COs for Automobile Engineering Department (3rd to 8th Semester)

Mathematics-III (BS-M 301)

BS-M 301	COURSE OUTCOMES
BS-M 301.1	Solve field problems in engineering involving PDEs.
BS-M 301,2	Implement the ideas of probability and random variables, calculate probabilities using conditional probability, rule of total probability and Bayes' theorem.
BS-M 301.3	Demonstrate various discrete and continuous probability distribution with their properties and their applications in physical and engineering environment.
BS-M 301.4	Use statistical tools for analyzing data samples and drawing inference on a given data set.

Biology (BS-BIO 301)

BS-BIO 301	COURSE OUTCOMES
BS-BIO 301.1	Define enzymes and their different action mechanisms.
BS-BIO 301.2	Explain the concepts of molecular information transfer considering DNA as a genetic material.
BS-BIO 301.3	Apply the concepts of biological processes at the reductionist level.
BS-BIO 301.4	Analyze thermodynamic principles to understand different biological systems.
BS-BIO 301.5	Evaluate the biological principles affecting microorganisms.

Basic Electronics Engineering (ES-ECE 301)

ES-ECE 301	COURSE OUTCOMES
ES-ECE301.1	Understand the basic electronic devices (Diode, BJT, etc.) and applications.
ES-ECE301.2	Comprehend the operation of OpAmp and Oscillators.
ES-ECE301.3	Design basic digital electronic circuits.
ES-ECE301.4	Realize the functioning of electronic communication system.

Engineering Mechanics (ES-AUE 301)

ES-AUE 301	COURSE OUTCOMES
ES-AUE 301.1	Understand scalar and vector analytical techniques for analyzing forces in practically used statically determinate structures.
ES-AUE 301.2	Apply basic kinematics & dynamics concepts, Newton's Law of Motion, Work- Energy principle and Impulse Momentum principle to solve Kinematics and Dynamics problems.
ES-AUE 301.3	Analyze all the concepts of linear kinetics to systems in general plane motion (Euler's Equation and considering energy of a system in general plane motion, and the work of couples and moments of forces).
ES-AUE 301.4	Evaluate the fundamental concepts of kinematics and kinetics of particles while designing simple and basic machine parts.
ES-AUE 301.5	Create and develop some fundamental models, projects related to basic machine parts



such as pulleys and mass spring systems.

Applied Thermodynamics (PC-AUE 301)

PC-AUE 301	COURSE OUTCOMES
PC-AUE 301.1	Understand the basic laws of thermodynamics and mutual relationships between
	energy, work, heat, internal energy enthalpy entropy used in different practical energy transferring systems.
PC-AUE 301.2	Apply the concepts of pure substances and phase diagrams for analyzing the phase change processes of conventionally used working fluids in industries.
PC-AUE 301.3	Analyze the different thermodynamic property relations for equilibrium conditions, spontaneity and stability of a thermodynamic process.
PC-AUE 301.4	Evaluate the different properties of steam used during generation of electricity through boilers, steam condensers and turbines.
PC-AUE 301.5	Investigate the different properties of air and refrigerants & their nature of applications to realize the principle of working of refrigeration and air conditioning.

Manufacturing Methods (PC-AUE 302)

PC-AUE 302	COURSE OUTCOMES
PC-AUE 302.1	Understand the concepts of conventional manufacturing processes i.e., Casting, Forging and Welding.
PC-AUE 302.2	
PC-AUE 302.3	Analyze the several manufacturing defects and its remedies to overcome the same.
PC-AUE 302.4	Evaluate the specific manufacturing processes applied in Industries for manufacturing several materials.

Machine Drawing (PC-AUE 391)

PC-AUE 391	COURSE OUTCOMES
PC-AUE 391.1	Understand conventional representation of common machine elements such as screws, nuts, bolts, keys, gears, webs, ribs and the product symbols of welding joints, pipe joints etc.
PC-AUE 391.2	Sketch orthographic projections of machine elements as well as auxiliary sectional views.
PC-AUE 391.3	Analyze assembly and part drawings of various machine components like stuffing box, flange coupling, universal joint etc.
PC-AUE 391.4	Create models based on the orthographic and isometric views of components using various tools and commands of AutoCAD.



Materials Engineering (ES-AUE 401)

ES-AUE 401	COURSE OUTCOMES
ES-AUE 401.1	Understand the crystal structures, defects leading to the different material properties
	suitably chosen for Industrial Purposes.
ES-AUE 401.2	Apply the concepts of plastic and elastic deformations to specifically choose the
	materials when applied under external loading conditions.
ES-AUE 401.3	Analyze the Iron Carbon Diagram to predict the changes in the material characteristics
	during different Heat Treatment processes applied for the industrial purposes.
ES-AUE 401.4	Evaluate the properties, characteristics and uniqueness of various Ceramics,
	Composites and Refractory Materials.
ES-AUE 401.5	Select different materials depending on their properties used in fabrication of
	Automotive Components.

Strength of Materials (PC-AUE 401)

PC-AUE 401	COURSE OUTCOMES
PC-AUE 401.1	Describe fundamental properties of engineering materials and basic concepts of stress, strain, moments etc. and apply those in engineering problem analysis.
PC-AUE 401.2	Apply various methods of finding principal plane and deflections in members; applied in real life designs.
PC-AUE 401.3	Analyze strain energy, torsion and elastic stability applicable for various mechanical structures.
PC-AUE 401.4	Design various members subjected to deformations and deflections caused by external loads.

Fluid Mechanics & Hydraulic Machines (PC-AUE 402)

PC-AUE 402	COURSE OUTCOMES
PC-AUE 402.1	Define fundamental equations of for finding out the various factors involved in fluid flow field.
PC-AUE 402.2	Calculate the effect of various fluid elements involved in components working under the presence of fluid.
PC-AUE 402.3	Analyze momentum, dimensional & model investigation applied in flow field.
PC-AUE 402.4	Evaluate the performance of hydraulic machines.

Theory of Machine (PC-AUE 403)

PC-AUE 403	COURSE OUTCOMES
PC-AUE 403.1	Understand the concept of commonly used mechanism for industrial application.
PC-AUE 403.2	Apply the velocity and acceleration of mechanisms analytically and synthesis of problems.
PC-AUE 403.3	Sketch the various cam profile diagram with respect to different followers used in various industrial applications.
PC-AUE 403.4	Evaluate the belt drive system and gear mechanisms for a given motion or a given input/output motion or force relationship.
PC-AUE 403.5	Create different models by using the different mechanisms to solve the various societal problems.

Metrology & Instrumentation (PC-AUE 404)

PC-AUE 404	COURSE OUTCOMES
PC-AUE 404.1	Understand the fundamentals of scientific measurements, standards, inspection methodologies and errors induced.
PC-AUE 404.2	Apply the concepts of Limits, Limit Gauges, Fits and Tolerances for measurement of Industrial Components.
PC-AUE 404.3	Analyze the various instruments to measure angles, threads, gears and surface finish.
PC-AUE 404.4	Evaluate the digital measurement devices (Sensors, Transducers) to measure force and torque; strain and stress and temperature.

Manufacturing and Testing Lab (PC-AUE 491)

PC-AUE 491	COURSE OUTCOMES
PC-AUE 491.1	Understand the mechanical properties of isotropic materials in different loading
	conditions by Tension, Compression, Impact, Hardness and Fatigue Tests
PC-AUE 491.2	Analyze the different microstructural, metallurgical and mechanical properties of materials by different heat treatment techniques
PC-AUE 491.3	Evaluate the various methods and types of molding sands, patterns and castings used in industrial products development.
PC-AUE 491.4	Design the basic forging processes to manufacture typical industrial products like sheet metal or Automotive Components.
PC-AUE 491.5	Fabricate weld joints using gas welding and arc welding and thereafter inspect the quality of welded joints using non-destructive testing methods.



Environmental Sciences (MC-481)

MC-481	COURSE OUTCOMES
MC-481.1	Understand the natural environment and its relationships with human activities.
MC-481.2	Apply the fundamental knowledge of science and engineering to assess environmental and health risk.
MC-481.3	Analyze guidelines and procedures for health and safety issues obeying the environmental laws and regulations.
MC-481.4	Develop skills for scientific problem-solving related to air, water, noise& land pollution.



Automotive Engines (PC-AUE 501)

PC-AUE 501	COURSE OUTCOMES
PC-AUE 501.1	Understand various air standard cycles of operations of Internal combustion engines,
	concept of knocking and fuel ignition system in various engines and the working of
	lubrication and cooling system in Internal Combustion Engine.
PC-AUE 501.2	Evaluate the Engine performance under different parameters of Internal Combustion
	Engine.
PC-AUE 501.3	Analyze the current scenario on the pollution caused by the emission of different noxious gases emitted from Engine Exhaust.
PC-AUE 501.4	Illustrate various methods applied on the Internal Combustion Engine by the different
	Industries to control the emission.
PC-AUE 501.5	
	reduce the emission level of various noxious gases emitted from the engine exhaust.

Automotive Body & Chassis Engineering (PC-AUE 502)

PC-AUE 502	COURSE OUTCOMES
PC-AUE 502.1	Understand the various types of chassis layout and its application areas.
PC-AUE 502.2	Apply the concepts of constructional features, working principles and functions of various automotive systems to study existing Automotive Systems.
PC-AUE 502.3	Analyze the different types of wheels & tyres and their corresponding defects.
PC-AUE 502.4	Evaluate driver's comfort level, visibility zone, safety purposes for the passengers from the perspective of Vehicle Aerodynamics.
PC-AUE 502.5	Assemble vehicular parts, vehicle bodies to conceptualize new Automotive Systems.

Heat Transfer (PC-AUE 503)

PC-AUE 503	COURSE OUTCOMES
PC-AUE 503.1	Apply one dimensional steady (with and without heat generation) as well as unsteady state (without heat generation) heat conduction concepts to evaluate the effectiveness and efficiency of rectangular and pin fins installed on a surface.
PC-AUE 503.2	Analyze the physical significances of the pertinent dimensionless numbers (i.e., Reynolds no, Nusselt no, Prandtl no, Grashoff no, Peclet no, Rayleigh no etc.) governing the forced and natural convective heat transfer empirical equations.
PC-AUE 503.3	Evaluate the physical mechanisms that governs the thermal radiation process between different types of surfaces.
PC-AUE 503.4	Design the industrial heat exchangers based on the heat transfer rate both theoretically and practically.



Design of Machine Element (PC-AUE 504)

PC-AUE 504	COURSE OUTCOMES
PC-AUE 504.1	Apply the failure theories for designing components under static and dynamic load conditions.
PC-AUE 504.2	Analyze the design of shafts, springs, sliding, rolling contact bearings under static and fatigue load conditions.
PC-AUE 504.3	Evaluate the design of Spur, helical, bevel and worm gears from strength and wear consideration.
PC-AUE 504.4	Design threaded fasteners, pre-loaded bolts and welded joints, clutches, brakes along with power screws and couplings.

Humanities and Social Sciences including Management (HM-HU 511A)

PC-AUE 511A	COURSE OUTCOMES
PC-AUE 511A.1	Understand the principles of different types of value and their importance.
PC-AUE 511A.2	Apply the sustenance of value in the process of social, political and technological system.
PC-AUE 511A.3	Analyze the concepts of ethics and its application in practical life.
PC-AUE 511A.4	Evaluate the application of values and ethics in the field of engineering.

Fluid Mechanics & Heat Transfer Lab (PC-AUE 591)

PC-AUE 591	COURSE OUTCOMES
PC-AUE 591.1	Calculate the discharge of Venturimeter and Orificemeter and thereafter find the friction factor during flow through pipes.
PC-AUE 591.2	Apply the fluid mechanics laws to find the performance characteristics of Pelton Wheel, Centrifugal Pump and Pitot tube.
PC-AUE 591.3	Analyze the principle of conduction, convection and radiation heat transfers through different experimental setups.
PC-AUE 591.4	Evaluate the performance characteristics of Heat Exchangers and Vapour Compression Refrigeration System.

Engine & Chassis Component Lab (PC-AUE 592)

PC-AUE 592	COURSE OUTCOMES
PC-AUE 592.1	Understand the various types of chassis & transmission system along with different types of tools used during experiment.
PC-AUE 592.2	Analyze the differences of Petrol and Diesel Engines along with different types of components related to the braking system, steering systems & transmission system.
PC-AUE 592.3	Evaluate the different types of efficiencies by performing calculations, graphs and thereafter develop and modify the features of Petrol and Diesel Engines.
PC-AUE 592.4	Assemble the modern automobile engines distinctly identifying the components of fuel supply, air intake, cooling, lubrication, ignition, braking, clutch & other allied



Sur Tech

systems.

ETPM Lab (PC-AUE 593)

PC-AUE 593	COURSE OUTCOMES
PC-AUE 593.1	Understand the governing parameters of Engine Testing & Performance, MPFI
: :	Systems, Valve timings & adjustment & also characteristics of fuel & oils.
PC-AUE 593.2	Perform the performance test, Morse test, heat balance of SI & CI engine, flash &
	fire point of an oil & also examine the calorific value of fossil fuels.
PC-AUE 593.3	Distinguish the exhaust emission characteristics, methods of heat balance & also
	performances with different types of advance IC engine.
PC-AUE 593.4	Evaluate the numerical rules for all the experiments which has been performed
	throughout by the process of relevant data tabulations, calculations and graphs.

Project-I (PW-AUE 581)

PW-AUE 581	COURSE OUTCOMES
PW-AUE 581.1	Identify real world problems by reviewing existing literature.
PW-AUE 581.2	Apply specific methodologies for the given problem with due consideration to environmental, social, and other relevant issues.
PW-AUE 581.3	Analyze appropriate tools and techniques to implement the project ideas while maintaining professional ethics.
PW-AUE 581.4	Demonstrate effective communication skills while presenting the project work as a team.
PW-AUE 581.5	Author original project report by documenting each aspect of the carried work.

(Formerly known as Dr. Sudhir Chandra Sur Degree Engineering College)

6TH Semester

Automotive Transmission (PC-AUE 601)

PC-AUE 601	COURSE OUTCOMES
PC-AUE 601.1	Understand the construction, working principle and performance of various types of
	transmission, and drives related to an Automobile.
PC-AUE 601.2	Apply the equation of torque capacity for different types of frictional clutch and gear
	boxes.
PC-AUE 601.3	Analyze the performance characteristics of various types of transmission components
	and improvements on transmission efficiency.
PC-AUE 601.4	Evaluate torque transmitted during clutch engagement and disengagement process,
_	gear ratios & speed of different components of Epicyclic Gear boxes.
PC-AUE 601.5	Select different types of frictional clutches, selective gear boxes for hydrostatic and
	electric drives.

Hybrid and Electric Vehicles (PC-AUE 602)

PC-AUE 602	COURSE OUTCOMES
PC-AUE 602.1	Understand the different configurations and controlling mechanism of electric drives.
PC-AUE 602.2	Calculate the capacity of the energy storage system in Hybrid electric vehicles.
PC-AUE 602.3	Differentiate between the different energy management processes for Hybrid Electric Vehicles.
PC-AUE 602.4	Evaluate the performances of the hybrid & battery electric vehicles.

Transport Management & Motor Vehicles Act (PE-AUE 611B)

PE-AUE 611B	COURSE OUTCOMES
PE-AUE 611B.1	Understand the various acts related to Motor Vehicles.
PE-AUE 611B.2	Apply the methods of vehicle registration, insurance, taxation allied to road safety.
PE-AUE 611B.3	Analyze the various Passenger & Goods Transport Operations and their controlling methodologies.
PE-AUE 611B.4	Evaluate the advanced policies and techniques used in Modern Traffic Management.

Introduction to Industrial Management (HM-HU 611A)

HM-HU 611A	COURSE OUTCOMES
HM-HU 611A.1	Define the fundamental knowledge of industrial management.
HM-HU 611A.2	Explain the theory and functions of human resource management
HM-HU 611A.3	Apply the appropriate tools or techniques to increase the productivity of an organization.
HM-HU 611A.4	Select appropriate quality control tools and sampling plan to optimize productivity.
HM-HU 611A.5	Decide critical path and predict project completion time of the project.

Quantitative Methods for Decision Making (HM-HU 611B)

HM-HU 611B	COURSE OUTCOMES
HM-HU 611B.1	Understand different types of quantitative methods and apply linear programming tools for decision making in various types of industries.
HM-HU 611B.2	Use transportation problems to minimize cost and understand the principles of assignment of jobs and machines to optimize production time and production costs.
HM-HU 611B.3	Analyze the principles of several inventory models and queuing models for MRP-I & MRP-II.
HM-HU 611B.4	Decide critical path and predict project completion time of the project using PERT/CPM techniques.

Automotive Design Lab (PC-AUE 691)

PC-AUE 691	COURSE OUTCOMES
PC-AUE 691.1	Understand basic concepts of automobile part designing using design software.
PC-AUE 691.2	Use proper tool for designing automotive components.
PC-AUE 691.3	Analyze various operations used in CATIA.
PC-AUE 691.4	Design automotive components by using design tools.

Vehicle Maintenance Lab (PC-AUE 692)

PC-AUE 692	COURSE OUTCOMES
PC-AUE 692.1	Understand the application of various tools and equipment used in Braking System, Fuel Injection System.
PC-AUE 692.2	Implement the different concepts of maintenance for any BS IV engines
PC-AUE 692.3	Analyze the different issues related to the while balancing and wheel alignment of vehicles.
PC-AUE 692.4	Investigate the particular tools which are required to use in particular maintenance process involved in vehicle maintenance.

Essence of Indian Traditional Knowledge (MC 601)

MC- 601	COURSE OUTCOMES
MC- 601.1	Understand and explain basics of Indian Traditional knowledge from modern scientific perspective.
MC- 601.2	Apply the Indian perspective of modern scientific world-view.
MC-601.3	Analyze basic principles of Yoga.
MC-601.4	Develop a holistic idea of health care.



Project-II (PW-AUE 681)

PW-AUE 681	COURSE OUTCOMES
PW-AUE 681.1	Identify real world problems by reviewing existing literature.
PW-AUE 681.2	Apply specific methodologies for the given problem with due consideration to environmental, social, and other relevant issues.
PW-AUE 681.3	Analyze appropriate tools and techniques to implement the project ideas while maintaining professional ethics.
PW-AUE 681.4	Demonstrate effective communication skills while presenting the project work as a team.
PW-AUE 681.5	Author original project report by documenting each aspect of the carried work.



Vehicle Dynamics (PC-AUE 701)

PC-AUE 701	COURSE OUTCOMES
PC-AUE 701.1	Understand Vehicle System Dynamics.
PC-AUE 701.2	Apply the concepts of driving and braking resistances on vehicle dynamics.
PC-AUE 701.3	Analyze the dynamics systems such as suspension systems, braking system, steering
	mechanisms and stability of the vehicle.
PC-AUE 701.4	Solve different engineering problems related to the dynamics of vehicle.
PC-AUE 701.5	Develop the different optimization technique to minimize the drag and visualize the
	air flow over the vehicle body surface.

Alternate Fuels and Energy Systems (PE-AUE 711A)

PE-AUE 711A	COURSE OUTCOMES
PE-AUE 711A.1	Understand the thermodynamic properties of a fuel during the combustion.
PE-AUE 711A.2	Apply the concepts of combustion & emission characteristics for storage, processing & safety handling of Alternative Fuels.
PE-AUE 711A.3	Analyze the controlling measures of Automobile emission from SI & CI engines.
PE-AUE 711A.4	Evaluate the testing procedures to regulate engine emissions.

Automotive Component and System Design (PE-AUE 712 A)

PE-AUE 712A	COURSE OUTCOMES
PE-AUE 712A.1	Understand the constructional details of various principal parts of IC Engines, transmission system components, brake system, suspension system and power transmitting drive trains.
PE-AUE 712A,2	Calculate the amount of torque transmitted through different clutches during the engagement of clutch, gear ratio during different gear positions from 1st gear to top gear, amount of braking force acting on the brake line, amount of load acting on each suspension springs.
PE-AUE 712A.3	Apply the fundamental knowledge of applied mechanics and material strength to solve the actual design problem.
PE-AUE 712A.4	Design the principal parts of IC Engines, clutches and gear boxes, propeller shaft, final drive, universal joint, leaf spring, coil spring and differential.



Two and Three Wheelers (PE-AUE 712 B)

PE-AUE 712B	COURSE OUTCOMES
PE-AUE 712B.1	Describe the constructional features, engine cooling & lubrication techniques of 2 stroke & 4 stroke engines.
PE-AUE 712B.2	Demonstrate the concepts of the suspension system, steering handlebar, brake system, wheel & tyre prominent in Two and Three Wheelers.
PE-AUE 712B.3	Analyze the various kinds of maintenance procedure for two & three wheelers.
PE-AUE 712B.4	Design new chassis subsystems of Two and Three wheelers capable of meeting industrial requirements.

Quality Control & Reliability Engineering (OE-AUE 711 A)

OE-AUE 711A	COURSE OUTCOMES
OE-AUE 711A.1	Define the concepts of descriptive statistics like mean, mode, median, standard deviation etc.
OE-AUE 711A.2	Understand different tools and techniques used in quality control engineering.
OE-AUE 711A.3	Apply basic concepts along with statistical and design model in reliability engineering.
OE-AUE 711A.4	Analyze different types of sampling methods used in control engineering.
OE-AUE 711A.5	Evaluate specific techniques to overcome the failures prominent in reliability engineering.

Economics For Engineers (HM-HU 701)

HM-HU 701	COURSE OUTCOMES
HM-HU 701.1	Define economic decisions and estimate engineering costs from different cost estimation models.
HM-HU 701.2	Explain cash flow diagrams for different situations.
HM-HU 701.3	Apply the concepts of expected value, estimates and simulation uncertainty in economic analysis.
HM-HU 701.4	Analyze the concepts of depreciation, replacement analysis important in financial planning and management.

Automobile Electrical & Electronics Lab (PC-AUE 791)

PC-AUE 791	COURSE OUTCOMES
PC-AUE 791.1	Understand the basics of Microprocessor Interfacing in practical applications.
PC-AUE 791.2	Use rectifiers, filters, A/D and D/A convertors.
PC-AUE 791.3	Analyze different kinds of automotive wiring.
PC-AUE 791.4	Develop basic electric circuits valid in Automotive Systems.



Project-III (PW-AUE 781)

PW-AUE 781	COURSE OUTCOMES
PW-AUE 781.1	Identify real world problems by reviewing existing literature.
PW-AUE 781.2	Apply specific methodologies for the given problem with due consideration to environmental, social, and other relevant issues.
PW-AUE 781.3	Analyze appropriate tools and techniques to implement the project ideas while maintaining professional ethics.
PW-AUE 781.4	Demonstrate effective communication skills while presenting the project work as a team.
PW-AUE 781.5	Author original project report by documenting each aspect of the carried work.



Off Road Vehicles (PE-AUE 811A)

PE-AUE 811A	COURSE OUTCOMES
PE-AUE 811A.1	Define the types, features & principles of off-road vehicles and their applications.
PE-AUE 811A.2	Identify the various kind of off-road vehicles i.e., earth moving and agricultural.
PE-AUE 811A.3	Apply the concepts to calculate the production capacity and cost of production of
	shovels, draglines and dumpers.
PE-AUE 811A.4	Differentiate between the maintenance processes of various off-road vehicles.

Non-Destructive Testing Methods (PE-AUE 812A)

PE-AUE 812A	COURSE OUTCOMES
PE-AUE 812A.1	Classify the different types of Destructive & Non-destructive Testing Methods.
PE-AUE 812A.2	Apply different type of Non-destructive testing methods to find requisite characteristics of a material.
DE ATTE 010 A 2	Analyze the Non-Destructive Testing methods to find the optimum methodology.
PE-AUE 812A.3	
PE-AUE 812A.4	Evaluate the various types of defects found during Non-Destructive Testing.

Soft Computing (OE-AUE 811C)

OE-AUE 811C	COURSE OUTCOMES
OE-AUE 811C.1	Define the basic concepts of soft computing and hard computing.
OE-AUE 811C.2	Identify appropriate rules for each of the architectures and neural network paradigms.
OE-AUE 811C.3	Apply fuzzy logic and reasoning to handle uncertainty while discussing interdisciplinary engineering problems.
OE-AUE 811C.4	Analyze the feasibility of applying genetic algorithms to various combinatorial optimization problems.
OE-AUE 811C.5	Design different soft computing methods to solve real world problems.

Entrepreneurship Development (OE-AUE 812B)

OE-AUE 812B	COURSE OUTCOMES
OE-AUE 812B.1	Describe various factors and skills needed to run a business successfully.
OE-AUE 812B.2	Interpret key regulations and legal aspects of entrepreneurship in India
OE-AUE 812B.3	Analyze the idea behind the concept of business plan and ownerships.
OE-AUE 812B.4	Evaluate the roots of financial growth and business account module of existing
	business.