



**Saraswati College of Engineering**  
**Department- Information Technology**  
**Semester- III**  
**Scheme (R-16)**

**Subject- AMIII**  
**301**

**Subject Code-AEC**

**Course Outcomes**

PO	PSO	Competancy	PI	Bloom's Level	CO	Description
1,2	-	1.1	1.1.2	5	1	Apply the concept of Laplace transforms and use to solve real integrals in engineering problems
1,2,3,4	-	3.1	3.1.6	3	2	Determine and develop Fourier series for real life problems and applications.
1,2,3	-	2.1	2.1.2	3,4	3	Identify the concept of inverse linear transform and compare to various functions and its applications
1,2,3	-	3.2	3.2.1	3	4	Apply properties of complex analysis and mapping and bilinear transformation
1,2,3	-	12.1	12.1.3	3	5	Solve partial differential equation such as vibration of string heat flow etc.
1,2,4,12	-	2.2	2.2.3	3	6	To identify theorem of complex integration and study of correlation and curve fitting

**Course Objectives**

Sr. No.	Description
1	Provide sound foundation in the mathematical fundamentals necessary to formulate, solve and analyse engineering problems.
2	To Study the basic principles of Laplace Transform, Fourier series, Complex variables.
3	Provide sound foundation in the mathematical fundamentals necessary to formulate, solve and analyse engineering problems.
4	To study properties of complex analysis and mapping and bilinear transformation
5	Formulate simple engineering problem as PDE & state the boundary conditions.

6	Apply statistical methods like correlation, regression analysis & curve fitting applied to construction management
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**Subject- Thermodynamics  
302**

**Subject Code- AEC**

**Course Outcomes**

PO	PSO	Competancy	PI	Bloom's Level	CO	Description
1		1.2	1.2.1	1	1	Define the different thermodynamic terminologies
1		1.3	1.3.1	3	2	Apply the first law of thermodynamics to solve the basic problems in engineering
1		1.4	1.4.1	3	3	Apply the entropy concept on the engineering systems.
1		1.2	1.2.1	2	4	Understanding the Thermodynamic relations, Availability and use of Steam tables and mollier chart.
2		2.4	2.4.1	5	5	Evaluate the compressor for the different engineering requirements
2		2.4	2.4.1	5	6	Evaluate the Vapour Power cycles and Gas Power cycles based on different inlet and mean temperature.

**Course Objectives**

Sr. No.	Description
1	Describe the energy concept in general, heat and work
2	Extrapolate to apply the basic principle of thermodynamics
3	Illustrate the fundamentals of quantification and grade of energy
4	interpret the concept of entropy and irreversibility
5	Use the steam table and mollier chart

<b>6</b>	Integrate the application of the concept of thermodynamics in vapour power, gas power cycle
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**Subject- Strength of Materials**

**Subject Code- AEC303**

**Course Outcomes**

<b>PO</b>	<b>PSO</b>	<b>Competency</b>	<b>PI</b>	<b>Bloom's Level</b>	<b>CO</b>	<b>Description</b>
1		1.4	1.4.1	3	CO-1	Apply Moment of Inertia, Stresses and Strains, Elastic Constants concepts to solve problems.
2		2.1	2.1.3	4	CO-2	Analyse the Shear Force and Bending Moment in Beams that applies to a given problem.
2		2.1	2.1.2	4	CO-3	Identify Stresses in Beams , Direct and Bending Stresses , Shear Stress in Beams to solve the problems
2		2.4	2.4.1	4	CO-4	Apply Torsion and Strain Energy parameters to solve the problems
2		2.2	2.2.3	4	CO-5	Illustrate Thin Cylindrical and Spherical Shells for solving the problem.
3		3.1	3.1.6	5	CO-6	Determine Columns and Struts Stresses , functional requirements and arrive at specifications

**Course Objectives**

<b>Sr. No.</b>	<b>Description</b>
1	To apply Moment of Inertia, Stresses and Strains, Elastic Constants concepts to solve problems.
2	To analyse the Shear Force and Bending Moment in Beams that applies to a given problem.
3	To identify Stresses in Beams, Direct and Bending Stresses, Shear Stress in Beams to solve the problems.
4	To apply Torsion and Strain Energy parameters to solve the problems.
5	To illustrate Thin Cylindrical and Spherical Shells for solving the problem.
6	To determine Columns and Struts Stresses, functional requirements and arrive at specifications.

**Course Outcomes**

<b>PO</b>	<b>PSO</b>	<b>Competancy</b>	<b>PI</b>	<b>Bloom's Level</b>	<b>CO</b>	<b>Description</b>
PO2		2.2		2.2.3	2	Understand and identify the various Production process and Metal casting process
PO2		2.2		2.2.4	4	Differentiate various joining process and contrast alternative processes to select the best joining process
PO2		2.3		2.3.1	2	Classification and Analysis of various metal working process
PO2		2.2		2.2.3	2	Identify machine tool and machining process
PO1		1.4		1.4.1	3	Illustrate principal and working of Non traditional machining process
PO2		2.4		2.4.4	2	Demonstrate and understand the manufacturing technologies like polymer processing, powder metallurgy and industry 4.0

**Course Objectives**

<b>Sr. No.</b>	<b>Description</b>
<b>1</b>	Define basic production process
<b>2</b>	Explain casting process
<b>3</b>	Distinguish various types of welding processes
<b>4</b>	Select appropriate production process for specific application.
<b>5</b>	Prescribe concept of producing polymer components and ceramic components.
<b>6</b>	Compose different machine tools.

**Course Outcomes**

<b>PO</b>	<b>PSO</b>	<b>Competancy</b>	<b>PI</b>	<b>Bloom's Level</b>	<b>CO</b>	<b>Description</b>
PO1		1.4	1.4.1	Level-2 Understand	CO1	Describe various Materials
PO2		2.4	2.4.3	Level-2 Understand	CO2	Explain various failure of Mechanism
PO3		3.2	3.2.1	Level-3 Apply	CO3	Apply different types thoery of alloys & Alloys diagrams
PO2		2.2	2.2.4	Level-2 Understand	CO4	Determine basic engineering materials their stucture -property-performance
PO3		3.3	3.3.1	Level-3 Apply	CO5	Detect the strengthening processes including heat treatment processes in order to enchance properties
PO2		2.3	2.3.2	Level-2 Understand	CO6	Prescribe new materials and their applications

**Course Objectives**

<b>Sr. No.</b>	<b>Description</b>
<b>1</b>	Describe various Materials
<b>2</b>	Explain various failure of Mechanism
<b>3</b>	Apply different types thoery of alloys & Alloys diagrams
<b>4</b>	Determine basic engineering materials their stucture -property-performance
<b>5</b>	Detect the strengthening processes including heat treatment processes in order to enchance properties
<b>6</b>	Prescribe new materials and their applications

**Subject- Computer Aided Machine Drawing  
AEL301**

**Subject Code-**

**Course Outcomes**

<b>PO</b>	<b>PSO</b>	<b>Competancy</b>	<b>PI</b>	<b>Bloom's Level</b>	<b>CO</b>	<b>Description</b>
PO3	-	3.2	3.2.2	3 (Apply)	CO1	Visualize and prepare detail drawing of a given object.
PO5	-	5.1	5.1.1	4 (Analyze)	CO2	Read and interpret the drawing
PO5	-	5.1	5.1.2	6 (Create)	CO3	Draw details and assembly of different mechanical systems.
PO5	-	5.2	5.2.1	6 (Create)	CO4	Convert detailed drawing into assembly drawing using modelling software
PO5	-	5.3	5.3.2	6 (Create)	CO5	Convert assembly drawing into detailed drawing using modelling software
PO3	-	3.1	3.1.4	5 (Evaluate)	CO6	Prepare detailed drawing of any given physical object/machine element with actual measurements

**Course Objectives**

<b>Sr. No.</b>	<b>Description</b>
<b>1</b>	To familiarise conversion of an object into a drawing
<b>2</b>	To study conventional representation of various machining and mechanical details as per IS
<b>3</b>	To become conversant with 2-D and 3-D drafting
<b>4</b>	Compose solid models of machine components.
<b>5</b>	Transform the assembly of Solid models.
<b>6</b>	Reconstruct the disassembly of the solid models.

## Semester IV

Subject- FEA  
603

Subject Code- AEC

### Course Outcomes

PO	PSO	Competancy	PI	Bloom's Level	CO	Description
PO1		1.4	1.4.1	"Level 3	CO1	Solve the differential equation using weighted residual method
PO2		2.1	2.1.3	Apply"	CO2	develop the finite element equations to model engineering problems govern by second order differential equations
PO2		2.1	2.1.3	Apply"	CO3	apply the basic finite element formulation technique to solve engineering problems by using one dimensional element
PO2		2.4	2.4.1	"Level 3	CO4	apply the basic finite element formulation technique to solve engineering problems by using two dimensional element
PO2		2.1	2.5.2	Apply"	CO5	apply basic of finite element formulation techniques to find natural frequency of single dimensional analysis
PO2		2.6	2.6.2	Apply"	CO6	use commercial software, to solve problem related to automobile engineering

### Course Objectives

Sr. No.	Description
1	To Familiarize with concepts of FEM
2	To study the applicability of FEM to engineering problems
3	To acquaint with application of numerical techniques for solving problems
4	To study the basic finite element formulation techniques to solve engineering problems
5	To learn finite element equations to model engineering problems
6	To learn FEA application problem

**Subject- FLID MECHANICS**

**Subject Code- AEC402**

**Course Outcomes**

<b>PO</b>	<b>PSO</b>	<b>Competency</b>	<b>PI</b>	<b>Bloom's Level</b>	<b>CO</b>	<b>Description</b>
PO1		1.2	1.2.1	"Level 1"	CO1	Define properties of fluids, classify of fluids and evaluate hydrostatic forces on various surfaces.
PO2		2.4	2.4.1	"Remember"	CO2	Differnciate velocity potential function and stream function and solve for velocity and accelerataion of fluid
PO1		1.4	1.4.1	"Remember"	CO3	Apply Bernoulli's equation to various flow measuring devices
PO2		2.1	2.1.2	"Level 2"	CO4	Understand the basic concepts of laminar flow in circular pipes
PO2		2.1	2.1.3	"Understand"	CO5	Apply the concept of Major losses and Minor losses in pipes to solve problems.
PO2		2.1	2.1.2	"Understand"	CO6	Apply the concept of Boundary layer formation to solve numerical on Boundary layer thickness

**Course Objectives**

<b>Sr. No.</b>	<b>Description</b>
1	Describe fluid statics and fluid dynamics
2	Demonstrate, measurement as well as apply calibration principles
3	Verify the concepts learnt in theory course
4	Identify application of mass, momentum and energy equations in fluid flow
5	Compare various flow measurement techniques
6	Prescribe fundamentals of compressible fluid flow



**Course Outcomes**

<b>PO</b>	<b>PSO</b>	<b>Competancy</b>	<b>PI</b>	<b>Bloom's Level</b>	<b>CO</b>	<b>Description</b>
PO1 PO2	PSO1	1.3 2.1	1.31 2.1.2	L3	CO1	Demonstrate characteristic of various electrical and electronics Components.
PO2	PSO1	2.1	2.1.2	L4	CO2	Develop simple applications built around rectifiers and Inverters components
PO3	PSO2	3.2	3.2.1	L6	CO3	Create and build circuits built around op-amp parameters.
PO2	PSO1	2.2	2.2.2	L4	CO4	Identify and use of different basic gates and digital circuits for industrial applications
PO5	PSO1	5.1	5.1.1	L2	CO5	Understand and demonstrate basic parameters measurement using microcontroller
PO2	PSO2	2.1	2.1.2	L4	CO6	Test and Analyse speed torque characteristic of electrical machines for speed control

**Course Objectives**

<b>Sr. No.</b>	<b>Description</b>
<b>1</b>	To study characteristic of various electrical and electronics Components.
<b>2</b>	Examine working of controlled Rectifiers and Inverters
<b>3</b>	To familiarise OpAmp and IC555 Circuits and their applications
<b>4</b>	To study digital logic gates and their applications.
<b>5</b>	To Acquaint with basics of microcontroller based applications and its programming.
<b>6</b>	To impart knowledge of different types of industrial electricals motors .

**Course Outcomes**

<b>PO</b>	<b>PSO</b>	<b>Competancy</b>	<b>PI</b>	<b>Bloom's Level</b>	<b>CO</b>	<b>Description</b>
1,2	-	1.1	1.1.3	3	1	Extend the concept of matrices to eigen value & eigen vector & use it to solve various engineering problem.
1,2,4	-	3.2	3.2.1	3	2	Apply principles of vector calculus to the analysis of engineering problems.
1,2,3,4.12	-	2.1	2.1.2	3,4	3	Translate business problem to mathematical form & can find optimal solution by graphical or simplex method & dual simplex method
1,2,12	-	2.1	2.1.2	3,4	4	Ability to use probability distribution to analyze & solve real time problem
1,2,3,12	-	2.4	2.4.1	2	5	Explain the test of hypothesis for small & large samples by using various test like t- test, z- test & chi- square test.
1,2,3,4	-	3.3	3.3.1	3	6	Develop the concept of ANOVA to measure the effect of extraneous variables.

**Course Objectives**

<b>Sr. No.</b>	<b>Description</b>
<b>1</b>	To inculcate an ability to relate engineering problems to mathematical context.
<b>2</b>	To provide a solid foundation in mathematical fundamentals required to solve engineering problem.
<b>3</b>	To study the basic principles of Vector analyses, complex integration, probability, test of hypothesis and correlation between data.
<b>4</b>	Apply test of hypothesis & Analysis of Variances for solving engineering problems.
<b>5</b>	To study linear programming problem and probability distribution.
<b>6</b>	To identify significance of sampling theory.

**Course Outcomes**

<b>PO</b>	<b>PSO</b>	<b>Competancy</b>	<b>PI</b>	<b>Bloom's Level</b>	<b>CO</b>	<b>Description</b>
PO1	PSO1	1.3	1.3.1	L3	CO1	Illustrate characteristic, working principles and applications of Power Electronics Devices.
PO2	PSO2	2.2	2.2.2	L2	CO2	Understand working of controlled Rectifiers , Inverters and DC to DC converters.
PO4	PSO1	4.1	4.1.2	L4	CO3	Analyse simple applications built around op-amp parameters.
PO2	PSO1	2.1	2.1.2	L1	CO4	Identify use of different basic gates and use digital circuits for industrial applications
PO5	PSO1	5.1	5.1.1	L3	CO5	Demonstrate basic parameters measurement using microcontroller
PO2	PSO1	2.2	2.2.3	L4	CO6	Analyse speed torque characteristic of electrical machines for speed control

**Course Objectives**

<b>Sr. No.</b>	<b>Description</b>
<b>1</b>	To equip the students with the basic knowledge, operational characteristic and application of Power semiconductor Devices.
<b>2</b>	To study the controlled Rectifiers, Inverters and DC to DC converters.
<b>3</b>	To familiarise basic properties of OpAmp.
<b>4</b>	To teach principles of digital electronics including Boolean algebra, basic gates, logic circuits, arithmetic circuits flip flops, registers , counters.
<b>5</b>	To Acquaint with basics of microcontroller based applications and its programming.
<b>6</b>	To study structure working and characteristic of different types of industrial electric motors.

**Course Outcomes**

<b>PO</b>	<b>PSO</b>	<b>Competancy</b>	<b>PI</b>	<b>Bloom's Level</b>	<b>CO</b>	<b>Description</b>
PO2		2.3	2.3.1	2 (Understand)	CO1	Define various components of mechanisms
PO4		4.2	4.2.1	3 (Apply)	CO2	Develop mechanisms to provide specific motion
PO5		5.1	5.1.2	4 (Analyze)	CO3	Draw velocity and acceleration diagrams of various mechanisms
PO5		5.1	5.1.2	4 (Analyze)	CO4	Draw Cam profile for the specific follower motion
PO5		5.2	5.2.2	3 (Apply)	CO5	Select appropriate power transmission for specific application
PO2		2.2	2.2.3	4 (Analyze)	CO6	Analyse forces in various gears

**Course Objectives**

<b>Sr. No.</b>	<b>Description</b>
<b>1</b>	To acquaint with basic concept of kinematics and kinetics of machine elements
<b>2</b>	Apply different types of special mechanism
<b>3</b>	To study different types of motion in mechanisms
<b>4</b>	To acquaint with different types of cam and follower
<b>5</b>	To familiarise with various basic mechanisms and inversions
<b>6</b>	To study basics of power transmission

**Course Outcomes**

<b>PO</b>	<b>PSO</b>	<b>Competancy</b>	<b>PI</b>	<b>Bloom's Level</b>	<b>CO</b>	<b>Description</b>
PO2		2.2	2.2.3	2 (Understand)	CO1	Demonstrate understanding of metal cutting principles and mechanism
PO2		2.2	2.2.2	4 (Analyze)	CO2	Identify cutting tool geometry of single point and multipoint cutting tool
PO2		2.3	2.3.1	2 (Understand)	CO3	Demonstrate various concepts of sheet metal forming operations
PO2		2.2	2.2.3	2 (Understand)	CO4	Demonstrate concepts and use of jigs and fixtures
PO2		2.2	2.2.4	2 (Understand)	CO5	Illustrate various non-traditional machining techniques
PO1		1.4	1.4.1	3 (Apply)	CO6	Illustrate concepts and applications of additive manufacturing

**Course Objectives**

<b>Sr. No.</b>	<b>Description</b>
<b>1</b>	To study sheet metal forming as well as mechanical behavior of stress system in metal forming processes.
<b>2</b>	To Acquaint basic principles of design of jigs and fixtures
<b>3</b>	To give exposure to Non-traditional machining operations.
<b>4</b>	To acquaint with fundamentals of metal cutting and tool engineering
<b>5</b>	Explain the fundamental of metal cutting and tool engineering
<b>6</b>	Explain the fundamentals of additive manufacturing

## Semester-V

**Subject- PRESS TOOL DESIGN  
AEDLO5011**

**Subject Code-**

### Course Outcomes

PO	PSO	Competancy	PI	Bloom's Level	CO	Description
1	1	1.4	1.4.1	3	1	Demonstrate various press working operations for mass production of sheet metal parts
2	1	2.1	2.1.3	3	2	Prepare working drawings and setup for economic production of sheet metal components
2	1	2.2	2.2.3	2	3	Identify press tool requirements to build concepts pertaining to design of press tools
2	1	2.2	2.2.3	3	4	Illustrate the principles and blank development in bent & drawn components
3	1	3.1	3.1.4	5	5	Select suitable materials for different elements of press tools
3	1	3.1	3.1.6	2	6	Elaborate failure mechanisms of pressed components, safety aspects and automation in press working

### Course Objectives

Sr. No.	Description
1	To acquaint with various press working operations for mass production of sheet metal components
2	To familiarise with sheet metal working techniques for design of press tools
3	To study Selection of Material and hardware
4	To familiarise with theory of Bending and Drawing
5	To study miscellaneous dies
6	. To inculcate knowledge about scrap minimization, safety aspects and automation in press working

## Course Outcomes

PO	PSO	Competancy	PI	Bloom's Level	CO	Description
PO2		2.4	2.4.3	2	1	Classify various types of static characteristics and types of errors occurring in the system
PO4 PO5		4.1 5.2	4.1.3 5.2.2	3	2	Classify various types of Mechanical Measurement and Identify Significance of Mechanical Measurements
PO2 PO5		2.2 5.2	2.2.4. 5.2.2	1	3	Recognize and Choose proper measuring instrument for pressure , temperature ,Strain , Displacement and Flow Measurement to meet society need .
PO1 PO2 PO4		1.2 2.1 4.1	1.2.1 2.1.2 4.1.3	2	4	Estimate and Discuss Mathematical Modeling and Distinguish various types of control systems
Po2	PSO1	2.1	2.1.2	1	5	Define and Describe Transient and steady state analysis of first and second order system.
PO3 PO2 PO4	PSO1	3.4 2.4 4.3	3.4.1 2.4.4 4.3.3	5	6	Determine and Justify the stability analysis in the Control system .

## Course Objectives

Sr. No.	Description
1	To impart knowledge of architecture of the measurement system
2	To study calibration of different measuring instruments
3	To deliver working principle of mechanical measurement system
4	To study working of mechanical measurement system
5	To study concept of mathematical modelling of the control system.
6	To acquaint with control system under different time domain

## Course Outcomes

PO	PSO	Competancy	PI	Bloom's Level	CO	Description
1		1.2	1.2.1	1	1	Define the different modes of heat transfer
1		1.3	1.3.1	3	2	Apply the Conduction to solve the basic problems in engineering
1		1.4	1.4.1	3	3	Apply the Convection concept on the engineering systems.
1		1.2	1.2.1	2	4	Understanding the different modes of convection and use it to solve problems
2		2.4	2.4.1	5	5	Evaluate the radiation energy from any system of engineering
2		2.4	2.4.1	5	6	Evaluate the effectiveness of heat exchanger and the NTU.

## Course Objectives

Sr. No.	Description
1	Describe Different modes of Heat Transfer
2	Classify/Illustrate different modes of heat transfer
3	Use/Apply steady state approach to solve conduction problems
4	identify and use transient methods to solve time variation problem
5	Analyse boiling and condensation processes
6	Propose the radiation analysis technique on simple problems



**Course Outcomes**

<b>PO</b>	<b>PSO</b>	<b>Competancy</b>	<b>PI</b>	<b>Bloom's Level</b>	<b>CO</b>	<b>Description</b>
1		1.2	1.2.1	1	1	Define the clutch functionality
1		1.3	1.3.1	3	2	Apply the transmission knowledge to be builded up for correct vehicle
1		1.4	1.4.1	3	3	Apply correct drive line for the automotive vehicle systems.
1		1.2	1.2.1	2	4	Understanding the the load distribution for drive and rear axle problems.
2		2.4	2.4.1	5	5	Evaluate the braking power and suspension value for the vehicle under study
2		2.4	2.4.1	5	6	Evaluate the steering system.

**Course Objectives**

<b>Sr. No.</b>	<b>Description</b>
<b>1</b>	Explain basic and advance automotive system
<b>2</b>	Interelate working of different autootive systems and subsystems
<b>3</b>	Recognize different vehicle layouts
<b>4</b>	Explain idea about how automotive systems are developed
<b>5</b>	Determine importance of Automotive systems
<b>6</b>	Explain Electrical motors for Automobile

**Course Outcomes**

<b>PO</b>	<b>PSO</b>	<b>Competancy</b>	<b>PI</b>	<b>Bloom's Level</b>	<b>CO</b>	<b>Description</b>
PO-2	1	2.1	1.4.1	2	CO-1	Estimate machining time for simple and taper turning operations on lathe.
PO-3	1	4.3	2.4.1	3	CO-2	Estimate machining time for threading/knurling operations on lathe.
PO-3	1	4.3	2.4.1	3	CO-3	Estimate machining time for various machining operations on shaper.
PO-3	2	5.1	3.1.6	4	CO-4	Perform NC, CNC and DNC machining operations.
PO-4	2	5.3	3.4.1	5	CO-5	Write CNC program for different operations.
PO-4	2	5.2	5.2.2	2	CO-6	Identify machining parameters for various Non Traditional machining operations.

**Course Objectives**

<b>Sr. No.</b>	<b>Description</b>
<b>1</b>	To study conventional machining operations.
<b>2</b>	To familiarise with CNC machining operation.
<b>3</b>	To acquaint with Non Traditional machining operations.
<b>4</b>	To become familiar with methodologies that can be used in conjunction with experimental designs for optimization.
<b>5</b>	
<b>6</b>	

**Subject- Internal Combustion Engines.****Subject Code- AEL501****Course Outcomes**

<b>PO</b>	<b>PSO</b>	<b>Competancy</b>	<b>PI</b>	<b>Bloom's Level</b>	<b>CO</b>	<b>Description</b>
1		1.4	1.4.1	3	CO-1	"Apply Air Standard, Fuel-Air and Actual Cycles
2		2.1	2.1.3	4	CO-2	concepts to solve problems. "
2		2.1	2.1.2	4	CO-3	"Analyze the SI Engine components, Ignition system and
2		2.4	2.4.1	4	CO-4	Combustion process that applies to a given problem."
2		2.2	2.2.3	4	CO-5	"Identify CI Engine variables and parameters to solve the
3		3.1	3.1.6	5	CO-6	CI Engine problems"

**Course Objectives**

<b>Sr. No.</b>	<b>Description</b>
<b>1</b>	To apply Air Standard, Fuel-Air and Actual Cycles concepts to solve problems.
<b>2</b>	To analyze the SI Engine components, Ignition system and Combustion process that applies to a given problem.
<b>3</b>	To identify CI Engine variables and parameters to solve the CI Engine problems
<b>4</b>	To apply engine lubrication and cooling system and parameters to solve the problems
<b>5</b>	To illustrate engine performance characteristics processes for solving the problem,
<b>6</b>	To determine IC Engine design objectives, functional requirements and arrive at specifications

## Semester VI

Subject- AUTOMOTIVE MATERIALS

Subject Code- AEDLO6023

### Course Outcomes

PO	PSO	Competancy	PI	Bloom's Level	CO	Description
2	1	2.1	2.1.2	2	1	Identify the need for new alternative materials to improve efficiency of automobiles.
2	1	2.2	2.2.4	2	2	Distinguish between the materials requirements for various types of automobiles
3	1	3.1	3.1.4	3	3	Estimate the role of different classes of materials for various automotive systems
5	1	5.2	5.2.1	5	4	Select proper material while designing any automotive subsystem
5	1	5.2	5.2.1	5	5	Select advanced materials for specific automobile components.
3	1	3.3	3.3.2	3	6	Comprehend Ashby charts for material selection

### Course Objectives

Sr. No.	Description
1	To familiarize the importance of different classes of materials in making of automobiles
2	"To acquaint with improving efficiency of automobiles through proper selection of materials and
3	processing methods"
4	To study composite materials used in Automobiles and their processing
5	To study Paints and Glass Technology
6	To familiarize the recent trends used in making of various automotive components.

**Subject- Mechanical Vibrations. Subject Code-AEC604**

**Course Outcomes**

<b>PO</b>	<b>PSO</b>	<b>Competancy</b>	<b>PI</b>	<b>Bloom's Level</b>	<b>CO</b>	<b>Description</b>
1		1.4	1.4.1	3	CO-1	"Apply Vibration concepts to solve Free Undamped
2		2.1	2.1.3	4	CO-2	Single Degree of freedom problems. "
2		2.1	2.1.2	4	CO-3	"Analyze the Free damped Single Degree of freedom
2		2.4	2.4.1	4	CO-4	system concepts that applies to a given problem."
2		2.2	2.2.3	4	CO-5	"Identify Free Undamped Multi Degree of freedom
2		2.4	2.4.1	4	CO-6	variables and parameters to solve the Vibration system

**Course Objectives**

<b>Sr. No.</b>	<b>Description</b>
<b>1</b>	To apply Vibration concepts to solve Free Undamped Single Degree of freedom problems.
<b>2</b>	To analyze the Free damped Single Degree of freedom system concepts that applies to a given problem.
<b>3</b>	To identify Free Undamped Multi Degree of freedom variables and parameters to solve the Vibration system problems.
<b>4</b>	To apply Forced Single Degree of freedom system concepts to solve the problems.
<b>5</b>	To illustrate the Balancing of rotating & reciprocating masses for solving the problems,
<b>6</b>	To apply Rotor Dynamics system concepts to solve the problems.

**Course Outcomes**

<b>PO</b>	<b>PSO</b>	<b>Competancy</b>	<b>PI</b>	<b>Bloom's Level</b>	<b>CO</b>	<b>Description</b>
PO2		2.2	2.2.3	2 (Understand)	CO1	Demonstrate understanding of various design considerations
PO2		2.1	2.1.2	3 (Apply)	CO2	Illustrate basic principles of machine design
PO4		4.3	4.3.1	3 (Apply)	CO3	Design machine elements for static as well as dynamic loading
P04		4.3	4.3.2	3 (Apply)	CO4	Design machine elements on the basis of strength/ rigidity concepts
PO5		5.2	5.2.2	4 (Analyze)	CO5	Use design data books in designing various components
PO4		4.3	4.3.4	5 (Evaluate)	CO6	Acquire skill in preparing production drawings pertaining to various designs

**Course Objectives**

<b>Sr. No.</b>	<b>Description</b>
<b>1</b>	To study basic principles of machine design
<b>2</b>	To acquaint with the concepts of design based on strength & rigidity
<b>3</b>	To familiarize with use of design data books & various codes of practice
<b>4</b>	To make conversant with preparation of working drawings based on designs
<b>5</b>	Infer conversant with preparation of working drawings based on designs.
<b>6</b>	Estimate endurance limit

**Subject- Mechatronics.**

**Subject Code- AEDLO6021**

**Course Outcomes**

<b>PO</b>	<b>PSO</b>	<b>Competancy</b>	<b>PI</b>	<b>Bloom's Level</b>	<b>CO</b>	<b>Description</b>
1		1.4	1.4.1	3	CO-1	"Apply Mechatronics and its block diagram representation
2		2.1	2.1.3	4	CO-2	concepts to solve problems. "
2		2.1	2.1.2	4	CO-3	Analyze the Selection of Sensors & Actuators s that applies to a given problem.
2		2.4	2.4.1	4	CO-4	Identify Data Acquisition, Signal Conditioning & Microcontroller SystemTheory.
2		2.2	2.2.3	4	CO-5	Apply Pneumatics and hydraulics to the problems
3		3.1	3.1.6	5	CO-6	Illustrate Control System for solving the problem.

**Course Objectives**

<b>Sr. No.</b>	<b>Description</b>
<b>1</b>	To apply Mechatronics and its block diagram representation concepts to solve problems.
<b>2</b>	To analyze the Selection of Sensors & Actuators s that applies to a given problem.
<b>3</b>	To identify Data Acquisition, Signal Conditioning & Microcontroller SystemTheory.
<b>4</b>	To apply Pneumatics and hydraulics to the problems.
<b>5</b>	To illustrate Control System for solving the problem.
<b>6</b>	To determine Discrete Control System PLC (Programming Logic Control)Theory arrive at solution.

**Course Outcomes**

<b>PO</b>	<b>PSO</b>	<b>Competancy</b>	<b>PI</b>	<b>Bloom's Level</b>	<b>CO</b>	<b>Description</b>
PO2		2.1	2.1.2	Level-2 Understand	CO1	Describe different types of vehicle body design
PO2		2.2	2.2.3	Level-2 Understand	CO2	Classify and explain different chassis construction
PO4		4.2	4.2.1	Level-3 Apply	CO3	Use/Apply roll over analysis to solve rolling problems
PO3		3.2	3.2.3	Level-3 Apply	CO4	Identify and Use of rolling drag method to solve varying problems
PO4		4.3	4.3.2	Level-4 Analyse	CO5	Analyse vehicle Areodynamics Drag
PO4		4.3	4.3.4	Level-4 Analyse	CO6	Propose the design procedure for commercial vehicle body Stucture

**Course Objectives**

<b>Sr. No.</b>	<b>Description</b>
<b>1</b>	Describe different types of vehicle body design
<b>2</b>	Classify and explain different chassis construction
<b>3</b>	Apply roll over analysis to solve rolling problems
<b>4</b>	Use of rolling drag method to solve varying problems
<b>5</b>	Analyse vehicle Areodynamics Drag
<b>6</b>	Formulate the design procedure for commercial vehicle body Stucture



## Semester VII

Subject- CAD/CAM/CAE

Subject Code- AEC702

### Course Outcomes

PO	PSO	Competancy	PI	Bloom's Level	CO	Description
PO1		1.4	1.4.1	Level 3 Apply	CO1	Apply computer graphics techniques for geometric modelling
PO1		1.4	1.4.1	Level 3 Apply	CO2	Apply transformation concepts to manipulate objects as well as store and manage data
PO1		1.4	1.4.1	Level 3 Apply	CO3	Apply CAM concepts to prepare NC- G code
PO5		5.1	5.1.1	Level 1 Remember	CO4	Identify the tools for Analysis of a complex engineering component
PO5		5.2	5.2.2	Level 2 Understand	CO5	Explain concept of CIM
PO5		5.2	5.2.2	Level 2 Understand	CO6	Discuss rapid prototyping and tooling concepts

### Course Objectives

Sr. No.	Description
1	To apply computer graphics techniques for geometric modelling
2	To apply transformation concepts to manipulate objects as well as store and manage data
3	To apply CAM concepts to prepare NC- G code
4	To identify the tools for Analysis of a complex engineering component
5	To explain concept of CIM
6	To discuss rapid prototyping and tooling concepts

**Course Outcomes**

<b>PO</b>	<b>PSO</b>	<b>Competancy</b>	<b>PI</b>	<b>Bloom's Level</b>	<b>CO</b>	<b>Description</b>
PO-1	1	1.4	1.4.1	2	CO-1	Explain the working of different batteries and fuel cells along with its charging, rating, and maintenance.
PO-2	2	2.1	2.1.2	3	CO-2	Demonstrate the working of charging systems used in automobiles.
PO-2	2	2.1	2.1.3	3	CO-3	Illustrate the working of starting systems used in automobiles.
PO-2	3	2.2	2.2.3	3	CO-4	Elaborate the advancements like Electronic Ignition and Engine control systems (ECM) with its significance in vehicle operations.
PO-2	3	2.4	2.4.4	2	CO-5	Discuss the working of different automotive Sensors and Actuators.
PO-3	2	3.1	3.1.6	4	CO-6	Draw and Interpret automotive lighting and wiring harness systems.

**Course Objectives**

<b>Sr. No.</b>	<b>Description</b>
<b>1</b>	To study basic and advance Automotive Electronics systems.
<b>2</b>	To acquaint with working of different Automotive Electronics systems and subsystems.
<b>3</b>	To familiarize basic and advance electronics technologies like Battery, Fuel Cell, ECM etc.
<b>4</b>	
<b>5</b>	
<b>6</b>	

**Subject- Disaster Management and Mitigation Measures**  
**Subject Code- ILO7017**

**Course Outcomes**

<b>PO</b>	<b>PSO</b>	<b>Competancy</b>	<b>PI</b>	<b>Bloom's Level</b>	<b>CO</b>	<b>Description</b>
6		6.1	6.1.1	4	1	Understand and distinguish the various types of disasters occurring around the world.
11 12		11.3 12.3	11.3.1 12.3.2	3 4	2	Identify and analyse natural and manmade disasters and their extent and possible effects on the economy
7		6.1 6.2	6.1.1 6.2.1	5	3	Determine and get acquainted with government policies, acts and various organizational structure associated with an emergency.
5 7		5.1 6.2	5.1.1 6.2.1	5	4	To explain the institutional framework and GIS application in disaster management
7 11		6.1 11.1	6.1.1 11.1.1	4	5	Categorize the various ways to raise the funds for relief operations
6 12		7.2 12.1	7.2.2 12.1.2	3	6	Make use of simple preventive and mitigation measures before and after disasters.

**Course Objectives**

<b>Sr. No.</b>	<b>Description</b>
<b>1</b>	To understand physics and various types of disaster occurring around the world
<b>2</b>	To identify extent and damaging capacity of a disaster
<b>3</b>	To study and understand the means of losses and methods to overcome /minimize it
<b>4</b>	To understand role of individual and various organization during and after disaster
<b>5</b>	To understand application of GIS in the field of disaster managemen
<b>6</b>	To understand the emergency government response structures before, during and after disaster

**Subject- Automotive Aerodynamics and Aesthetics**  
**Subject Code- AEDLO7033**

**Course Outcomes**

<b>PO</b>	<b>PSO</b>	<b>Competancy</b>	<b>PI</b>	<b>Bloom's Level</b>	<b>CO</b>	<b>Description</b>
PO1		1.2	1.2.1	Level-2 Understand	CO1	Understand various flow phenomenon related to vehicles.
PO2		2.2	2.2.3	Level-3 Apply	CO2	Implement different types of drag forces.
PO4		4.1	4.1.2	Level-3 Apply	CO3	Design an Optimization of various shape configurations in automobiles.
PO4		4.3	4.3.1	Level-3 Apply	CO4	Comprehend stability of vehicle under aerodynamics forces
PO4		4.2	4.2.1	Level-4 Analyse	CO5	Analyze the principle of wind tunnel technology.
PO4		4.3	4.3.3	Level-3 Apply	CO6	Demonstrate various techniques used for drag reduction.

**Course Objectives**

<b>Sr. No.</b>	<b>Description</b>
<b>1</b>	Recognize various flow phenomenon related to vehicles.
<b>2</b>	Interpret different types of drag forces.
<b>3</b>	Investigate to Optimize various shape configurations in automobiles
<b>4</b>	Excuite stability of vehicle under aerodynamics forces.
<b>5</b>	Analyze the principle of wind tunnel technology.
<b>6</b>	Impliment various techniques used for drag reduction.

**Course Outcomes**

<b>PO</b>	<b>PSO</b>	<b>Competancy</b>	<b>PI</b>	<b>Bloom's Level</b>	<b>CO</b>	<b>Description</b>
PO 3		3.3	3.3.1	Level-6	CO 1	Select and design specific gear pairs for given conditions.
PO 3		3.2	3.2.2	Level-6	CO 2	Design Gearbox
PO 3		3.2	3.2.2	Level-6	CO 3	Design various Engine components
PO 3		3.2	3.2.2	Level-6	CO 4	Design clutch/brakes with drive lines.
PO 3		3.3	3.3.1	Level-6	CO 5	Select standard components such as Bearings/belts.
PO 3		3.2	3.2.2	Level-6	CO 6	Design Cam and follower for given requirement.

**Course Objectives**

<b>Sr. No.</b>	<b>Description</b>
<b>1</b>	To familiarize with the fundamental knowledge in the field of automotive design.
<b>2</b>	To acquaint with required analytical abilities to provide solutions to design problems
<b>3</b>	
<b>4</b>	
<b>5</b>	
<b>6</b>	

**Course Outcomes**

<b>PO</b>	<b>PSO</b>	<b>Competancy</b>	<b>PI</b>	<b>Bloom's Level</b>	<b>CO</b>	<b>Description</b>
PO 4		4.1	4.1.2	Level-2	CO 1	Demonstrate understanding of various design consideration
PO 3		3.3	3.3.1	Level-3	CO 2	Apply basic design concepts for safe working of parts in automotive system
PO 3		3.2	3.2.2	Level-6	CO 3	Prepare production drawings pertaining to various designs.
PO 4		4.1	4.1.2	Level-5	CO 4	Select appropriate materials for various components of the mechanical systems.
PO 4		4.1	4.1.2	Level-2	CO 5	Demonstratedesign calculations for various automotive components.
PO 4		4.3	4.3.1	Level-4	CO 6	Analyze various automotivesystems using standard analysis software's

**Course Objectives**

<b>Sr. No.</b>	<b>Description</b>
<b>1</b>	To familiarize with basic concept of design for designing the automotive components
<b>2</b>	To acquaint with preparation of working drawings based on designs.
<b>3</b>	
<b>4</b>	
<b>5</b>	
<b>6</b>	

## Course Outcomes

PO	PSO	Competancy	PI	Bloom's Level	CO	Description
PO 2		2.2	2.2.3	Level-1	CO 1	Do literature survey/industrial visit and identify the problem
PO 1		1.3	1.3.1	Level-3	CO 2	Apply basic engineering fundamental in the domain of practical applications
PO 9		9.1	9.1.2	Level-3	CO 3	Cultivate the habit of working in a team
PO 4		4.1	4.1.1	Level-3	CO 4	Attempt a problem solution in a right approach
PO 4		4.3	4.3.2	Level-1	CO 5	Correlate the theoretical and experimental/simulations results and draw the proper inferences
PO 4		4.3	4.3.3	Level-1	CO 6	Prepare report as per the standard guidelines.

## Course Objectives

Sr. No.	Description
1	"To acquaint with the process of undertaking literature survey/industrial visit and identifying the
2	problem"
3	To familiarize the process of solving the problem in a group
4	"To acquaint with the process of applying basic engineering fundamental in the domain of practical
5	
6	

## Semester VIII

**Subject- Vehicle Dynamics  
AEC 802**

**Subject Code-**

### Course Outcomes

PO	PSO	Competancy	PI	Bloom's Level	CO	Description
1		1.2		1.2.1	1	Define the road loads
1		1.3		1.3.1	3	Apply moments and forces on the tire
1		1.4		1.4.1	3	Apply isolation and vibration concept towards stability of the vehicle
1		1.2		1.2.1	2	Understanding the the load distribution for drive and rear axle problems.
2		2.4		2.4.1	5	Evaluate suspension effect on the steering
2		2.4		2.4.1	5	Evaluate ESC system

### Course Objectives

Sr. No.	Description
1	Explain basic and advance vehicle dynamics
2	Interrelate working of tyre systems
3	Recognize different suspension systems
4	Explain different motion frequencies
5	Determine importance of steering systems
6	Explain ESC system



**Subject- Transport Management and Motor Industry**  
**Subject Code- AEDLO8044**

**Course Outcomes**

<b>PO</b>	<b>PSO</b>	<b>Competancy</b>	<b>PI</b>	<b>Bloom's Level</b>	<b>CO</b>	<b>Description</b>
PO-3	1	3.5	3.5.1	2	CO-1	Demonstrate transport management systems.
PO-3	2	3.6	3.6.2	3	CO-2	Implement advance techniques in traffic management.
PO-6	1	6.4	6.4.1	2	CO-3	Demonstrate understanding of motor vehicle act.
PO-6	2	6.3	6.3.1	4	CO-4	Interpret about vehicle insurance and taxation.
PO-2	1	2.8	2.8.3	2	CO-5	Illustrate the knowledge of Passenger transport operation.
PO-2	1	2.8	2.8.3	2	CO-6	Illustrate the knowledge of Goods transport operation

**Course Objectives**

<b>Sr. No.</b>	<b>Description</b>
<b>1</b>	To familiarize with basic concepts of transport management.
<b>2</b>	To acquaint with different types of motor insurance.
<b>3</b>	
<b>4</b>	
<b>5</b>	
<b>6</b>	

**Course Outcomes**

<b>PO</b>	<b>PSO</b>	<b>Competancy</b>	<b>PI</b>	<b>Bloom's Level</b>	<b>CO</b>	<b>Description</b>
7		7.1.2	1	1	7	To Understand and identify environmental issues relevant to India and global concerns
7		7.2.1	2	2	7	To Study the needs for sustainable development
7		7.1.1	1	3	7	To Learn concepts of ecology
7		7.2.2	2	4	7	To Understand the Scope and implementation of Environment Management in corporates
7		7.1.1	3	5	7	To Learn Total Quality Environmental Management and its certification process
7		7.2.2	2	6	7	To Familiarize environment related legislations

**Course Objectives**

<b>Sr. No.</b>	<b>Description</b>
<b>1</b>	Understand the concept of environmental management
<b>2</b>	Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.
<b>3</b>	Explain the concept of ecosystem its interdependence & food chain etc
<b>4</b>	Illustrate EQM and Corporate Environmental Responsibility
<b>5</b>	Apply the process of ISO-14000, EMS Certification to their respective companies
<b>6</b>	Understand and interpret environment related legislations

## Subject- Product Design and Development. Subject Code-AEDLO8043

### Course Outcomes

PO	PSO	Competancy	PI	Bloom's Level	CO	Description
1		1.4	1.4.1	3	CO-1	Apply Product Lifecycle Management (PLM).
2		2.1	2.1.3	4	CO-2	Analyze Product Design concepts that applies to a given problem.
2		2.1	2.1.2	4	CO-3	"Identify Product Data Management (PDM) system problems."
2		2.4	2.4.1	4	CO-4	Apply Virtual Product Development Tools to solve the problems.
2		2.2	2.2.3	4	CO-5	Illustrate the Integration of Environmental Aspects in Product Design for solving the problems,
2		2.4	2.4.1	4	CO-6	Apply Life Cycle Assessment and Life Cycle Cost Analysis.

### Course Objectives

Sr. No.	Description
1	To apply Product Lifecycle Management (PLM).
2	To analyze Product Design concepts that applies to a given problem.
3	To identify Product Data Management (PDM) system problems.
4	To apply Virtual Product Development Tools to solve the problems.
5	To illustrate the Integration of Environmental Aspects in Product Design for solving the problems,
6	To apply Life Cycle Assessment and Life Cycle Cost Analysis.

**Course Outcomes**

<b>PO</b>	<b>PSO</b>	<b>Competancy</b>	<b>PI</b>	<b>Bloom's Level</b>	<b>CO</b>	<b>Description</b>
PO2		2.4	2.4.4	Level-2 Understand	CO1	Describe the basic safety concepts
PO2		2.2	2.2.3	Level-2 Understand	CO2	Classify/Illustrate and explain accident reconstruction analysis method
PO3		3.1	3.1.5	Level-3 Apply	CO3	Sketch different issues in vehicle safety
PO4		4.3	4.3.4	Level-4 Analyse	CO4	Relate and analyse rear crash of automobiles
PO4		4.3	4.3.3	Level-4 Analyse	CO5	Analysis the reconstruction of vehicle roll-over
PO6		6.1	6.1.1	Level-4 Analyse	CO6	Propose the different automotive Safety systems

**Course Objectives**

<b>Sr. No.</b>	<b>Description</b>
<b>1</b>	Explain the basic safety concepts
<b>2</b>	Express and explain accident reconstruction analysis method
<b>3</b>	Compare different issues in vehicle safety
<b>4</b>	Illustrate and analyse rear crash of automobiles
<b>5</b>	Analysis the reconstruction of vehicle roll-over
<b>6</b>	Formulate the different automotive Safety systems

**Subject- Project II****Subject Code- AEP801****Course Outcomes**

<b>PO</b>	<b>PSO</b>	<b>Competancy</b>	<b>PI</b>	<b>Bloom's Level</b>	<b>CO</b>	<b>Description</b>
PO 2		2.2	2.2.3	Level-1	CO 1	Do literature survey/industrial visit and identify the problem
PO 1		1.3	1.3.1	Level-3	CO 2	Apply basic engineering fundamental in the domain of practical applications
PO 9		9.1	9.1.2	Level-3	CO 3	Cultivate the habit of working in a team
PO 4		4.1	4.1.1	Level-3	CO 4	Attempt a problem solution in a right approach
PO 4		4.3	4.3.2	Level-1	CO 5	Correlate the theoretical and experimental/simulations results and draw the proper inferences
PO 4		4.3	4.3.3	Level-1	CO 6	Prepare report as per the standard guidelines.

**Course Objectives**

<b>Sr. No.</b>	<b>Description</b>
<b>1</b>	To acquaint with the process of undertaking literature survey/industrial visit and identifying the problem
<b>2</b>	To familiarize the process of solving the problem in a group
<b>3</b>	"To acquaint with the process of applying basic engineering fundamental in the domain of practical applications"
<b>4</b>	To inculcate the process of research
<b>5</b>	
<b>6</b>	

**Subject- Vehicle Maintenance****Subject Code- AEC 801****Course Outcomes**

<b>PO</b>	<b>PSO</b>	<b>Competancy</b>	<b>PI</b>	<b>Bloom's Level</b>	<b>CO</b>	<b>Description</b>
PO 4		4.1	4.1.2	Level-2	CO 1	Demonstrate the maintenance procedure for automotive Engine and prepare checklist
PO 3		3.1	3.1.1	Level-2	CO 2	Comprehend of the operation of OBD for diagnosing various faults.
PO 4		4.1	4.1.1	Level-1	CO 3	. Identify the trouble diagnosis procedure for steering and suspension system.
PO 4		4.1	4.1.1	Level-2	CO 4	". Illustrate the trouble diagnosis procedure for electrical systems like Battery, starting Systems etc."
PO 4		4.1	4.1.1	Level-2	CO 5	Illustrate trouble diagnosis procedure for lubrication and fuel delivery system etc.
PO 4		4.1	4.1.1	Level-2	CO 6	" Illustrate trouble diagnosis procedure for heating system of automobile.

**Course Objectives**

<b>Sr. No.</b>	<b>Description</b>
<b>1</b>	To study basic types of vehicle maintenance along with its importance
<b>2</b>	To become aware about workshop skills and career opportunities available in Automobile Industry.
<b>3</b>	To acquaint with various Trouble shooting, fault tracing practices available in automobile industry
<b>4</b>	
<b>5</b>	
<b>6</b>	