



**ARMIET**  
**Alamuri Ratnamala**  
**Institute of Engineering and Technology**  
*(Run by Koti Vidya Charitable Trust)*  
**Accredited by NAAC with 'B+' Grade**  
**ISO 9001:2015 CERTIFIED**

# **COURSE OUTCOMES OF MECHANICAL ENGINEERING**

**ACADEMIC YEAR: 2019-20**



## **SECOND YEAR, SEMESTER-III**

**SUBJECT: APPLIED MATHEMATICS-III (AM-III)**

### **Course Outcomes:**

- Demonstrate the ability of using Laplace Transform in solving the Ordinary Differential Equations and Partial Differential Equations
- Demonstrate the ability of using Fourier Series in solving the Ordinary Differential Equations and Partial Differential Equations
- Solve initial and boundary value problems involving ordinary differential equations
- Identify the analytic function, harmonic function, orthogonal trajectories
- Apply bilinear transformations and conformal mappings
- Identify the applicability of theorems and evaluate the contour integrals.

**SUBJECT: PRODUCTION PROCESS**

### **Course Outcomes:**

- Demonstrate understanding of casting process
- Illustrate principles of forming processes
- Demonstrate applications of various types of welding processes.
- Differentiate chip forming processes such as turning, milling, drilling, etc.
- Illustrate the concept of producing polymer components and ceramic components.
- Distinguish between the conventional and modern machine tools.

**SUBJECT: THERMODYNAMICS**

### **Course Outcomes:**

- Demonstrate application of the laws of thermodynamics to wide range of systems.
- Write steady flow energy equation for various flow and non-flow thermodynamic systems
- Compute heat and work interactions in thermodynamics systems
- Demonstrate the interrelations between thermodynamic functions to solve practical problems.
- Use steam table and mollier chart to compute thermodynamics interactions
- Compute efficiencies of heat engines, power cycles etc.



## **SUBJECT: STRENGTH OF MATERIALS**

### **Course Outcomes:**

- Demonstrate fundamental knowledge about various types of loading and stresses induced.
- Draw the SFD and BMD for different types of loads and support conditions.
- Analyse the stresses induced in basic mechanical components.
- Estimate the strain energy in mechanical elements.
- Analyse the deflection in beams.
- Analyse buckling and bending phenomenon in columns, struts and beams.

## **SUBJECT: MATERIAL TECHNOLOGY**

### **Course Outcomes:**

- Identify various crystal imperfections, deformation mechanisms, and strengthening mechanisms
- Demonstrate understanding of various failure mechanisms of materials.
- Interpret Iron-Iron carbide phase diagram, and different phases in microstructures of materials at different conditions.
- Select appropriate heat treatment process for specific applications.
- Identify effect of alloying elements on properties of steels
- Illustrate basics of composite materials, Nano- materials and smart materials

## **SUBJECT: COMPUTER AIDED MACHINE DESIGN**

### **Course Outcomes:**

- Visualize and prepare detail drawing of a given object.
- Read and interpret the drawing
- Draw details and assembly of different mechanical systems.
- Convert detailed drawing into assembly drawing using modelling software
- Convert assembly drawing into detailed drawing using modelling software
- Prepare detailed drawing of any given physical object/machine element with actual measurements.



## **SECOND YEAR, SEMESTER-IV**

**SUBJECT: APPLIED MATHEMATICS-IV (AM-IV)**

### **Course Outcomes:**

- Solve the system of linear equations using matrix algebra with its specific rules
- Demonstrate basics of vector calculus
- Apply the concept of probability distribution and sampling theory to engineering problems
- Apply principles of vector calculus to the analysis of engineering problems
- Identify, formulate and solve engineering problems
- Illustrate basic theory of correlations and regression

**SUBJECT: FLUID MECHANICS**

### **Course Outcomes:**

- Define properties of fluids and classification of fluids
- Evaluate hydrostatic forces on various surfaces and predict stability of floating bodies
- Formulate and solve equations of the control volume for fluid flow systems
- Apply Bernoulli's equation to various flow measuring devices
- Calculate resistance to flow of incompressible fluids through closed conduits and over surfaces
- Apply fundamentals of compressible fluid flows to relevant systems

**SUBJECT: INDUSTRIAL ELECTRONICS**

### **Course Outcomes:**

- Illustrate construction, working principles and applications of power electronic switches
- Identify rectifiers and inverters for dc and ac motor speed control
- Develop circuits using OPAMP and timer IC555
- Identify digital circuits for industrial applications
- Illustrate the knowledge of basic functioning of microcontroller
- Analyse speed-torque characteristics of electrical machines for speed control



**SUBJECT: PRODUCTION PROCESS II**

**Course Outcomes:**

- Demonstrate understanding of metal cutting principles and mechanism
- Identify cutting tool geometry of single point and multipoint cutting tool
- Demonstrate various concepts of sheet metal forming operations
- Demonstrate concepts and use of jigs and fixtures
- Illustrate various non-traditional machining techniques
- Illustrate concepts and applications of additive manufacturing

**SUBJECT: KINEMATICS OF MACHINERY**

**Course Outcomes:**

- Define various components of mechanisms
- Develop mechanisms to provide specific motion
- Draw velocity and acceleration diagrams of various mechanisms
- Draw Cam profile for the specific follower motion
- Analyse forces in various gears
- Select appropriate power transmission for specific application

**THIRD YEAR, SEMESTER-V**

**SUBJECT: INTERNAL COMBUSTION ENGINES**

**Course Outcomes:**

- Demonstrate the working of different systems and processes of S.I. engines
- Demonstrate the working of different systems and processes of C.I. engines
- Illustrate the working of lubrication, cooling and supercharging systems.
- Analyse engine performance



- Illustrate emission norms and emission control
- Comprehend the different technological advances in engines and alternate fuels

**SUBJECT: MECHANICAL MEASUREMENT AND CONTROL**

**Course Outcomes:**

- Classify various types of static characteristics and types of errors occurring in the system.
- Classify and select proper measuring instrument for linear and angular displacement
- Classify and select proper measuring instrument for pressure and temperature measurement
- Design mathematical model of system/process for standard input responses
- Analyse error and differentiate various types of control systems and time domain specifications
- Analyse the problems associated with stability

**SUBJECT: HEAT TRANSFER**

**Course Outcomes:**

- Identify the three modes of heat transfer (conduction, convection and radiation).
- Illustrate basic modes of heat transfer
- Develop mathematical model for each mode of heat transfer
- Develop mathematical model for transient heat transfer
- Demonstrate and explain mechanism of boiling and condensation
- Analyse different heat exchangers and quantify their performance

**SUBJECT: DYNAMICS OF MACHINERY**

**Course Outcomes:**

- Demonstrate working Principles of different types of governors and Gyroscopic effects on the mechanical systems



- Illustrate basic of static and dynamic forces
- Determine natural frequency of element/system
- Determine vibration response of mechanical elements / systems
- Design vibration isolation system for a specific application
- Demonstrate basic concepts of balancing of forces and couples

#### **SUBJECT: PRESS TOOL DESIGN**

##### **Course Outcomes:**

- Demonstrate various press working operations for mass production of sheet metal parts
- Identify press tool requirements to build concepts pertaining to design of press tools
- Prepare working drawings and setup for economic production of sheet metal components
- Select suitable materials for different elements of press tools
- Illustrate the principles and blank development in bent & drawn components
- Elaborate failure mechanisms of pressed components, safety aspects and automation in press working

#### **SUBJECT: BUSINESS COMMUNICATION & ETHICS**

##### **Course Outcomes:**

- Design a technical document using precise language, suitable vocabulary and apt style.
- Develop the life skills/ interpersonal skills to progress professionally by building stronger relationships.
- Demonstrate awareness of contemporary issues knowledge of professional and ethical responsibilities.
- Apply the traits of a suitable candidate for a job/higher education, upon being trained in the techniques of holding a group discussion, facing interviews and writing resume/SOP.
- Deliver formal presentations effectively implementing the verbal and non-verbal skills



## **THIRD YEAR, SEMESTER-VI**

### **SUBJECT: METROLOGY AND QUALITY ENGINEERING**

#### **Course Outcomes:**

- Demonstrate inspection methods and different gauges
- Illustrate working principle of measuring instruments and calibration methodology
- Illustrate basic concepts and statistical methods in quality control
- Demonstrate characteristics of screw threads, gear profile, and tool profile
- Illustrate the different sampling techniques in quality control
- Illustrate different nondestructive techniques used for quality evaluation

### **SUBJECT: MACHINE DESIGN – I**

#### **Course Outcomes:**

- Demonstrate understanding of various design considerations
- Illustrate basic principles of machine design
- Design machine elements for static as well as dynamic loading
- Design machine elements on the basis of strength/ rigidity concepts
- Use design data books in designing various components
- Acquire skill in preparing production drawings pertaining to various designs

### **SUBJECT: FINITE ELEMENT ANALYSIS**

#### **Course Outcomes:**

- Solve differential equations using weighted residual methods
- Develop the finite element equations to model engineering problems governed by second order differential equations
- Apply the basic finite element formulation techniques to solve engineering problems by using one dimensional elements



- Apply the basic finite element formulation techniques to solve engineering problems by using two dimensional elements
- Apply the basic finite element formulation techniques to find natural frequency of single degree of vibration system
- Use commercial FEA software, to solve problems related to mechanical engineering

## **SUBJECT: REFRIGERATION AND AIR CONDITIONING**

### **Course Outcomes:**

- Demonstrate fundamental principles of refrigeration and air conditioning
- Identify and locate various important components of the refrigeration and air conditioning system
- Illustrate various refrigeration and air conditioning processes using psychometric chart
- Design Air Conditioning system using cooling load calculations.
- Estimate air conditioning system parameters
- Demonstrate understanding of duct design concepts .

## **SUBJECT: MECHATRONICS**

### **Course Outcomes:**

- Identify the suitable sensor and actuator for a mechatronics system
- Select suitable logic controls
- Analyse continuous control logics for standard input conditions
- Develop ladder logic programming
- Design hydraulic/pneumatic circuits
- Design a mechatronic system



## **BE, SEMESTER VII**

**SUBJECT: MACHINE DESIGN – II**

### **Course Outcomes:**

- Select appropriate gears for power transmission on the basis of given load and speed
- Design gears based on the given conditions.
- Select bearings for a given applications from the manufacturers catalogue.
- Select and/or design belts and flywheel for given applications
- Design cam and follower mechanisms.
- Design clutches and brakes
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**SUBJECT: CAD/CAM/CAE**

### **Course Outcomes:**

- Identify proper computer graphics techniques for geometric modelling.
- Transform, manipulate objects & store and manage data.
- CAM Toolpath Creation and NC- G code output.
- Use rapid prototyping and tooling concepts in any real life applications.
- Identify the tools for Analysis of a complex engineering component.

**SUBJECT: PRODUCTION PLANNING AND CONTROL**

### **Course Outcomes:**

- Illustrate production planning functions and manage manufacturing functions in a better way
- Develop competency in scheduling and sequencing of manufacturing operations
- Forecast the demand of the product and prepare an aggregate plan
- Develop the skills of Inventory Management and cost effectiveness
- Create a logical approach to Line Balancing in various production systems



- Implement techniques of manufacturing planning and control

## **SUBJECT: AUTOMOBILE ENGINEERING**

### **Course Outcomes:**

- Illustrate the types and working of clutch and transmission system.
- Demonstrate the working of different types of final drives, steering gears and braking systems
- Illustrate the constructional features of wheels, tyres and suspension systems
- Demonstrate the understanding of types of storage, charging and starting systems
- Identify the type of body and chassis of an automobile
- Comprehend the different technological advances in automobile

## **SUBJECT: ENERGY AUDIT AND MANAGEMENT**

### **Course Outcomes:**

- To identify and describe present state of energy security and its importance.
- To identify and describe the basic principles and methodologies adopted in energy audit of an utility.
- To describe the energy performance evaluation of some common electrical installations and identify the energy saving opportunities.
- To describe the energy performance evaluation of some common thermal installations and identify the energy saving opportunities
- To analyze the data collected during performance evaluation and recommend energy saving measures



## **BE, SEMESTER-VIII**

### **SUBJECT: DESIGN OF MECHANICAL SYSTEMS**

#### **Course Outcomes:**

- Apply the concept of system design.
- Design material handling systems such as hoisting mechanism of EOT crane,
- Design belt conveyor systems
- Design engine components such as cylinder, piston, connecting rod and crankshaft
- Design pumps for the given applications
- Prepare layout of machine tool gear box and select number of teeth on each gear

### **SUBJECT: INDUSTRIAL ENGINEERING AND MANAGEMENT**

#### **Course Outcomes:**

- Illustrate the need for optimization of resources and its significance
- Develop ability in integrating knowledge of design along with other aspects of value addition in the conceptualization and manufacturing stage of various products.
- Demonstrate the concept of value analysis and its relevance.
- Manage and implement different concepts involved in method study and understanding of work content in different situations.
- Describe different aspects of work system design and facilities design pertinent to manufacturing industries.
- Illustrate concepts of Agile manufacturing, Lean manufacturing and Flexible manufacturing

### **SUBJECT: POWER ENGINEERING**

#### **Course Outcomes:**

- Compute heat interactions in combustion of reactive mixtures
- Differentiate boilers, boiler mountings and accessories
- Calculate boiler efficiency and assess boiler performance



- Demonstrate working cycles of gas turbines
- Draw velocity triangles of impulse/reaction turbines and calculate performance parameters/efficiency
- Demonstrate basic working of pumps

## **SUBJECT: POWER PLANT ENGINEERING**

### **Course Outcomes:**

- Comprehend various equipment/systems utilized in power plants
- Demonstrate site selection methodology, construction and operation of Hydro Electric Power Plants
- Discuss working, site selection, advantages, disadvantages of steam power plants
- Discuss operation of Combined Cycle Power Plants
- Discuss types of reactors, waste disposal issues in nuclear power plants
- Illustrate power plant economics

## **SUBJECT: ENVIRONMENTAL MANAGEMENT (EVM)**

### **Course Outcomes:**

- Understand the concept of environmental management
- Understand ecosystem and interdependence, food chain etc.
- Understand and interpret environment related legislations.