PROGRAMME OUTCOME, PROGRAMME SPECIFIC OUTCOMES AND COURSE OUTCOMES OF ALL DEPARTMENTS - 2018-19 (CRITERIA - 2)

Department of Mechanical Engineering

2.6.1 Program outcomes, program specific outcomes and course outcomes

Program Outcomes:



- **PO1 Engineering Knowledge:**
- **PO2** Problem Analysis:
- PO3 Design/Development of solutions:

- **PO4** Conduct Investigations of Complex problems:
- PO5 Modern Tool Usage.
- **PO6** The Engineer and Society:
- **PO7** Environment and Sustainability:
- **PO8** Ethics:
- **PO9** Individual and Team Work:
- **PO10** -Communication:
- **PO11** -Project Management and Finance
- **PO12** -Life-Long Learning:

PROGRAM SPECIFIC OUTCOMES (PSOs):

Engineering Graduates will be able to:

	Students acquire knowledge in basic science, technical and
PSO-1	managerial skills that develop self-confidence for lifelong learning.
	Students acquire theoretical knowledge of advance engineering
PSO-	tools in Design, Thermal and Manufacturing Science that they
	are capable of applying it for solving real time problems.
2	

Course Outcomes:

Year / SEM : 2 nd year / 3 rd sem	Year of Study : 2017-18	
Course Name: Material Science – 17ME32		
CO1	To describe the mechanical properties of metals, their alloys and various modes of failure	
CO2	To understand the microstructures of ferrous and non-ferrous materials to mechanical properties.	

CO3	To explain the process of heat treatment of various alloys
CO4	To understand the properties and potentialities of various alloys
CO5	To know about composite materials and their processing as well as applications

Year / SEM : 2 nd year / 3 rd sem	Year of Study : 2017-18
Cou	rse Name: Basic Thermodynamics – 17ME33
CO1	To explain thermodynamic systems, properties, Zeroth law of thermodynamics, temperature scales and energy interactions
CO2	To determine heat, work, internal energy, enthalpy for flow & non flow process First and Second Law of Thermodynamics.
CO3	To interpret behavior of pure substances and its applications to practical problems.
CO4	To determine change in internal energy, change in enthalpy and change in entropy using TD relations for ideal gases.
CO5	To calculate thermodynamics properties of real gases at all ranges of pressure, temperatures using modified equation of state including Vander Waals equation , Redlich Wong equation and Beattie.

3 ^{ru} sem

Course Name: Mechanics of Materials – 17ME34		
CO1	To understand simple, compound, thermal stresses and strains their relations, Poisson's ratio, Hooke's law, Mechanical properties including elastic constants and their relations.	
CO2	To Determine stresses, strains and deformations in bars with varying circular and rectangular cross-sections subjected to normal and temperature loads	
CO3	To Determine plane stress, principal stress, maximum shear stress and their orientations using analytical method and Mohr's circle	
CO4	To Determine the dimensions of structural members including beams, bars and rods using Energy methods and also stress distribution in thick and thin cylinders	
CO5	To Draw SFD and BMD for different beams including cantilever beams, simply supported beams and overhanging beams subjected to UDL, UVL, Point loads and couples	
C06	To Determine dimensions, bending stress, shear stress and its distribution in beams of circular, rectangular, symmetrical I and T sections subjected to point loads and UDL	
C07	To Determine the dimensions of shafts based on torsional strength, rigidity and flexibility and also elastic stability of columns using Rankin's and Euler's theory	

Year / SEM : 2 nd year / 3 rd sem		Year of Study : 2017-18
Course Name: Metal Casting and Welding – 17ME35A/45A		and Welding – 17ME35A/45A
C01	Describe the casting proc sand molds and Sweep, S	cess, preparation of Green, Core, dry Shell, Investment and plaster molds.

CO2	Explain the Pattern, Core, Gating, Riser system and Jolt, Squeeze, Sand Slinger Molding Machines.
CO3	Compare the Gas fired pit, Resistance, Coreless, Electrical and Cupola Metal Furnaces.
CO4	Compare the Gravity, Pressure die, Centrifugal, Squeeze, slush and Continuous Metal mold castings.
CO5	Explain the Solidification process and Casting of Non-Ferrous Metals.
C06	Describe the Metal Arc, TIG, MIG, Submerged and Atomic Hydrogen Welding processes used in manufacturing.
C07	Explain the Resistance spot, Seam, Butt, Projection, Friction, Explosive, Thermit, Laser and Electron Beam Special type of welding process used in manufacturing.
CO8	Describe the Metallurgical aspects in Welding and inspection methods for the quality assurance of components made of casting and joining process.

Year	/ SEM : 2 nd year / 3 rd sem	Year of Study : 2017-18
Course Name: Machine Tools and Operations – 17ME35B/45B		
C01	Explain the construction & specification of various machine tools.	
CO2	Describe various machining processes pertaining to relative motions between tool & work piece.	
CO3	Discuss different cutting surface finish.	tool materials, tool nomenclature &

CO4	Apply mechanics of machining process to evaluate machining time.
CO5	Analyze tool wear mechanisms and equations to enhance tool life and minimize machining cost.

Year 3 rd se	/ SEM : 2 nd year / em	Year of Study : 2017-18
Course	Name: Computer Aided M	lachine Drawing – 17ME36A/46A
C01	Sections of pyramids, prison their bases in 2D	sms, cubes, cones and cylinders resting
CO2	Orthographic views of machine parts with and without sectioning in 2D.	
CO3	Sectional views for threads with terminologies of ISO Metric, BSW, square and acme, sellers and American standard threads in 2D.	
CO4	Hexagonal and square headed bolt and nut with washer, stud bolts with nut and lock nut, flanged nut, slotted nut, taper and split pin for locking counter sunk head screw, grub screw, Allen screw assemblies in 2D	
C05	Parallel key, Taper key, and Woodruff Key as per the ISO standards in 2D	
CO6	single and double riveted single/double cover strap in 2D	lap joints, butt joints with s, cotter and knuckle joint for two rods
C07	Sketch split muff, protecte Oldham's and universal c	ed type flanged, pin type flexible, ouplings in 2D
CO8	assemblies from the part given for Plummer block, I connecting rod, Screw Jac Lathe square tool post in 2	drawings with limits ,fits and tolerance Ram bottom safety valve, I.C. Engine k, Tailstock of lathe, Machine Vice and 2D and 3D

Year	/ SEM : 2 nd year / 3 rd sem	Year of Study : 2017-18
Course Name: Mechanical Measurements and Metrology – 17ME36B/46B		
CO1	Understand the objectives of measurement, selection of r of measurement and calibration	f metrology, methods of neasuring instruments, standards ition of end bars.
CO2	Describe slip gauges, wringing of slip gauges and building of slip gauges, angle measurement using sine bar, sine center, angle gauges, optical instruments and straightness measurement using Autocollimator.	
CO3	Explain tolerance, limits of size, fits, geometric and position tolerances, gauges and their design.	
CO4	Understand the principle of comparator, dial indicator, Solex comparators and Zeis	Johnson Mikrokator, sigma LVDT, back pressure gauges, s Ultra Optimeter
CO5	Describe measurement of m pitch, angle and effective dia wire, 3 – wire methods, scre microscope.	ajor diameter, minor diameter, ameter of screw threads by 2 – w thread gauges and tool maker's
CO6	Explain measurement of toor method, addendum compara method, composite error usin of pitch, concentricity, run o	th thickness using constant chord tor methods and base tangent ng gear roll tester and measurement ut and involute profile.
C07	Understand laser interferon machines.	neters and Coordinate measuring
CO8	Explain measurement syste modifying devices and term	ms, transducers, intermediate inating devices.
CO9	Describe functioning of force temperature measuring devi	, torque, pressure, strain and ces.

Year / SEM : 2 nd year / 3 rd sem	Year of Study : 2017-18
Course Name: Material Testing Lab – 17ME37A/47A	

CO1	Acquire experimentation skills in the field of material testing.
CO2	Develop theoretical understanding of the mechanical properties of materials by performing experiments.
CO3	Apply the knowledge to analyze a material failure and determine the failure inducing agent/s.
CO4	Apply the knowledge of testing methods in related areas.
C05	Know how to improve structure/behavior of materials for various industrial applications.

Year	/ SEM : 2 nd year / 3 rd sem	Year of Study : 2017-18		
Cours	Course Name: Mechanical Measurement and Metrology Lab – 17ME37B/47B			
C01	To calibrate pressure gaug micrometer	ge, thermocouple, LVDT, load cell,		
CO2	To measure angle using Sine Center/ Sine Bar/ Bevel Protractor, alignment using Autocollimator/ Roller set.			
CO3	To demonstrate measurements using Optical Projector/Tool maker microscope, Optical flats			
CO4	To measure cutting tool fo dynamometer	prces using Lathe/Drill tool		
C05	To measure Screw thread method, gear tooth profile micrometer.	parameters using 2-Wire or 3-Wire using gear tooth vernier/Gear tooth		
C06	To measure surface rough Comparator.	ness using Tally Surf/ Mechanical		

Year /	SEM	:	2 nd year	/	3 rd sem
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Year of Study : 2017-18

Course Name: Foundry and Forging Lab – 17ME38A/48A		
C01	Demonstrate various skills of sand preparation, molding.	
CO2	Demonstrate various skills of forging operations.	
CO3	Work as a team keeping ethical principles	

Year	/ SEM : 2 nd year / 3 rd sem	Year of Study : 2017-18
	Course Name: Machine	Shop - 17ME38B/48B
CO1	Perform turning , facing , tapering , eccentric turnin / slots , grooves etc using	knurling , thread cutting, ng and allied operations, keyways g shaper
CO2	Perform gear tooth cuttin	g using milling machine
C03	Understand the formation single point cutting tool u cutter grinder, Surface M	n of cutting tool parameters of using bench grinder / tool and illing/Slot Milling
CO4	Demonstrate precautions Shop	and safety norms followed in Machine
C05	Exhibit interpersonal skil	lls towards working in a team

Year sem	/ SEM : 2 nd year / 4 th	Year of Study : 2017-18
Course Name: Kinematics of Machines – 17ME42		
C01	Identify mechanisms with	n basic understanding of motion.
CO2	Comprehend motion analysis of planar mechanisms, gears, gear trains and cams.	
CO3	Carry out motion analysis trains and cams.	of planar mechanisms, gears, gear

Year sem	/ SEM : 2 nd year / 4 th	Year of Study : 2017-18
	Course Name: Applied Th	ermodynamics – 17ME43
C01	Apply thermodynamic con power cycles including pr	ncepts to analyze the performance of gas opulsion systems.
CO2	Evaluate the performance of steam turbine components.	
CO3	Understand combustion of fuels and combustion processes in I C engines including alternate fuels and pollution effect on environment.	
CO4	Apply thermodynamic concepts to analyze turbo machines.	
C05	Determine performance p conditioning systems.	arameters of refrigeration and air-
C06	Understand the principle systems.	s and applications of refrigeration
C07	Analyze air-conditioning processes using the principles of psychrometry and Evaluate cooling and heating loads in an air- conditioning system.	
C08	Understand the working, applications, relevance of air and identify methods for performance improvement	

Year	/ SEM : 2^{nd} year / 4^{th}	Year of Study : 2017-18
Course Name: Fluid Mechanics – 17ME44		
C01	Identify and calculate the key fluid properties used in the analysis of fluid behavior.	
CO2	2 Understand and apply the principles of pressure, buoyancy and floatation	

CO3	Apply the knowledge of fluid statics, kinematics and dynamics while addressing problems of mechanical and chemical engineering.
CO4	Understand and apply the principles of fluid kinematics and dynamics.
CO5	Understand the concept of boundary layer in fluid flow and apply dimensional analysis to form dimensionless numbers in terms of input output variables.
C06	Understand the basic concept of compressible flow and CFD

Year sem	/ SEM : 3^{rd} year / 5^{th}	Year of Study : 2017-18
Course	Name: Management and	Engineering Economics- 17ME51
C01	Explain the development of management and the role it plays at different levels in an organization.	
CO2	Comprehend the process and role of effective planning, organizing and staffing for the development of an organization.	
CO3	Understand the necessity of good leadership, communication and coordination for establishing effective control in an organization.	
CO4	Understand engineering importance in economic solving.	economics demand supply and its s decision making and problem
C05	Calculate present worth alternatives in economi	n, annual worth and IRR for different c decision making.
C06	Understand the proced a simple component, pr methods	ure involved in estimation of cost for roduct costing and depreciation, its

Year / SEM : 3 rd year / 5 th sem	Year of Study : 2017-18
Course Name: Dynamics of Machines – 17ME52	

001	Determine the forces and couples for static and
C01	dynamic conditions of four bar and slider crank
	mechanisms to keep the system in equilibrium.
	Determine magnitude and angular position of balancing
CO2	masses under static and dynamic condition of rotating masses
	in same and different planes.
	Determine unbalanced primary, secondary forces and couples in
CO3	single and multi-cylinder engine.
	Determine sensitiveness, isochronisms, effort and power of porter
CO4	and hartnell governors.
	Determine gyroscopic couple and effects related to 2, 4 wheeler,
CO5	plane disc, ship and aeroplanes.
	Understand types of vibration, SHM and methods of finding
CO6	natural frequencies of simple mechanical systems.
	Determine equation of motion, natural frequency, damping
C07	factor, logarithmic decrement of damped free vibration (SDOF)
	systems.
	Determine the natural frequency, force and motion
CO8	transmissibility of single degree freedom systems.
	Determine equation of motion of rotating and reciprocating
CO9	unbalance systems, magnification factor, and transmissibility of
	forced vibration (SDOF) systems

Year sem	/ SEM : 3^{rd} year / 5^{th}	Year of Study : 2017-18	
	Course Name: Turbo Machines – 17ME53		
CO1	Able to give precise defini	tion of turbo machinery	
CO2	Identify various types of t	urbo machinery	
CO3	Apply the Euler"s equation transfer in turbomachine	on for turbo machinery to analyze energy s	

CO4	Understand the principle of operation of pumps, fans, compressors and turbines.
C05	Perform the preliminary design of turbomachines (pumps, rotary compressors and turbines)
C06	Analyze the performance of turbo machinery

Year / SEM : 3 rd year / 5 th sem		Year of Study : 2017-18	
Co	Course Name: Design of Machine Elements-1 – 17ME54		
CO1	Describe the design proce	ess, choose materials.	
CO2	Apply the codes and standards in design process.		
CO3	Analyze the behavior of machine components under static, impact, fatigue loading using failuretheories.		
CO4	Design shafts, joints, cou	plings.	
CO5	Design of riveted and wel	ded joints.	
C06	Design of threaded fastene	ers and power screws	

Year	/ SEM : 3^{rd} year / 5^{th}	Year of Study : 2017-18
Course Name: Refrigeration and Air Conditioning– 17ME551		
C01	Illustrate the principles, refrigeration systems.	nomenclature and applications of
CO2	Explainvapor compressio methods for performance	n refrigeration system and identify improvement

CO3	Study the working principles of air, vapor absorption, thermoelectric and steam-jet and thermo-acoustic refrigeration systems
CO4	Estimate the performance of air-conditioning systems using the principles of psychometry.
C05	Compute and Interpret cooling and heating loads in an air- conditioning system
C06	Identify suitable refrigerant for various refrigerating systems

Year sem	/ SEM : 3^{rd} year / 5^{th}	Year of Study : 2017-18
	Course Name: Theory	of Elsticity- 17ME552
C01	Describe the state of stre members subjected to dir	ss and strain in 2D and 3D elastic rect loads and thermal loads.
CO2	Analyse the structural m	embers: beam, rotating disks, columns.
CO3	Analyse the torsional rigi sections.	dity of circular and non-circular
CO4	Analyse the stability of col	umns.

Year sem	/ SEM : 3 rd year / 5 th	Year of Study : 2017-18
Course Name: Human Resource Management- 17ME553		
C01	Understand the importan Resource Management ar	ce, functions and principles Human nd process of Job analysis
CO2	Summarize the objectives Recruitment and selection	s of Human Resource planning, n process
CO3	Understand the process in development activities.	volved in Placement, Training and

CO4	Understand the characteristics of an effective appraisal system and compensation planning.
C05	Understand the issues related to employee welfare, grievances and discipline.

Year sem	$r / SEM : 3^{rd} year / 5^{th}$	Year of Study : 2017-18
	Course Name: Non Tradit	ional Machining– 17ME554
C01	Understand the compare machining processand re machining process.	traditional and non-traditional cognize the need for Non-traditional
C02	Understand the construct parameters, process chara limitations of USM, AJM a	tional features, performance acteristics, applications, advantages and and WJM.
CO3	Identify the need of Chemi process along with the cor parameters, process chara limitations.	ical and electro-chemical machining nstructional features, process acteristics, applications, advantages and
C04	Understand the construct parameters, process char and limitations EDM & P.	tional feature of the equipment, process racteristics, applications, advantages AM.
C05	Understand the LBM equip characteristics. EBM equip removal, applications, adv	pment, LBM parameters, and pment and mechanism of metal rantages and limitations LBM & EBM.

Year sem	/ SEM : 3^{rd} year / 5^{th}	Year of Study : 2017-18
	Course Name: Optimizat	ion Techniques- 17ME561
C01	Understand the overview design space, constraint	of optimization techniques, concepts of surfaces and objective function.
CO2	Review differential calcul functions of several varia	us in finding the maxima and minima of bles.
CO3	Formulate real-life proble	ems with Linear Programming.

CO4	Solve the Linear Programming models using graphical and simplex methods.
CO5	Formulate real-life transportation, assignment and travelling salesman problems to find the optimum solution using ransportation algorithms
C06	Analyze the Queuing model for effective customer satisfaction
C07	Apply dynamic programming to optimize multi stage decision problems.
CO8	Determine the level of inventory that a business must maintain to ensure smooth operation.
CO9	Construct precedence diagram for series of activities in a huge project to find out probability of expected completion time using PERT-CPM networks. Also reduce the duration of project by method of crashing.

Year / SEM : 3 rd year / 5 th sem		Year of Study : 2017-18
	Course Name: Energy &	Environment – 17ME562
C01	Summarize the basic concepts of energy, its distribution and general Scenario.	
CO2	Explain different energy storage systems, energy management, audit and economic analysis.	
CO3	Summarize the environment eco system and its need for awareness.	
CO4	Identify the various types of environment pollution and their effects.	
CO5	Discuss the social issues of the environment with associated acts.	

Year sem	/ SEM : 3^{rd} year / 5^{th}	Year of Study : 2017-18
	Course Name: Automatic	on & Robotics – 17ME563
C01	Identify potential areas for automation and justify need for automation.	
CO2	selecting suitable major control components required to automate a process or an activity	
CO3	To study the various part	s of robots and fields of robotics.
CO4	To study the various kine robots.	ematics and inverse kinematics of
C05	To study the control of rot	oots for some specific applications.

Year / SEM : 3 rd year / 5 th sem		Year of Study : 2017-18
	Course Name: Project	Management– 17ME564
CO1	Understand the selection, prioritization and initiation of individual projects and strategic role of project management.	
CO2	Understand the work breakdown structure by integrating it with organization.	
CO3	Understand the scheduling and uncertainty in projects.	
CO4	Students will be able to understand risk management planning using project quality tools.	
C05	Understand the activities like purchasing, acquisitions, contracting, partnering and collaborations related to performing projects.	
C06	Determine project progres scorecard approach	ss and results through balanced

	Draw the network diagram to calculate the duration of the project
C07	and reduce it using crashing.

Year , sem	/ SEM : 3 rd year / 5 th	Year of Study : 2017-18
	Course Name: Ene	ergy Lab- 17MEL57
CO1	Perform experiments to determine the coefficient of discharge of flow measuring devices.	
CO2	Conduct experiments on hydraulic turbines and pumps to draw characteristics.	
CO3	Test basic performance parameters of hydraulic turbines and pumps and execute the knowledge in real life situations.	
CO4	Determine the energy flow pattern through the hydraulic turbines and pumps	
CO5	Exhibit his competency to hydraulic machines	owards preventive maintenance of

Year / SEM : 3 rd year / 5 th sem		Year of Study : 2017-18
	Course Name: Project	Management– 17ME58
CO1	Perform experiments to d	etermine the properties of fuels and oils.
CO2	Conduct experiments on engines and draw characteristics.	
CO3	Test basic performance parameters of I.C. Engine and implement the knowledge in industry.	
CO4	Identify exhaust emission remedies.	, factors affecting them and report the

C05	Determine the energy flow pattern through the I C Engine
C06	Exhibit his competency towards preventive maintenance of IC engines.

Year sem	/ SEM : 3 rd year / 6 th	Year of Study : 2017-18
	Course Name: Finite Ele	ement Analysis– 17ME61
C01	Understand the concepts	behind formulation methods in FEM.
CO2	Identify the application and characteristics of FEA elements such as bars, beams, plane and iso-parametric elements.	
C03	Develop element characte equation.	ristic equation and generation of global
CO4	Able to apply suitable boundary conditions to a global equation for bars, trusses, beams, circular shafts, heat transfer, fluid flow, axi symmetric and dynamic problems and solve them displacements, stress and strains induced.	

Year sem	/ SEM : 3 rd year / 6 th	Year of Study : 2017-18
Cour	se Name: Computer Integ	grated Manufacturing– 17ME62
C01	Able to define Automation differences between these	n, CIM, CAD, CAM and explain the concepts.
CO2	Solve simple problems of transformations of entities on computer screen.	
CO3	Explain the basics of automated manufacturing industries through mathematical models and analyze different types of automated flow lines.	
CO4	Analyze the automated fle enhance productivity.	ow linesto reduce down time and

	Explain the use of different computer applications in
CO5	manufacturing, and able to prepare part programs for simple jobs
	on CNC machine tools and robot programming.
	Visualize and appreciate the modern trends in Manufacturing like
CO6	additive manufacturing, Industry 4.0 and applications of Internet
	of Things leading to Smart Manufacturing.

Year sem	/ SEM : 3^{rd} year / 6^{th}	Year of Study : 2017-18
	Course Name: Hea	t Transfer– 17ME63
C01	Understand the basic mod	les of heat transfer.
CO2	Compute temperature distribution in steady-state and unsteady- state heat conduction	
CO3	Understand and interpret heat transfer through extended surfaces.	
CO4	Interpret and compute for	rced and free convective heat transfer.
C05	Explain the principles of radiation heat transfer and understand the numerical formula for heat conductionproblems.	
CO6	Design heat exchangers us	sing LMTD and NTU methods.

Year /	SEM : 3 rd year / 6 th sem	Year of Study : 2017-18
C	ourse Name: Design of Ma	achine Elements-II– 17ME64
CO1	Apply engineering design	tools to product design.

CO2	Design mechanical systems involving springs, belts and pulleys.
CO3	Design different types of gears and simple gear boxes for different applications.
CO4	Design brakes and clutches.
C05	Design hydrodynamic bearings for different applications.
CO6	Select Anti friction bearings for different applications using the manufacturers, catalogue.
C07	Develop proficiency to generate production drawings using CAD software.
CO8	Become good design engineers through learning the art of working in a team with morality and ethics

Year / SEM : 3 rd year / 6 th sem		Year of Study : 2017-18
	Course Name: Computer	Fluid Dynamics- 17ME651
CO1	Understand mathematical characteristics of partial differential equations.	
CO2	Explain how to classify and computationally solve Euler and Navier-Stokes equations.	
CO3	Make use of the concepts like accuracy, stability, consistency of numerical methods for the governingequations.	
CO4	Identify and implement nu integration of partial differ	umerical techniques for space and time cential equations.
C05	Conduct numerical experi	ments and carry out data analysis.

CO6	Acquire basic skills on programming of numerical methods used to solve the Governing equations.
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Year /	SEM : 3 rd year / 6 th sem	Year of Study : 2017-18	
Cou	Course Name: Mechanics of Composite Materials- 17ME652		
CO1	To identify the properties o commercial composites, as techniques.	f fiber and matrix materials used in well as some common manufacturing	
CO2	To predict the failure strength of a laminated composite plate		
CO3	Understand the linear elasticity with emphasis on the difference between isotropic and anisotropic material behaviour.		
CO4	Acquire the knowledge for and test simulation of ad Components.	r the analysis, design, optimization vanced composite structures and	

Year sem	/ SEM : 3^{rd} year / 6^{th}	Year of Study : 2017-18
	Course Name: Meta	l Forming– 17ME653
C01	Able to understandthe co	ncept of different metal forming process.
CO2	Able to approach metal forming processes both analytically and numerically	
CO3	Able to design metal form	ing processes
CO4	Able to develop approache forming processes and the	s and solutions to analyze metal associated problems and flaws.

Year	/ SEM : 3 rd year / 6 th sem	Year of Study : 2017-18
	Course Name: Too	ol Design– 17ME63
CO1	To develop capability to design and select single point and multipoint cutting tools for various machining operations.	
CO2	Exposure to variety of locating and clamping methods available.	
CO3	To enable the students to design jigs and fixtures for simple components.	
CO4	To expose the students to the design/selection procedure of press tools and die casting dies.	

Year	/ SEM : 3 rd year / 6 th sem	Year of Study : 2017-18
	Course Name: Automobil	e Engineering- 17ME655
CO1	To identify the different pa	rts of an automobile and it's working
CO2	To understand the working of transmission and braking systems	
CO3	To comprehend the workin	g of steering and suspension systems
CO4	To learn various types of fu	aels and injection systems
C05	To know the cause of auton environment and methods t	nobile emissions, its effects on to reduce the emissions.

Year / SEM : 3 rd year / 6 th sem		Year of Study : 2017-18	
	Course Name: Energy Auditing- 17ME661		
CO1	Understand the basic concepts of energy audit and energy management		
CO2	Explain different types of energy audit, maximizing and optimizing system efficiency.		
CO3	Summarize energy management systems, prepare and present energy audit report		
CO4	Identify energy saving potential of thermal and electrical systems		
CO5	Discuss Energy audit instruments, Procedures and Techniques.		

Year ,	/ SEM : 3 rd year / 6 th sem	Year of Study : 2017-18	
Course Name: Industrial Safety- 17ME662			
CO1	Understand the basic safety terms.		
CO2	Identify the hazards around the work environment and industries.		
CO3	Use the safe measures while performing work in and around the work area of the available laboratories.		
CO4	Able to recognize the sign boards and its application.		
C05	Able to demonstrate the pe class of fires.	ortable extinguishers used for different	
CO6	Able to write the case stud employees working in hou electrical labs, machine sh laboratories.	lies by sharing experience of the sekeeping, laboratories like workshops, nops, electronics and computer	

	Able to understand and report the case studies from various
C07	references (text books, news report, journals, visiting industries like
	power stations, manufacturing and maintenance).

Year / SEM : 3 rd year / 6 th sem		Year of Study : 2017-18
Course Name: Maintenance Engineering- 17ME663		
C01	Understand maintenance objectives and evaluate various maintenance strategies for process plant application, Develop necessary planning and scheduling and control of preventive maintenance activities.	
C02	Evaluate reliability of a simple plant component and system.	
CO3	Understand and apply the advanced concepts such as RCM and advantages for a company employing them	
CO4	Understand and apply the advantages for a company	e advanced concepts such as TPM and employing
C05	Applythe principles of con	dition monitoring systems.
C06	Apply the mechanical cond the data used in condition	ition monitoring techniques and analyze monitoring

Year /	SEM : 3 rd year / 6 th sem	Year of Study : 2017-18	
	Course Name: Total Quality Management- 17ME664		
CO1	Explain the various appro	aches of TQM	
CO2	Infer the customer percep	tion of quality	
CO3	Analyze customer needs a systems.	nd perceptions to design feedback	

CO4	Apply statistical tools for continuous improvement of systems
C05	Apply the tools and technique for effective implementation of TQM.

Year	/ SEM : 3 rd year / 6 th sem	Year of Study : 2017-18
	Course Name: Heat T	ransfer Lab– 17MEL67
CO1	Perform experiments to de metal rod	termine the thermal conductivity of a
CO2	Conduct experiments to de coefficient for free and fore theoretical values.	etermine convective heat transfer ced convection and correlate with
CO3	Estimate the effective ther efficiency in pin-fin	mal resistance in composite slabs and
C04	Determine surface emissiv	rity of a test plate
C05	Estimate performance of a	refrigerator and effectiveness of fin
C06	Calculate temperature dist conduction through plane approach.	ribution of study and transient heat wall, cylinder and fin using numerical

Year /	SEM : 3 rd year / 6 th sem	Year of Study : 2017-18
Course Name: Modeling and Analysis Lab- 17MEL68		
C01	Demonstrate the basic fea	tures of an analysis package.
CO2	Use the modern tools to f geometry, descritize, appl	ormulate the problem, and able to create y boundary condition to solve problems

	of bars, truss, beams, plate to find stress with different- loading conditions.
CO3	Demonstrate the deflection of beams subjected to point, uniformly distributed and varying loads further to use the available results to draw shear force and bending moment diagrams.
CO4	Analyze the given problem by applying basic principle to solve and demonstrate 1D and 2D heat transfer with conduction and convection boundary conditions.
C05	Carry out dynamic analysis and finding natural frequencies for various boundary conditions and also analyze with forcing function.

Year sem	/ SEM : 4^{th} year / 7^{th}	Year of Study : 2017-18
	Course Name: Energy	Engineering- 17ME71
CO1	Summarize the basic conc	epts of thermal energy systems,
CO2	Identify renewable energy	sources and their utilization.
CO3	Understand the basic con working of solar PV and th	cepts of solar radiation and analyze the nermal systems.
CO4	Understand principles of including wind, geotherm	energy conversion from alternate sources al, ocean, biomass, biogas.
C05	Understand the concepts thermoelectric convertor a	and applications of fuel cells, and MHD generator.
C06	Identify methods of energy	storage for specific applications

Year / SEM : 4^{th} year / 7^{th}	Year of Study : 2017-18
sem	

	Course Name: Fluid Power Systems- 17ME72		
C01	Identify and analyse the functional requirements of a fluid power transmission system for a given application.		
C02	Visualize how a hydraulic/pneumatic circuit will work to accomplish the function.		
CO3	Design an appropriate hydraulic or pneumatic circuit or combination circuit like electro-hydraulics, electro-pneumatics for a given application.		
CO4	Select and size the different components of the circuit.		
CO5	Develop a comprehensive circuit diagram by integrating the components selected for the given application.		

Year sem	/ SEM : 4^{th} year / 7^{th}	Year of Study : 2017-18
	Course Name: Control	Engineering- 17ME73
CO1	Recognize control system	and its types , control actions
CO2	Determine the system gov models(Electrical, Therma	erning equations for physical l, Mechanical, ElectroMechanical)
CO3	Calculate the gain of the s flow graph	system using block diagram and signal
CO4	Illustrate the response of	1st and 2nd order systems
C05	Determine the stability of and frequency domain	transfer functions in complex domain
C06	Employ state equations to observability	study the controllability and

Year / sem	/ SEM : 4^{th} year / 7^{th}	Year of Study : 2017-18
Co	urse Name: Design of The	rmal Equipments – 17ME741
CO1	To have complete knowled	lge of heat exchanger and its applications
CO2	To be able to design shell	and tube heat exchanger
CO3	To be able to select and de compact heat exchanger co application	sign of steam heat condenser and ondenser and heat pipes for various

Year , sem	/ SEM : 4^{th} year / 7^{th}	Year of Study : 2017-18
	Course Name: Tr	ibology– 17ME742
CO1	Understand the fundament parameters.	ntals of tribology and associated
CO2	Apply concepts of tribolog design of components exp	y for the performance analysis and periencing relative motion.
CO3	Analyse the requirements plane slider bearings for a	and design hydrodynamic journal and a given application.
CO4	Select proper bearing mat tribological application.	erials and lubricants for a given
C05	Apply the principles of sur of tribology.	face engineering for different applications

Year / SEM : 4 th year / 7 th sem		Year of Study : 2017-18
	Course Name: Financial	l Management– 17ME743
C01	Measure the returns from and present a risk-return	engineering projects of differing risks tradeoff relationship (PO 4, 12)

C02	Determine the financial ratios and profitability margins of projects to evaluate economic viability to accept or reject the project. (PO 11)
CO3	Evaluate cost break ups of engineering projects and processes to determine and control the prohibitive cost components (PO 11)
CO4	Apply a Engineering Asset Management techniques to evaluate the economic value of physical assets. (PO 1, 11, 12)

Year , sem	/ SEM : 4^{th} year / 7^{th}	Year of Study : 2017-18
	Course Name: Design of	Manufacturing– 17ME744
CO1	Describe the different type comparetheir suitability for components and products.	es of manufacturing systems and preconomic production of various
CO2	Identify factors and causin occur with different manu mechanical products and them.	ng mechanisms of the defects likely to facturing processes in producing the relevant design approaches to rectify
CO3	Select proper materials and products/components by a and economic production.	d manufacturing processes for designing applying the relevant principles for ease

Year sem	/ SEM : 4^{th} year / 7^{th}	Year of Study : 2017-18
	Course Name: Smart Mate	rials and MEMS– 17ME745
CO1	Describe the methods of c and fabrication methods c	ontrolling vibration using smart systems of MEMS.
CO2	Explain the principle cond Fibre optics, ER & MR Flu principles of working.	epts of Smart materials, structures, hids, Biomimetics and MEMS with
CO3	Analyze the properties of applications and select su	smart structures, MEMS, with the itable procedure forfabrication.
CO4	Summarize the methods an Biomimetics, types of polyn piezoelectric sensing and a	nd uses of Micro fabrications, ners used in MEMS, Fibre optics, ctuation.

Year / sem	/ SEM : 4^{th} year / 7^{th}	Year of Study : 2017-18
	Course Name: Automoti	ve Electronics- 17ME751
C01	Explain the electronics sy	stems used for control of automobiles
CO2	Select sensors, actuators	and control systems used in automobiles
CO3	Diagnose the faults in the automobile	sub systems and systems used

Ye sei	ar / SEM : 4 th year / 7 th m	Year of Study : 2017-18
	Course Name: Fracto	ure Mechanics- 17ME752
CO1	Develop basic fundamenta defects on the performance Engineering structures.	l understanding of the effects of crack like e of aerospace, civil, and Mechanical
CO2	Learn to select appropriate insure damage tolerance.	e materials for engineering structures to
CO3	Learn to employ modern n crack sizes and fatigue cra structures.	umerical methods to determine critical ack propagation rates in engineering
CO4	Gain an appreciation of the fracture mechanics.	status of academic research in field of

Year / SEM : 4 th year / 7 th sem		Year of Study : 2017-18
	Course Name: Mec	hatronics- 17ME753
C01	Illustrate various compon	ents of Mechatronics systems.

C02	Assess various control systems used in automation.
CO3	Develop mechanical, hydraulic, pneumatic and electrical control systems.

Year / sem	/ SEM : 4^{th} year / 7^{th}	Year of Study : 2017-18	
	Course Name: Advanced Vibrations- 17ME754		
C01	Understand and characte freedom systems subjecte without damping.	rize the single and multi degrees of d to free and forced vibrations with and	
CO2	Understand the method o controlling.	f vibration measurements and its	
CO3	Understand the concept of system.	dynamic vibrations of a continuous	

Year / sem	SEM: 4 th year / 7 th	Year of Study : 2017-18
	Course Name: Design	Laboratory– 17MEL76
C01	To understand the workin as Governors, Gyroscopes	ng principles of machine elements such etc.,
CO2	To identify forces and cou components.	ples in rotating mechanical system
CO3	To identify vibrations in m damping methods and to shaft.	hachine elements and design appropriate determine the critical speed of a rotating
CO4	To measure strain in vario gauges.	ous machine elements using strain

CO5	To determine the minimum film thickness, load carrying capacity, frictional torque and pressure distribution of journal bearing.
CO6	To determine strain induced in a structural member using the principle of photo-elasticity.

Year / sem	SEM: 4 th year / 7 th	Year of Study : 2017-18
Course	Name: Computer Integra	ted Manufacturing Lab– 17MEL77
C01	Generate CNC Lathe part Chamfering, Grooving, Ste interpolation etc.	program for Turning, Facing, ep turning, Taper turning, Circular
C02	Generate CNC Mill Part pr motions, Line motions, Ci Pocket milling- circular, r	rogramming for Point to point rcular interpolation, Contour motion, ectangular, Mirror commands etc.
CO3	Use Canned Cycles for Dr Turning, Facing,Taper tur	illing, Peck drilling, Boring, Tapping, ning Thread cutting etc.
CO4	Simulate Tool Path for dif components using CNC La	ferent Machining operations of small athe & CNC Milling Machine.
CO5	Use high end CAM packag state of art cutting tools a optimize cycle time; set up	ges for machining complex parts; use nd related cutting parameters; o and cut part on.
CO6	Understand & write progr understand the operating pneumatics and electro p	ams for Robot control; principles of hydraulics, neumatic systems.

Year / SEM : 4 th year / 8 th sem		Year of Study : 2017-18
	Course Name: Operati	ons Research– 17ME81
C01	Understand the meaning, techniques of operations r	definitions, scope, need, phases and research.

CO2	Formulate as L.P.P and derive optimal solutions to linear programming problems by graphical method, Simplex method, Big-M method and Dual Simplex method.
CO3	Formulate as Transportation and Assignment problems and derive optimum solutions for transportation, Assignment and travelling salesman problems.
CO4	Solve problems on game theory for pure and mixed strategy under competitive environment.
C05	Solve waiting line problems for M/M/1 and M/M/K queuing models.
C06	Construct networkdiagrams and determine critical path, floats for deterministic and PERT networks including crashing of Networks.
C07	Determine minimum processing times for sequencing of n jobs-2 machines, n jobs-3machines, n jobs-m machinesand 2 jobs-n

Year / sem	/ SEM : 4 th year / 8 th	Year of Study : 2017-18
Course Name: Additive Manufacturing- 17ME82		
C01	Understand the different p Polymer, Powder and Nan	process of Additive Manufacturing. using o materials manufacturing.
CO2	Analyse the different char	acterization techniques.
CO3	Describe the various NC, C Automation techniques.	NC machine programing and

Year / SEM : 4 th year / 8 th sem	Year of Study : 2017-18
Course Name: Cryogenics- 17ME831	

C01	To be able to understand the cryogenic system.
C02	To have complete knowledge of cryogenic refrigeration system
CO3	To be able to design gas separation and gas purification system
CO4	To able to solve the problem in , insulation, storage of cryogenic liquids
CO5	To be able to apply cryogenic in various areas and to be able take up research in cryogenics

Year sem	/ SEM : 4 th year / 8 th	Year of Study : 2017-18
Course Name: Experimental Stress Analysis- 17ME832		
CO1	Explain and the elastic be	havior of solid bodies.
CO2	Describe stress strain and electrical resistance strain	lysis of mechanical systems using gauges.
CO3	Understand the experiment strains induced.	ntal methods of determining stresses and
CO4	Apply the coating techniqu	es to determine the stresses and strains.

Year / SEM : 4 th year / 8 th sem	Year of Study : 2017-18
Course Name: Theory of Elasticity– 17ME833	

C01	Understand stress, strain, deformations, relation between stress and strain and plastic deformation in solids.
C02	Understand plastic stress-strain relations and associated flow rules.
CO3	Perform stress analysis in beams and bars including Material nonlinearity.
CO4	Analyze the yielding of a material according to different yield theory for a given state of stress.

Year / sem	SEM: 4^{th} year / 8^{th}	Year of Study : 2017-18	
	Course Name: Green Manufacturing- 17ME834		
C01	Understand the basic desi technologies and the oper- manufacturing.	gn concepts, methods, tools, the key ation of sustainable green	
CO2	Apply the principles, techniques and methods to customize the learned generic concepts to meet the needs of a particular industry/enterprise.		
CO3	Identify the strategies for sustainable green manufa	the purpose of satisfying a set of given cturing requirements.	
CO4	Design the rules and processes to meet the market need and the green manufacturing requirements by selecting and evaluating suitable technical, managerial / project management and supply chain management scheme.		
CO5	Understand the basic desig technologies and the opera	n concepts, methods, tools, the key tion of sustainable green manufacturing.	

Year / SEM : 4 th year / 8 th sem	Year of Study : 2017-18
Course Name: Product Life Cycle Management– 17ME835	

C01	Explain the various strategies of PLM and Product Data Management
C02	Describe decomposition of product design and model simulation
CO3	Apply the concept of New Product Development and its structuring.
CO4	Analyze the technological forecasting and the tools in the innovation.
C05	Apply the virtual product development and model analysis