Course Outcome of the Courses of B.Tech. 6rd 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	ME181601	Machine Design-II	3	0	2	4	30	70
2	ME181602	Fluid Mechanics-II	3	0	0	3	30	70
3	ME181603	Mechanical Measurements and Instrumentation	3	0	0	3	30	70
4	ME181604	Workshop Theory and Practice-II	3	0	2	4	30	70
5	ME181605	Heat Transfer-II	3	0	0	3	30	70
6	HS181606	Accountancy	2	0	0	2	30	70
Practical								
1	ME181612	Fluid Mechanics-II Lab	0	0	2	1	15	35
2	ME181613	Mechanical Measurements and Instrumentation Lab	0	0	2	1	15	35
3	ME181615	Heat Transfer-II Lab	0	0	2	1	15	35
Total			**17**	**0**	**10**	**22**	**225**	**525**
Total Contact Hours per week: 27								
Total Credits: 22								

N.B. 4-6 weeks Mandatory Industry Internship need to be done in the 6th semester break and thereport is to be submitted and evaluated in 7th semester

MACHINE DESIGN-II [ME181601]

Course Outcome (COs): At the end of the course, the student will be able to

CO1	**Identify** the modes of fatigue failure in materials in cases of axial, torsional, flexural and combined loading conditions with stress concentration criteria
CO2	**Distinguish** between cases of static and dynamic loading conditions to test the theories of failurein design of simple mechanical elements like plates, bars, beams and shafts
CO3	**Design** gears, springs by selecting and analyzing engineering materials and considering designcriterions of failure under static and dynamic loading conditions using design data hand book(s)
CO4	**Utilize** the principles of tribology to design sliding contact bearing and select antifriction-bearings under static and dynamic loading conditions using design data hand book(s)
CO5	**Design and analyse** brakes and clutches under the consideration of power transmission usingdesign data hand book(s).

Mapping of COs with POs

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

FLUID MECHANICS – II [ME181602]

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

CO1	familiarize with behaviour of compressible gas flow and to understand the difference between subsonic and supersonic flow
CO3	Illustrate the effect of Mach number on wave pattern, and do analysis for Fanno flow, Rayleigh flow and isothermal flow
CO4	Determine integral thicknesses, wall shear stresses, and skin friction coefficient using the concepts of viscous boundary layers and the momentum integral
CO5	Justify the cause of boundary layer separation in viscous and turbulent flows, deduce velocity distribution, shear velocity, and intensity in turbulent flows and derive the governing equations for the respective flows
CO6	Solve turbulent fluid flow problems with the application of turbulent theories and boundary conditions, differentiate between hydraulically smooth and rough boundaries

Mapping of PO's with CO's

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

MECHANICAL MEASUREMENTS AND INSTRUMENTATION [ME181603]

Mechanical Measurement and Instrumentation (ME181603)

CO1: Understand the generalized methods and devices for mechanical measurements.

CO2: **Apply** the concept of static and dynamic characteristics to understand the behavior of different types of systems and their input-output relationship

CO3: **Apply** transducers and sensors for measuring mechanical parameters.

CO4: **Select** and apply measuring instruments for measurement of different mechanical parameters.

CO5: **Explain** different display devices and recorders

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

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

CO1	**Apply** the principles of static and dynamic characteristics of the instruments for their calibration
CO2	**Apply** transducers and sensors for measuring mechanical parameters
CO3	**Apply** modulation and demodulation for mechanical signals and different conversion techniques
CO4	**Apply** the concept of measurement and **identify** the errors involved in the control systems
CO5	**Selec**t and **apply** measuring instruments for industrial manufacturing systems

Mapping of COs with POs

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

WORKSHOP THEORY AND PRACTICE-II [ME181604]

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

CO1	**Explain** suitable welding process for a given application under specific conditions, advantages and limitations of several welding and allied processes.
CO2	**Estimate** tool life and cutting forces for known process parameters in machining with single point cutting tool and explain the process parameters to improve tool life by reducing tool wear and cutting forces.
CO3	**Distinguish** between Jigs and Fixtures and select the appropriate work holding device for a given manufacturing operation
CO4	**Explain** additive manufacturing (AM) over conventional manufacturing for a given application and choose a suitable AM technology based on consideration of material and product design.
CO5	**Describe** the non-conventional machining processes and identify suitable technology for a given machining applications.
CO6	**Construct** simple butt joints using gas/ arc welding, single point cutting tool by grinding from square rod blank.

Mapping of COs with POs

Cos	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	**2**	**1**	**-**	**-**	**-**	**-**	**-**	**1**	**1**	**1**	**-**	**1**
CO2	**3**	**1**	**-**	**-**	**-**	**-**	**-**	**1**	**1**	**1**	**-**	**1**
CO3	**2**	**2**	**-**	**-**	**-**	**-**	**-**	**1**	**1**	**1**	**-**	**1**
CO4	**2**	**1**	**-**	**-**	**-**	**-**	**-**	**1**	**1**	**1**	**-**	**1**
CO5	**2**	**-**	**-**	**-**	**-**	**-**	**-**	**1**	**1**	**1**	**-**	**1**
CO6	**2**	**-**	**3**	**-**	**-**	**-**	**-**	**1**	**1**	**1**	**-**	**1**

HEAT TRANSFER-II [ME181605]

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

CO1	**Classify** the various types of Convective heat transfer problems and discuss their applications
CO2	**Apply** dimensional analysis in convective heat and mass transfer to **derive** empirical equations
CO3	**Compare** different types of boundary layers formed in various flow problems and **evaluate** various parameters of hydrodynamic and thermal boundary layers
CO4	**Design** different types of heat exchangers by deducing sizing and thermal analysis methods and **analyze** two-phase flow problems
CO5	**Evaluate** the heat transfer rate in forced and free convection modes using corresponding empirical correlations

Mapping of COs with POs

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	2	2	-	-	-	-	-	-	-	-	-	1
CO2	2	2	2	-	-	-	-	-	-	-	-	1
CO3	2	1	-	--	--	--	--	--	--	--	--	1
CO4	2	2	1	-	-	-	-	-	-	-	-	1
CO5	2	2	2	-	-	-	-	-	-	-	-	1
CO6	2	1	-	-	-	-	-	-	-	-	-	1

FLUID MECHANICS-II LAB (ME181612)

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

CO1	Categorize different regimes in a pipe flow, visually and theoretically using Reynolds Apparatus
CO2	Determine the coefficient of discharge, C_d of venturi meter and know the experimental techniques for fluid mechanics

Mapping of PO's with CO's

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

MECHANICAL MEASUREMENTS AND INSTRUMENTATION LAB [ME181613]

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

CO1	**Explain** the working principle of devices for mechanical measurements.
CO2	**Formulate** objective(s) and identify key factors in designing experiments for a given problem.
CO3	**Apply** the concepts of calibration, traceability, and uncertainty for accurate and reliable measurements.
CO4	**Identify** and **estimate** measurement errors and **suggest** suitable techniques to minimize them.
CO5	**Analyse** the results to draw valid conclusions.

Mapping of COs with POs:

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

HEAT TRANSFER-II LAB [ME181615]

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

CO1	Estimate convective heat transfer coefficient for forced and free convection and compare the values under steady state condition
CO2	Determine various stage of boiling and critical heat flux.

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	**2**	**3**	**-**	**-**	**-**	**-**	**-**	**1**	**1**	**1**	**-**	**1**