



# Mar Ephraem

College of Engineering & Technology

(NAAC Accredited Institution)

Run by Catholic Diocese of Marthandam

Approved by AICTE

Affiliated To Anna University, Chennai, Accredited by NAAC

Malankara Hills, Elavuvilai, Marthandam - 629 171, Kanyakumari District, Tamil Nadu

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## DEPARTMENT OF MECHANICAL ENGINEERING

### COURSE OUTCOME

#### ANNA UNIVERSITY REGULATION 2013

Year	Semester	Theory/Practical	Code	Subject Name	COURSE OUTCOME
1	1	Theory	HS 615 1	Technical English - I	1 Interpret various visual materials (line graphs, pie charts etc.)
					2 Use the electronic media (internet) for email communication
					3 Describe various processes using sequence words
					4 Comprehend different spoken discourses/excerpts
					5 Write cohesively and coherently and flawlessly avoiding grammatical errors,
			M A6 151	Mathematics - I	1 Find inverse of a matrix using Cayley Hamilton theorem
		2 Find the area and volume enclosed by any curve using double and multiple integration technique			
		3 Use a wide vocabulary range to organize the ideas logically on a topic			
		4 Find the unknown parameter of the given problem which formulated in term of derivative			
		5 Find the radius of curvature of any curve.			
		6 To check the convergency of the given series using different test.			
		PH 615 1	Engineering Physics - I	1 Calculate the packing factor in crystalline structures.	
				2 Choose appropriate material for manufacturing automobile parts,power plants,engines based on their modulus of elasticity.	
				3 Select proper material for heat exchangers, boilers, evaporators, compressors based on their thermal behavior.	
				4 Analyse the dual nature of electrons in SEM,TEM,STEM.	
				5 Apply ultrasonic NDT to Find flaws in metal processing ,ships,automobile parts ,aircrafts.	
				6 Demonstrate fibre optic sensors used for sensing temperature and pressure variation in pipelines,boilers,oil tanks.	



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Year	Semester	Theory/Practical	Code	Subject Name	COURSE OUTCOME	
1	1		CY6151	Engineering Chemistry – I	1 Recognize the right type of polymer in designing.	
					2 Apply various energy transformations principle in systems	
					3 Analyze compounds spectroanalytically	
					4 Analyze defects in structures using spectroanalytical methods	
					5 Choose appropriate alloys in manufacturing.	
					6 Select proper nanomaterial in manufacturing technology.	
			GE6151	Computer Programming	1 Describe the functions of a digital computer with its organization	
					2 Apply appropriate algorithm to solve the problem.	
					3 Analyse the different conditional constructs to solve simple scientific and statistical problems	
	GE6152	Engineering Graphics	4 Analyse the usage of functions and pointers			
			5 Solve the program using arrays and strings			
			6 Apply the concept of structures and unions in writing C programs.			
			1 Draw the free hand sketching			
			2 Draw the special curves			
			3 Draw the Isometric and Perspective Projection			
	1	1	Practical	GE6161	Computer Practices Laboratory	4 Draw the Development of Surfaces
						5 Draw the Solids and Section of Solids
						6 Draw the Points, Lines and Planes
1 Choose appropriate office automation tool to solve the problem						
2 Apply good programming design methods for program development.						
3 Design and implement C programs for simple applications.						
GE6162		Engineering Practices Laboratory		4 Solve problems using String functions		
				5 Create and Implement the C programs with the help of structures and unions.		
				1 Fabricate carpentry parts		
				2 Demonstrate plumbing work		
				3 Demonstrate sheet metal work		
HS6251		Technical English – II		4 Demonstrate electrical circuit connections		
				5 Demonstrate soldering joints		
				1 create reports & curriculum vitae		
				2 use active & passive sentences		
	3 produce different types of writing such as narration, description, exposition and argument					
MA6251	Mathematics – II	4 analyse and evaluate the implied meanings of various texts				
		5 write minutes of meeting				
		6 demonstrate the skill of skimming & scanning				
		1 apply the Laplace transform techniques in the analysis of linear time invariant systems				



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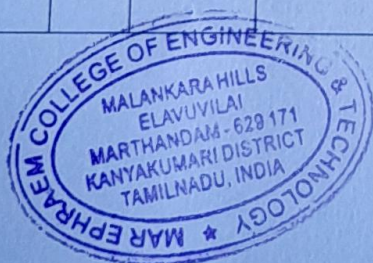
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					5	Determine the friction and the effects by the laws of friction
					6	Solve the various principles used to determine forces in engineering problems
1	2	Practical	GE6261	Computer Aided Drafting and Modeling Laboratory	1	Apply drawing practices, limits, fits and tolerances
					2	Draw part drawing for mechanical components
					3	Draw part drawing for mechanical components
					4	Draw sectional views
					5	Draw assembly drawings
			GE6262	Physics and Chemistry Laboratory -II	1	Evaluate the quantitative chemical analysis of hardness, alkalinity and copper ion.
					2	Evaluate the iron content of the given solution using potentiometer
					3	Evaluate the determination of BaCl <sub>2</sub> and sodium using conductivity meter
					4	Describe optics, thermal physics,
					5	Evaluate engineering properties of materials.
		MA6351	Transforms and Partial Differential Equations	1	Develop partial differential equations for any provided equations	
				2	Solve various types of partial differential equations	
				3	Solve one dimensional wave equations and heat equations using fourier series	
				4	Transform aperiodic function from one domain to another domain using Fourier transform method.	
				5	Transform periodic function into sum of sine and cosine series	
				6	Solve difference equations using Z-Transform.	
2	3	Theory	CE6306	Strength of Materials	1	Compute stress, strain and deformation of simple and compound bars
					2	Compute shear force and bending moment in beams subjected to transverse loading.
					3	Compute shear stress due to torsion in shafts and helical springs.
					4	Calculate the slope and deflection in beams using different methods.
					5	Compute stress and deformation in thin, thick cylinders and spherical shells.
					6	Calculate stress distribution due to shearing force and bending moment.
			ME6301	Engineering Thermodynamics	1	Apply first law of thermodynamics for simple open and closed systems under steady and unsteady conditions.
					2	Apply second law of thermodynamics to open and closed systems
					3	Apply rankine cycle for steam power plant and compare few cycle improvement methods.
					4	Derive simple thermodynamic relations of ideal and real gases



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			Laboratory	2	Perform the load test, OC and SC test on a single phase transformer
				3	Evaluate the regulation of an alternator by EMF and MMF method
				4	Perform the load test and speed control on various types of induction motor
				5	Demonstrate the working of DC and AC starters
			MA6452 Statistics and Numerical Methods	1	Apply the concept of testing of hypothesis for small and large samples
				2	Apply the basic concepts of DOE in Engineering problems
				3	Apply the numerical techniques of differentiation and integration for Engineering problems.
				4	Apply the numerical techniques for solving first and second order ordinary differential equations.
				5	Solve the partial and ordinary differential equations with initial and boundary conditions
				6	Calculate the eigen values of matrix by power method
			ME6401 Kinematics of Machinery	1	Discuss the basics of mechanism in machines
				2	Calculate displacement, velocity and acceleration in simple mechanisms
				3	Develop cam profiles for SHM, parabolic, Uniform Velocity and Cycloidal motion
				4	Solve basic problems in gear and gear train mechanism
				5	Calculate friction in various machine elements
				6	Apply the fundamentals of mechanism for the design of new mechanisms.
2	4	Theory	ME6402 Manufacturing Technology- II	1	Explain the mechanism of material removal processes
				2	Describe the constructional and operational features of centre lathe and other special purpose lathes.
				3	Describe the constructional and operational features of shaper, planner, milling, drilling, sawing and broaching machines
				4	Explain the types of grinding and gear manufacturing processes
				5	Develop part programs for NC machines
				6	Compare the functions and applications of different metal cutting tools
			ME6403 Engineering Materials and Metallurgy	1	Explain alloys and phase diagram, Iron-Iron Carbon diagram and steel classification
				2	Describe the effect of heat treatment processes.
				3	Explain the effect of alloying elements on ferrous and non-ferrous metals
				4	Summarize the properties and applications of non metallic materials.
				5	Explain the types of mechanical testing.
				6	Describe fatigue and creep failure mechanisms



  
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			GE6351	Environmental Science and Engineering	1	Explain the nature and fact about environment, ecosystem and biodiversity
					2	Interpret the causes and apply the relevant control measures of pollution
					3	Describe energy resource and the importance of renewable and non-renewable resources.
					4	Explain forest resource, water resource, mineral resource, food resource, energy resource and land resource of environment
					5	Explain the social issues and legislative act on environment
					6	Explain the role of individual in conservation of natural resources
			ME6404	Thermal Engineering	1	Compute mean effective pressure and air standard efficiency using thermodynamic concepts for different air standard cycles
					2	Explain the functioning and features of IC engines, components and auxiliaries
					3	Compute the maximum condition of flow of steam through nozzle and turbine
					4	Calculate work of compression with and without clearance in single stage and multistage air compressors
					5	Calculate Performance parameters and Cooling Load in refrigeration and air conditioning system
					6	Calculate Performance parameters in IC engines
2	4	Practical	ME6411	Manufacturing Technology Laboratory-II	1	Demonstrate contour milling and generate a spur gear from a cylindrical work piece
					2	Perform helical gear cutting operation and generate gear using hobbing machine
					3	Demonstrate plain surface grinding operation
					4	Demonstrate cylindrical grinding and tool and Cutter Grinder
					5	Measure cutting forces in Milling / Turning Process and develop CNC part programming
			ME6412	Thermal Engineering Laboratory -I	1	Draw the valve timing and port timing diagram for single cylinder four stroke diesel engine and two stroke petrol engine
					2	Calculate the mechanical efficiency of four stroke SI engine by Morse test
					3	Compute the performance of four stroke single cylinder CI engine & Predict actual diagram.
					4	Calculate the performance of steam generator and steam turbines
					5	Compute the flash and fire point of various fuel/lubricants.
			CE6315	Strength of Materials Laboratory	1	Compute the yield stress, breaking stress and ultimate stress of the given specimen under tension test
					2	Conduct the torsion test and deflection test on solid materials
					3	Perform Hardness test and find out the hardness number of Solid materials.
					4	Compute the stiffness of the open coil and closed coil spring
					5	Compute the impact strength of given specimen using Izod Impact testing machine.
3	5	Theo	ME6501	Computer	1	Explain product cycle, design process, sequential and concurrent



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ry	Aided Design		1	engineering in design process.	
			2	Explain the fundamentals of parametric curves, surfaces and Solids	
			3	Illustrate the algorithms for visual realism	
			4	Explain the fundamentals of assembly of parts	
			5	Summarize the different types of graphic standards used in CAD	
			6	Describe 2D, 3D transformations of computer graphics	
	ME6502	Heat and Mass Transfer		1	Apply heat conduction equations to different surface configurations under steady state and transient conditions
				2	Apply free and forced convective heat transfer correlations to internal and external flows through/over various surface configurations
				3	Apply LMTD and NTU methods of thermal analysis to different types of heat exchanger configurations
				4	Describe the phenomena of boiling and condensation
				5	Apply the basic laws for Radiation in heat transfer between different types of surfaces
				6	Apply diffusive and convective mass transfer equations and correlations in steady state molecular diffusion
	ME6503	Design of Machine Elements		1	Apply the concepts of steady and variable stresses in machine component design
				2	Apply the concepts of design to shafts, keys and couplings
				3	Apply the concepts of design to temporary and permanent joints.
				4	Apply the concepts of design to energy absorbing members, connecting rod and crank shaft.
				5	Apply the concepts of design to bearings
				6	Explain the various theory of failures used in machine component design.
	ME6504	Metrology and Measurements		1	Describe the basic principles of instrumentation and metrology
				2	Illustrate the different types of linear and angular measurements.
				3	Describe the laser principles in advanced metrology
				4	Explain the techniques of form measurements in industrial components
				5	Describe measuring methods of power, flow and temperature
				6	Explain the procedures for conducting computer aided measurements
ME6505	Dynamics of Machines		1	Calculate static and dynamic forces of mechanisms.	
			2	Calculate the balancing masses and their locations of reciprocating and rotating masses.	
			3	Compute the frequency of free vibration.	
			4	Compute the frequency of forced vibration and damping coefficient.	
			5	Calculate the speed and lift of governors	
			6	Compute the gyroscopic couple on automobiles, ships and airplanes	



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			GE6075	Professional Ethics in Engineering	1 Explain the importance of human values and ethics
					2 Describe the theories in engineering ethics
					3 Apply the ethical theories in Engineering projects
					4 Differentiate the safety and risk factors in the society
					5 Discuss the global ethical issues related to Engineering
					6 Explain the responsibility and rights of Engineer in the society
3	5	Practical	ME6511	Dynamics Laboratory	1 Demonstrate the principles of kinematics in various types of gears, gear trains, mechanisms and universal joints
					2 Compute the mass moment of inertia of axisymmetric objects using Turn table apparatus, bi-filar suspension, compound pendulum and fly wheel and axle system
					3 Compute the natural frequency and damping coefficient, torsional frequency, critical speed of shaft under the given load conditions and the gyroscopic couple
					4 Perform characteristic test of Watt, Porter, Proell and Hartnell governors
					5 Demonstrate the balancing of rotating masses in dynamic balancing machine
			ME6512	Thermal Engineering Laboratory-II	1 Calculate the thermal conductivity of various Engineering materials
					2 Compute heat transfer rate in free and forced convection environment
					3 Compute emissivity of grey surface
					4 Calculate the effectiveness of parallel and counter flow heat exchanger
					5 Calculate the performance of refrigeration, air conditioning system, air compressor and fluidized bed cooling tower
		ME6513	Metrology and Measurements Laboratory	1 Measure the temperature, force, torque using relevant sensors.	
				2 Measure the dimensions, angularity and parallelism of a given component	
				3 Calibrate the vernier, micrometer and vernier height gauge using gauge blocks	
				4 Measure the gear tooth dimensions and threaded parameters using profile projector	
				5 Measurement of angles using bevel protractor and sine bar	
3	6	Theory	ME6601	Design of Transmission Systems	1 Apply the concepts of design to belts, chains and rope drives
					2 Apply the concepts of design to spur, helical gears
					3 Apply the concepts of design to worm and bevel gears.
					4 Apply the concepts of design to gear boxes
					5 Apply the concepts of design to cams, brakes
					6 Apply the concepts of design to clutches
		MG6851	Principles of Management	1 Explain the management functions of an organization	
				2 Describe the planning tools and techniques in the organization	
				3 Explain the functions of human resource management	
				4 Describe the leadership and motivation theories of an organization	
				5 Classify budgetary and non-budgetary controlling techniques	



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6			ME6602	Automobile Engineering	6	Describe the leadership qualities of a Manager in an organization.
					1	Explain the various parts of automobiles with their functions and materials
					2	Describe the engine auxillary system and engine emission control
					3	Distinguish the working of different types of transmission system
					4	Explain the steering , brake and suspension system
					5	Explain the various alternate fuels used in automobiles
					6	Explain vehicle aerodynamics and traction control
			ME6603	Finite Element Analysis	1	Summarize the basics of finite element formulation
					2	Apply finite element methods to solve one dimensional problems
					3	Apply finite element methods to solve two-dimensional Scalar Problems
					4	Apply finite element methods to solve two-dimensional Vector problems
					5	Apply finite element methods to solve problems on isoparametric elements.
					6	Solve basic Dynamic problems using Finite element methods
			ME6604	Gas Dynamics and Jet Propulsion	1	Apply the concept of compressible flow in constant area duct
					2	Compute static and stagnation properties of Rayleigh and Fanno flow in constant area duct
					3	Examine the effect of compression and expansion waves in compressible flow
4	Apply the concepts of gas dynamics in jet propulsion					
5	Apply the basic concepts of gas dynamics in space propulsion					
6	Apply the concept of compressible flow in variable area duct					
3	6	Practical	ME6611	C.A.D. / C.A.M. Laboratory	1	Create 2D models using modeling softwares
					2	Create 3D models using modeling softwares
					3	Demonstrate basic operations in CNC milling machines
					4	Demonstrate the basic operations in CNC turning machines
					5	Simulate turning and milling operations using cam softwares
		ME6612	Design and Fabrication Project	1	Design the machine components or product based on specification	
				2	Fabricate the machine components or product based on the design	
				3	Demonstrate the working model of the completed mechanical product.	
				4	Manage projects through work plan and detailed budgets.	
				5	Present their finding Orally to the review committee	
				6	Contribute effectively as individual and team member	



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			GE6674	Communication and Soft Skills- Laboratory Based	1 Listen and respond appropriately
					2 Participate in group discussion
					3 Read and evaluate text critically
					4 Write for media content on current events
					5 Communicate effectively with appropriate vocabulary and grammar
4	7	Theory	ME6701	Power Plant Engineering	1 Explain the layout , construction and working of the components of thermal power plant.
					2 Explain the layout , construction and working of the components of Diesel, Gas and Combined cycle power plants.
					3 Explain the layout , construction and working of the components of nuclear power plants.
					4 Explain the layout , construction and working of the components of renewable energy power plants
					5 Describe the economic and environmental issues on power plants
					6 Estimate the cost of electrical energy production in power plants
			ME6702	Mechatronics	1 Discuss the interdisciplinary applications of electronics, electrical, mechanical and computer systems
					2 Explain the architecture of 8085 microprocessor and 8051 microcontroller
					3 Explain the Programmable Peripheral Interface and Architecture of 8255 PPI
					4 Describe the architecture , programming and application of programmable logic controller.
					5 Explain the types of motors and actuators in mechatronics system
					6 Describe the structure and operation of pick and place robot
			ME6703	Computer Integrated Manufacturing Systems	1 Explain the basic concept of CAD/CAM in computer integrated manufacturing
					2 Illustrate the use of computers in process planning
					3 Differentiate the different coding system used in Group Technology
					4 Explain the concept of FMS and AGVs
					5 Classify the robots used in Industrial application
					6 Solve quantitative analysis in cellular manufacturing using ROC Algorithm
GE6757	Total Quality Management	1 Describe the needs and basic concepts of TQM			
		2 Apply the TQM principles and concepts in business			
		3 Apply Benchmarking techniques in quality management processes			
		4 Explain the concepts of Six Sigma			
		5 Describe the quality systems and standards in the organisations.			
		6 Describe the concepts of total productive maintenance			
4	7	Practical	ME6711	Simulation and Analysis Laboratory	1 Analyze stresses and strains induced in plates, brackets and beams using finite element software
					2 Calculate natural frequency of 2D components and beams using finite element software
					3 Demonstrate basic harmonic analysis in beams



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					4	Analyse stresses in basic cylindrical shell problems.
					5	Compute the natural frequency of simple spring mass systems.
			ME6712	Mechatronics Laboratory	1	Develop programs for arithmetic functions,,sorting and code conversion functions
					2	Develop program codes to interface traffic light controller and stepper motor, speed control of DC motor
					3	Demonstrate the hydraulic , pneumatic, electro pneumatic and PLC circuits
					4	Modeling and analysis of the hydraulic and pneumatic using simulation software
					5	Compute the dimensions of given geometry using image processing techniques
4	S	Practical	ME6713	Comprehension	1	Comprehend any problem related to basic science
					2	Comprehend any problem related to thermal science
					3	Comprehend any problem related to manufacturing
					4	Comprehend any problem related to design
					5	Comprehend any problem related to industrial engineering and maintenance
4	S	Theory	MG6863	Engineering Economics	1	Explain the basic concepts of Economics and different types of costs.
					2	Describe value engineering procedures
					3	Differentiate Cash Dominated and Revenue Dominated Cash flow.
					4	Explain the principles of Replacement and Maintenance analysis.
					5	Compute depreciation of products.
					6	Determine the economic life of an asset.
4	S	Practical	ME6811	Project Work	1	Identify a specific Engineering problem from the context of societal issues
					2	Provide eco-friendly solution for the identified problem
					3	Design and development of systems and models for the solution of identified problem
					4	Conduct experiments for the developed solutions with the aid of modern tools.
					5	Interpret and discuss the results
					6	provide valid conclusions for the obtained results
					7	Manage projects through work plan and detailed budgets.
					8	Present their finding Orally to the review committee
					9	Contribute effectively as individual and team member



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