Course Outcome of the Courses of B.Tech. 7th Semester and Mapping of the Course Outcome with Programme Outcome

Sl. No.	Sub-Code	Subject	Hours per Week			Credit	Marks	
			L	T	P	C	CE	ESE
Theory								
1	ME181701	Vibration of Mechanical Systems	3	0	0	3	30	70
2	ME181702	Applied Thermodynamics - II	3	0	0	3	30	70
3	ME181703	Industrial Engineering and Management	3	0	0	3	30	70
4	ME181PE1*	Program Elective -1	3	0	0	3	30	70
5	ME181OE1*	Open Elective -1	3	0	0	3	30	70
6	HS181704	Principles of Management	3	0	0	3	30	70
Practical								
1	ME181722	Project-1	0	0	8	4	50	50
2	ME181723	Grand Viva Voce-I	0	0	0	1	0	50
3	SI181721	Internship-III (SAI - Industry)	0	0	0	2	0	200
TOTAL			18	0	8	**25**	**230**	**720**
Total Contact Hours per week: 26								
Total Credit: 25								

1	ME181701	Vibration of Mechanical Systems
2	ME181702	Applied Thermodynamics - II
3	ME181703	Industrial Engineering and Management
4	ME181PE11	Hydraulic Machines
5	ME181PE13	Power Plant Technology
6	ME181PE15	Refrigeration
1	ME181OE11	Operation Research
2	ME181OE12	Renewable Energy Sources
3	ME181OE13	Solid Waste Management

VIBRATION OF MECHANICAL SYSTEMS [ME181701]

Course Outcomes (COs): At the end of the course, the students will be able to:

CO1	**Construct** free body diagram and formulate the equation of motion for free vibration of mechanical system under damped and undamped conditions.
CO2	**Develop** mathematical models of physical systems under forced vibration using Newton's laws of motion and principles of conservation of energy and solve.
CO3	**Analyze** results of seismic instruments to estimate vibration parameters.
CO4	**Evaluate** vibration parameters and noise for multi degrees of freedom system and estimate the critical speed of a shaft for whirling motion.

Mapping of COs with POs

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

APPLIED THERMODYNAMICS – II [ME181702]

Course Outcomes (COs): At the end of the course, the students will be able to:

CO1	Evaluate Indicated power, FAD, Isothermal efficiency of air compressors
CO2	Explain the methods of improving the thermal efficiency of the gas turbine and estimate the thermal efficiency, specific power consumption, power developed by a gas turbine unit for given an operating condition and. [M2]
CO3	Explain the effect different operating parameter on the VCR and **estimate** the refrigerating effect, capacity, COP, power required for operating a refrigerating unit for given operating conditions.
CO4	Explain Air Breathing Engines (Ramjet, Turbojet (standard): Fan exhausted turbojet & Fan mixed turbojet and Turbo prop.) and Non-Air Breathing Engines (Solid Rocket Motors and Liquid Rocket Engines).

Mapping of COs with POs

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	2	-	-	-	-	-	1	1	1	-	1
CO2	2	2	-	-	-	-	-	1	1	1	-	1
CO3	3	1	-	-	-	-	-	1	1	1	-	1
CO4	2	-	-	-	-	-	-	1	1	1	-	1
CO5	3	1	-	-	-	-	-	1	1	1	-	1

INDUSTRIAL ENGINEERING AND MANAGEMENT [ME181703]

Course Outcomes (COs): At the end of the course, the students will be able to:

CO1	**Explain** the concept of Organization, functions of Management and Organization types.
CO2	**Analyse** the problems related to Plant Location and Layout for optimal solutions.
CO3	**Utilize** the concept of Project Management to **Solve** various problems related to time optimization of Projects.
CO4	**Explain** the concepts of Work Study, Product Design; **Solve** PPC and basic Inventory Management problems.
CO5	Explain the concepts of Maintenance Management & TQM; **Solve** problems of Quality Control in Organizations.

Mapping of COs with POs

COs	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**
CO1	3	-	-	-	-		-	-	1	1	-	1
CO2	3	2	-	-	-	1	-	1	1	1	-	1
CO3	3	2	-	-	-	1	1	1	1	1	-	1
CO4	3	1	-	-	-	1	1	1	1	1	-	1
CO5	2	2	-	-	-	1	1	1	1	1	-	1

HYDRAULIC MACHINES [ME181PE11]

Course Outcomes (COs): At the end of the course, the students will be able to:

CO1	**Develop** the Euler equation of hydraulic machines and distinguish different classes of turbines. [M1]
CO2	**Explain** the working principle and **analyse** performance of hydraulic turbines. [M2]
CO3	**Explain** the concept of cavitation and **analyse** the performance of draft tube. [M2]
CO4	**Classify** different classes of pumps, their construction, features and **analyse** their performance. [M3]
CO5	**Utilize** the knowledge of various hydraulic machines for industrial applications. [M4]

Mapping of PO's with CO's

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	**3**	**2**	**-**	**-**	**-**	**-**	**-**	**1**	**1**	**1**	**-**	**1**
CO2	**3**	**2**	**-**	**-**	**-**	**-**	**1**	**1**	**1**	**1**	**-**	**1**
CO3	**3**	**2**	**-**	**-**	**-**	**-**	**-**	**1**	**1**	**1**	**-**	**1**
CO4	**3**	**2**	**-**	**-**	**-**	**-**	**-**	**1**	**1**	**1**	**-**	**1**
CO5	**3**	**-**					**-**	**1**	**1**	**1**		**1**

POWER PLANT TECHNOLOGY [ME1818PE13]

Course Outcomes (COs): At the end of the course, the students will be able to:

CO1	Identify the different components of power plants and understand local and global energy scenario.
CO2	Evaluate the performance of steam power plant and its different components.
CO3	Compare the working and performance of diesel and gas turbine power plant.
CO4	Differentiate the working and relative merits between different non-conventional power plants.
CO5	Analyse the economics of power generation in different power plant.

Mapping of PO's with CO's

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	2	2	-	-	-	1	2	1	-	1	-	1
CO2	3	3	1	2	-	1	1	1	-	1	-	1
CO3	2	1	-	-	-	-	-	1	1	1	-	1
CO4	2	3	-	-	-	1	2	1	-	1	-	1
CO5	3	2	-	2		1	1	1	1	1	-	1

REFRIGERATION [ME181PE15]

Course Outcomes (COs): At the end of the course, the students will be able to:

CO1	**Illustrate** and **solve** problems on air refrigeration systems for aircraft
CO2	**Solve** problems on and **analyse** the vapour compression refrigeration cycle.
CO3	**Explain** vapour absorption and non-conventional refrigeration system
CO4	**Explain** various refrigeration equipment used in VCRS and VARS.
CO5	**Select** environmentally friendly refrigerants and **illustrate** various refrigeration applications.

Mapping of PO's with CO's

COS	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	1	-	-	-	-	-	1	-	1	-	-
CO2	3	3	3	-	2	-	-	1	-	1	-	2
CO3	3	-	-	-	-	-	-	1	-	1	-	2
CO4	3	-	-	-	-	-	-	1	-	1	-	2
CO5	2	-	-	-	-	2	2	1	-	1	-	2

OPERATION RESEARCH [ME181OE11]

Course Outcomes (COs): At the end of the course, the students will be able to:

CO1	**Develop** linear programming models for simple real-life problems and **solve** them to find the best feasible solutions.
CO2	**Solve** transportation and assignment problems to **find** the best feasible solution.
CO3	**Solve** single and multi-variate linear and non-linear problems using classical methods of optimization techniques.
CO4	**Solve** classical inventory problems involving demands of deterministic nature.

CO5	**Develop** a mathematical model for simulation and **find** the future outcomes of simple real-life problems using Monte-Carlo Simulation.

Mapping of PO's with CO's

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	2	2	–	–	3	–	–	–	1	1	–	1
CO2	2	2	1	–	1	–	–	–	1	1	–	1
CO3	3	–	–	–	–	–	–	–	1	1	–	1
CO4	3	–	–	–	–	–	–	–	1	1	–	1
CO5	2	2	–	–	2	–	–	–	1	1	–	1

Renewable Energy Sources [ME181OE12]

Course Outcomes (COs): At the end of the course, the students will be able to:

CO1	Explain the processes and mechanism of conversion of biomass into gaseous fuels
CO2	Explain different solar thermal energy harvesting devices and design solar air and water heaters
CO3	Describe Special characteristics, turbine parameters, optimum operation, electric power generation from wind/tidal energy; Types of wind mills, and elementary design principle
CO4	Describe geothermal power plant, Principle of ocean thermal energyconversion Power plant based on OTEC, working principle of nuclear powerplant and its different components
CO5	Explain the direct energy conversion methods; Thermo-ions, MHD, electrochemical devices, fuel cells etc., integrated energy packages using solar, biomass, and wind.

Mapping of PO's with CO's

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	2	-	–	–	-	1	1	1	1	1	–	1
CO2	1	2	2	–	-	1	1	1	1	1	–	1
CO3	2	–	–	–	–	1	1	1	1	1	–	1
CO4	2	–	–	–	–	1	1	1	1	1	–	1
CO5	2	-	–	–	-	1	1	1	1	1	–	1

SOLID WASTE MANAGEMENT [ME181OE13]

Course Outcomes (COs): At the completion of the course the student will be able to:

CO1	**Explain** the 4-R Principle in waste minimization, Concept of Zero Waste, Types and Sources of Solid Waste, Characteristics & Quantification technique of Solid Waste, Legislation & Regulations.
CO2	**Explain** Collection Systems and different stages of Processing of Solid Waste.
CO3	**Explain** different techniques of solid waste composting, combustion and energy recovery techniques from solid waste.
CO4	**Explain** the environmental problems relating to solid waste management.
CO5	**Explain** the need of implementing scientific solid waste management in modern society.

Mapping of COs with POs:

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	–	–	–	–	–	2	3	1	1	1	–	1
CO2	–	–	–	–	–	1	3	1	1	1	–	1
CO3	–	–	–	–	–	1	3	1	1	1	–	1
CO4	–	–	–	–	–	2	3	1	1	1	–	1
CO5	–	–	–	–	–	2	3	1	1	1	–	1

PROJECT-I [ME181722]

Course Outcomes: Upon completion of the project, students shall be able to:

CO1	**Apply** engineering knowledge, and modern engineering and IT tools and techniques to **investigate** complex system, **analyze** data to produce useful information and **draw** conclusion and also **develop** system or system components.
CO2	Communicate results, concepts, analyses and ideas in written and oral form through report preparation, project presentation and paper publication
CO3	**Develop** the attributes of the capability of working in team, project management through information, knowledge and skill sharing to achieve the goal of the project assigned.

Mapping of COs with POs

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

GRAND VIVA VOCE-I [ME181723]

Course Outcomes: Upon completion of the course, students shall be able to:

CO1	Develop self-learning skills
CO2	Demonstrate domain knowledge and skills in interview
CO3	Communicate effectively in personnel interview

Mapping of COs with POs

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

INTERNSHIP-III (SAI - INDUSTRY) [SI181721]

Course Outcomes: At the end of the internship, the students will be able to

CO1	Communicate effectively through report preparation and presentation.
CO2	Describe the use of advanced tools and techniques available in industry and also industrial safety measures practiced in industry
CO3	Develop interpersonal and team skills, confidence of working in industry, awareness about the working environment and self-learning capability

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