DEPARTMENT OF MECHANICAL ENGINEERING		
YEAR: IIIrd	SEMESTER: Ist	COURSEOUTCOMES(R20)
S.No	**COURSE CODE: R2031031**	**COURSE NAME: THERMAL ENGINEERING-II**
1	**CO1:** Explain the basic concepts of thermal engineering and boilers.	
	CO2: Discuss the concepts of steam nozzles and steam turbines.	
	CO3: Gain knowledge about the concepts of reaction turbine and steam condensers.	
	CO4: Discuss the concepts of reciprocating and rotary type of compressors.	
	CO5: Acquire knowledge about the centrifugal and axial flow compressors.	
	COURSE CODE: R2031032	**COURSE NAME: DESIGN OF MACHINE MEMBERS-I**
2	**CO1:** Judge about materials and their properties along with manufacturing considerations.	
	CO2: Gain knowledge about the strength of machine elements.	
	CO3: Apply the knowledge in designing the riveted and welded joints, keys, cotters and knuckle joints.	
	CO4: Apply the knowledge in designing the shafts and shaft couplings.	
	CO5: Apply the knowledge in designing the mechanical springs.	
	COURSE CODE: R2031033	**COURSE NAME: MACHINING, MACHINE TOOLS & METROLOGY**
3	**CO1**: Discuss the concepts of machining processes.	
	CO2: Apply the principles of lathe, shaping, slotting and planning machines.	
	CO3: Apply the principles of drilling, milling and boring processes.	
	CO4: Analyze the concepts of finishing processes and the system of limits and fits.	
	CO5: Learn the concepts of surface roughness and optical measuring instruments.	
	COURSE CODE: R203103G	**COURSE NAME: SUSTAINABLE ENERGY TECHNOLOGIES (OE-1)**
4	**CO1:** Explain the importance of solar energy collection and storage.	
	CO2: Apply the principles of wind energy and biomass energy.	
	CO3: Analyze knowledge on geothermal and ocean energy.	
	CO4: Justify the knowledge about energy efficient systems.	
	CO5: Discuss the concepts of green manufacturing systems.	
	COURSE CODE: R203103H	**COURSE NAME: OPERATIONS RESEARCH (OE-1)**
5	**CO1:** Apply the basics of operations research and linear programming problems.	
	CO2: Apply the knowledge in solving problems of transportation, assignment and sequencing.	
	CO3: Judge the replacement and game theories and apply the knowledge to solve problems.	
	CO4: Discuss the waiting line models and project management techniques.	
	CO5: Apply the knowledge in solving problems of dynamic programming and simulation.	

	COURSE CODE: R203103I	**COURSE NAME: NANO TECHNOLOGY (OE-1)**
6	**CO1:** Explain about nano-structured materials and their applications.	
	CO2: Apply knowledge about the nano crystalline materials, their properties and defects.	
	CO3: Justify various techniques of nanofabrication.	
	CO4: Apply the tools to characterize nano materials.	
	CO5: Analyze the applications of nano materials.	
	COURSE CODE: (OE-1)	**COURSE NAME: THERMAL MANAGEMENT OF ELECTRONIC SYSTEMS (OE-1)**
7	**CO1:** Apply the basics of heat transfer and analyze heat transfer through fins	
	CO2: Analyze the basics of convection and radiation modes of heat transfer.	
	CO3: Analyze knowledge about the thermal analysis of printed circuit boards and their cooling.	
	CO4: Explain the principles of two-phase cooling and heat pipes.	
	CO5: Justify knowledge about the thermoelectric coolers.	
	COURSE CODE: R203103A	**COURSE NAME: FINITE ELEMENT METHODS (PE-1)**
8	**CO1:** Apply basic principles of finite element methods.	
	CO2: Analyze about discretization principles and apply to analyse the trusses.	
	CO3: Apply the finite element method to analyze and solve beam problems.	
	CO4: Judge the knowledge about two dimensional stress analysis.	
	CO5: Apply steady state and dynamic analysis.	
	COURSE CODE: R203103B	**COURSE NAME: INDUSTRIAL ROBOTICS (PE-1)**
9	**CO1:** Perceive the concepts of robotics and its sytems.	
	CO2: Apply knowledge about the motion analysis and manipulator kinematics.	
	CO3: Analyze the differential transformations.	
	CO4: Apply the basics about path description and generation.	
	CO5: Judge about the actuators, feedback components and robotic applications.	
	COURSE CODE: R203103C	**COURSE NAME: ADVANCED MATERIALS (PE-1)**
10	**CO1:** Justify the knowledge about metals and alloys and their utility in different environments.	
	CO2: Judge about polymers and ceramics and their applications.	
	CO3: Analyze composite materials along with reinforcements and their applications.	
	CO4: Utilize shape memory alloys and functionally graded materials for different applications.	
	CO5: Justify about the nanomaterials and their applications.	
	COURSE CODE: R203103D	**COURSE NAME: RENEWABLE ENERGY SOURCES (PE-1)**
11	**CO1:** Explain the importance of, solar energy collection and storage.	
	CO2: Discuss the wind energy principles.	
	CO3: Analyze about biomass energy concepts.	
	CO4: Apply the principles of tidal energy.	
	CO5: Utilize the concepts of geothermal energy.	

	COURSE CODE: (PE-1)	**COURSE NAME: MECHANICS OF COMPOSITES (PE-1)**
12	**CO1:** Discuss the composite materials and their classification.	
	CO2: Apply the micro mechanical analysis of a lamina.	
	CO3: Learn about two dimensional angle lamina.	
	CO4: Apply the macro mechanical analysis of a lamina.	
	CO5: Utilize knowledge in designing the laminates.	
	COURSE CODE: R2031034	**COURSE NAME: MACHINE TOOLS LABORATORY**
13	**CO1:** Demonstrate about general purpose machine tools in the machine shop.	
	CO2: Perform various operations on lathe machine.	
	CO3: Perceive different operations on drilling machine.	
	CO4: Experiment with basic operations on shaping machine.	
	CO5: Utilize slotting machine to make keyways.	
	CO6: Experiment with the basic operations on milling machine.	
	COURSE CODE: R2031035	**COURSE NAME: THERMAL ENGINEERING LAB**
14	**CO1:** Experiment with two stroke and four stroke compression and spark ignition engines for various characteristics.	
	CO2: Perceive flash point, fire point, calorific value of different fuels using various apparatus.	
	CO3: Perform engine friction, heat balance test, volumetric efficiency, load test of petrol and diesel engines.	
	CO4: Perform speed test, performance test and cooling temperature on petrol and diesel engines.	
	CO5: Utilize air compressor for its performance test and to determine efficiency.	
	CO6: Discuss the principles through assembly and disassembly of 2/3 wheelers, 2/4 stroke engines, tractor, heavy duty engines, boilers and their mountings and accessories.	
	COURSE CODE: R2031037	**COURSE NAME: PROFESSIONAL ETHICS AND HUMAN VALUES**
15	**CO1:** Judge the concepts of human values.	
	CO2: Justify knowledge about the principles of engineering ethics.	
	CO3: Interpret engineering as social experimentation.	
	CO4: Realize engineers' responsibility for safety and risk.	
	CO5: Learn about the engineers' rights and responsibilities.	
	COURSE CODE: R2031036	**COURSE NAME: ADVANCED COMMUNICATION SKILLS LAB**
16	**CO1:** Acquire vocabulary and use it contextually	
	CO2: Listen and speak effectively	
	CO3: Develop proficiency in academic reading and writing	
	CO4: Increase possibilities of job prospects	

HOD PRINCIPAL