.



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C403	ME8791	MECHATRONICS
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Course Outcomes (Cos)

C403.1	Students will be able to discuss the interdisciplinary applications of electronics, electrical, mechanical and computer systems for the control of mechanical, electronic systems and sensor technology.
C403.2	Students will be able to discuss the architecture of microprocessor and microcontroller, pin diagram, addressing modes of microprocessor and microcontroller.
C403.3	Students will be able to discuss programmable peripheral interface, architecture of 8255 ppi, and various device interfacing
C403.4	Students will be able to explain the architecture, programming and application of programmable logic controllers to problems and challenges in the areas of mechatronic engineering.
C403.5	Students will be able to discuss various Actuators and Mechatronics system using the knowledge and skills acquired through the course and also from the given case studies

C404	OML751	TESTING OF MATERIALS
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Course Outcomes (Cos)

C404.1	Students will be able to acquire basic knowledge on material testing fundamentals, testing organizations, testing standards and procedures
C404.2	Students will be able to comprehend different types of destructive testing methods and its applications
C404.3	Students will be able to comprehend different types of basic non-destructive testing methods and its applications
C404.4	Students will be able to explicate various optical instruments used for material characterization
C404.5	Students will be able to comprehend various thermal and chemical testing techniques.




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C405 (PE II – 4)	ME8073	UNCONVENTIONAL MACHINING PROCESS
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Course Outcomes (Cos)

C405.1	Students will be able to explain the need for unconventional machining processes and its classification
C405.2	Students will be able to compare various thermal energy and electrical energy based unconventional machining processes.
C405.3	Students will be able to summarize various chemical and electro-chemical energy based unconventional machining processes.
C405.4	Students will be able to explain various nano abrasives based unconventional machining processes.
C405.5	Students will be able to distinguish various recent trends based unconventional machining processes.

C405 (PE II – 7)	GE8077	TOTAL QUALITY MANAGEMENT
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Course Outcomes (Cos)

C405.1	The student will be able to discuss the evolution of quality, contributions of management gurus and how to focus on customers.
C405.2	The student will be able to explain the various principles of total quality management.
C405.3	The student will be able to apply different TQM tools and techniques in the manufacturing processes.
C405.4	The student will be able to apply different TQM tools and techniques in the service processes.
C405.5	The student will be able to describe the quality and environmental management systems.

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C406 (PE III – 1)	ME8099	ROBOTICS
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Course Outcomes (Cos)

C406.1	Students will be able to explain the concepts of industrial robots, classification, specifications and coordinate systems. also summarize the need and application of robots in different sectors.
C406.2	Students will be able to illustrate the different types of robot drive systems as well as robot end effectors.
C406.3	Students will be able to apply the different sensors and image processing techniques in robotics to improve the ability of robots.
C406.4	Students will be able to develop robotic programs for different tasks and familiarize with the kinematics motions of robot.
C406.5	Students will be able to examine the implementation of robots in various industrial sectors and interpolate the economic analysis of robots.

C406 (PE III – 4)	ME8097	NON-DESTRUCTIVE TESTING AND EVALUATION
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Course Outcomes (Cos)

C406.1	Students will be able to explain the fundamental concepts of NDT
C406.2	Students will be able to discuss the different methods of NDT
C406.3	Students will be able to explain the concept of thermography and eddy current testing
C406.4	Students will be able to explain the concept of ultrasonic testing and acoustic emission
C406.5	Students will be able to explain the concept of radiography



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C407	ME8711	SIMULATION AND ANALYSIS LABORATORY
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Course Outcomes (Cos)

C407.1	Students will be able to simulate the working principle of air conditioning system, hydraulic and pneumatic cylinder and cam follower mechanisms using MATLAB.
C407.2	Students will be able to analyse the stresses and strains induced in plates, brackets and beams and heat transfer problems.
C407.3	Students will be able to calculate the natural frequency and mode shape analysis of 2D components and beams.
C407.4	Students will be able to analyse the thermal stresses and heat transfer analysis of various plates.
C407.5	Students will be able to analyse harmonic, transient and spectrum analysis of simple systems.

C408	ME8781	MECHATRONICS LABORATORY
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Course Outcomes (Cos)

C408.1	Program the microprocessor, microcontrollers and PLC for the given applications/
C408.2	Demonstrate the functioning of mechatronics system with various pneumatic, hydraulic and electrical systems.
C408.3	Demonstrate the working of different types of sensors and their applications.



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C409	ME8712	TECHNICAL SEMINAR
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Course Outcomes (Cos)

C409.1	Demonstrate their communication skills and presentation skills on technical topics of interest.
C409.2	To prepare and present technical papers or recent advances in engineering/technology (recent advances in Mechanical Engineering).

C410	MG8591	PRINCIPLES OF MANAGEMENT
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Course Outcomes (Cos)

C410.1	The student will be able to discuss the evolution of management, functions and roles of managers.
C410.2	The student will be able to explain the different types of planning process and tools used for planning.
C410.3	The student will be able to elaborate different organization structures and functions of human resources manager.
C410.4	The student will be able to illustrate the different theories of motivation and leadership.
C410.5	The student will be able to describe the control techniques and the role of technology in management.

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C411 (PE IV- 1)	IE8693	PRODUCTION PLANNING AND CONTROL
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Course Outcomes (Cos)

C411.1	To understand the process, equipment, and tools for various industrial products
C411.2	To perform and prepare process planning activity chart
C411.3	To apply suitable method of selecting the concept of cost estimation.
C411.4	To make the cost estimate for and compute the job order cost for different type of shop floor.
C411.5	To evaluate the machining time for various machining operations.

C412	ME8811	PROJECT WORK
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Course Outcomes (Cos)

C412.1	Identify and formulate Engineering problems by detailed literature survey.
C412.2	Apply knowledge gained through core engineering courses to analyze and solve problem.
C412.3	Provide suitable interpretations to solutions correlating with theoretical concepts and existing literature.



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