

Department of

Department of Automobile Engineering

Programme Name: B.E.-Automobile Engineering

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2022 Scheme(UG)

Course Outcomes of Second -Year Courses

Course Name	AUTOMOTIVE ENGINES
Course Code	22BAU301
Course outcomes (COs): At the end of the course the student will be able to:	
22BAU301.1	Explain the constructional details of SI and CI engines and classify engines.
22BAU301.2	Explain the construction and working of carburettors and fuel injection pumps. .
22BAU301.3	Explain the combustion process in SI and CI engines, and suggest an efficient cooling system for IC engines.
22BAU301.4	Select a proper lubricant to be used in an automobile used in various environmental conditions.

Course Name	MATERIAL SCIENCE AND METALLURGY
Course Code	22BAU302
Course outcomes (COs): At the end of the course the student will be able to:	
22BAU302.1	Explain different crystal structures, mechanism of various types of failure, types of heat treatment processes and types and methods of manufacturing of composites.
22BAU302.2	Draw stress strain diagrams for various metals.
22BAU302.3	Select various non-ferrous metals and alloys based on composition and properties for a given application.
22BAU302.4	Understand the basics of Batteries and Super capacitors.

Course Name	MANUFACTURING PROCESSES
Course Code	22BAU303
Course outcomes (COs): At the end of the course the student will be able to:	
22BAU303.1	Prepare molds using moulding sand and tools and explain different types of casting methods.
22BAU303.2	Fabricate simple models using various joining techniques.
22BAU303.3	Explain various hot and cold forming processes.
22BAU303.4	Produce simple models/jobs using necessary cutting tools, machining operations and machine tools..

Course Name	ENGINEERING THERMODYNAMICS
Course Code	22BAU304
Course outcomes (COs): At the end of the course the student will be able to:	
22BAU304.1	Understand the basic and applied concepts of thermodynamics.
22BAU304.2	Analyze the Evaluate thermal performance of heat engines.
22BAU304.3	Compare the performance of heat engines.
22BAU304.4	Apply the concepts to solve engineering problems related to thermodynamics

Course Name	BASIC AUTOMOBILE ENGINEERING LABORATORY
Course Code	22BAUL305
Course outcomes (COs): At the end of the course the student will be able to:	
22BAU304.1	Dismantle and assemble the various automobile systems(assemblies)
22BAU304.2	Sketch the automobile assemblies/systems and name the various parts.
22BAU304.3	Explain the working of various automobile systems
22BAU304.4	Understand the equipment used for dismantling and assembly of automobile systems.

2021 Scheme (UG)

Course Outcomes of Second-Year Courses

Course Name	Transform Calculus, Fourier Series and Numerical Techniques
Course Code	21MAT31
Course outcomes (COs): At the end of the course the student will be able to:	
21MAT31.1	Illustrate the concepts of– Laplace, Fourier & Z transformation, Fourier series , Numerical solutions of PDE & ODE and Calculus of variation .
21MAT31.2	Apply the above acquired knowledge to solve the problems in engineering.
21MAT31.3	Analyze the solutions of the real world problems using above techniques.
21MAT31.4	Interpret the overall knowledge gained to demonstrate the problems arising in practical situations.

Course Name	Material Science and Metallurgy
Course Code	21AU32
Course outcomes (COs): At the end of the course the student will be able to:	
21AU32.1	Explain different crystal structures, mechanism of various types of failure, types of heat treatment processes and types and methods of manufacturing of composites.
21AU32.2	Draw stress strain diagram for various metals,
21AU32.3	Select various non-ferrous metals and alloys based on composition and properties for a given application
21AU32.4	Understand the basics of Batteries and Super capacitors

Course Name	Manufacturing Processes
Course Code	21AU33
Course outcomes (COs): At the end of the course the student will be able to:	
21AU33.1	Prepare moulds using moulding sand and tools and Explain different types of casting methods
21AU33.2	Fabricate simple models using various joining techniques.
21AU33.3	Explain various hot and cold forming processes.
21AU33.4	Produce simple models/jobs using necessary cutting tools, machining operations and machine tools.

Course Name	Engineering Thermodynamics
Course Code	21AU34
Course outcomes (COs): At the end of the course the student will be able to:	
21AU34.1	Understand the basic and applied concepts of thermodynamics.
21AU34.2	Analyze the Evaluate thermal performance of heat engines.
21AU34.3	Compare the performance of heat engines.
21AU34.4	Apply the concepts to solve engineering problems related to thermodynamics

Course Name	Basic Automobile Engineering Laboratory
Course Code	21AUL35
Course outcomes (COs): At the end of the course the student will be able to:	
21AUL35.1	Understand tools and equipment used for dismantling and assembly of automobile systems
21AUL35.2	Dismantle and assemble the various automobile systems(assemblies)
21AUL35.3	Sketch the automobile assemblies/systems and name the various part

21AUL35.4	Explain the working of various automobile systems
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Course Name	Basic Automobile Engineering Laboratory
Course Code	21AUL35
Course outcomes (COs): At the end of the course the student will be able to:	
21AU384.1	Introduce the students to the methods of Clay modelling techniques
21AU384.2	Prepare clay material for creating simple 3D forms
21AU384.3	Prepare simple 3D forms by using clay modelling tools and techniques
21AU384.4	Create 3D automobile body shapes and other simple showpiece models.

Course Name	Complex Analysis, Probability and Linear Programming
Course Code	21MATME41
Course outcomes (COs): At the end of the course the student will be able to:	
21MATME41.1	Illustrate the concepts of– Complex functions, transformation, Probability distributions and Optimization techniques
21MATME41.2	Apply the above acquired knowledge to solve the problems in mechanical and allied branches of engineering.
21MATME41.3	Analyze the solutions of the real world problems using above techniques.
21MATME41.4	Interpret the overall knowledge gained to demonstrate the problems arising in practical situations.

Course Name	Mechanical Measurement and Metrology
Course Code	21AU42
Course outcomes (COs): At the end of the course the student will be able to:	
21AU42.1	Explain significance of mechanical measurements, elements of a generalized measuring system, theory
21AU42.2	Define Metrology, appreciate the objectives of Metrology, and explain the importance of standards
21AU42.3	Interpret the limits specified, identify fits, and explain the concept of tolerance.
21AU42.4	Use comparators, screw, and gear metrology

Course Name	Fluid Mechanics and Fluid Machines
Course Code	21AU43
Course outcomes (COs): At the end of the course the student will be able to:	
21AU43.1	1. Understand the properties of fluids, basic principles, laws and concepts of fluid mechanics and fluid machineries like pumps and compressors.
21AU43.2	Analyze the fluid flow problems concerning pressure, force, flow measurement, buoyancy and stability, dimensionless parameters, and fluid machineries.
21AU43.3	Apply the fluid kinetics and dynamics principles to solve fluid flow problems.
21AU43.4	Design and compare the various instruments propelled by fluid machines

Course Name	Theory of Machines
Course Code	21AU44
Course outcomes (COs): At the end of the course the student will be able to:	
21AU44.1	Determine the mobility of given mechanisms.
21AU44.2	Plot cam profiles using displacement diagrams for various types of motions.
21AU44.3	Calculate static and dynamic forces at various points in different types of mechanism flywheel dimensions
21AU44.4	Find the controlling force in various governors.

Course Name	Earth Moving Equipments
Course Code	21AU482
Course outcomes (COs): At the end of the course the student will be able to:	
21AU482.1	Explain about various basic operations
21AU482.2	Understand the various applications of earth moving equipment.
21AU482.3	Select undercarriage, hydraulics, steering systems of tractors
21AU482.4	Select a suitable hauling machine depending on type of land, haul distance, climate, etc.

Course Name	HYDRAULICS AND PNEUMATICS SYSTEM LAB
Course Code	21AUL46
Course outcomes (COs): At the end of the course the student will be able to:	
21AUL46.1	Analyse the performance of Four stroke and Multi cylinder engines
21AUL46.2	Operate the hydraulic and pneumatic components.
21AUL46.3	Apply the suitable cylinders according to the applications.
21AUL46.4	Appreciate the purpose of valves.

Course Name	Design Thinking for Innovation
Course Code	21AE482
Course outcomes (COs): At the end of the course the student will be able to:	
21AE482.1	Understand what design thinking is and when to use it
21AE482.2	Use design thinking for innovation
21AE482.3	Generate innovative ideas based upon design thinking
21AE482.4	Determine which ones are likely to produce specific, desired outcomes

Course Outcomes of Third-Year Courses

Course Name	Heat and Mass Transfer
Course Code	21AU51
Course outcomes (COs): At the end of the course the student will be able to:	
21AU51.1	Explain fundamental principles and laws of conduction, convection and radiation modes of heat transfer and mass transfer.
21AU51.2	Analyze all modes of heat transfer and mass transfer under different conditions.
21AU51.3	Calculate heat exchange through heat exchanger.
21AU51.4	Apply laws of radiation heat transfer to solve engineering problems.

Course Name	Fundamentals Of Electrical Vehicles
Course Code	21AU52
Course outcomes (COs): At the end of the course the student will be able to:	
21AU52.1	Understand the basic requirements of an electric vehicle like dynamics, performance parameters, batteries , traction control and fuel cell as an alternative power source
21AU52.2	Analyze the design parameters of vehicle dynamics and apply the same to arrive at power and torque requirement, battery/fuel cell type and requirement of different segments of EVs,
21AU52.3	Apply the basics of vehicle dynamics, batteries and fuel cell to calculate the performance parameters, capacity of the cell and the traction controllers
21AU52.4	Design a small battery pack and test run using a small vehicle prototype.

Course Name	Design of Automobile components
Course Code	21AU53
Course outcomes (COs): At the end of the course the student will be able to:	
21AU53.1	Define and explain basic terms related to the design of machine elements.
21AU53.2	Design various machine elements & Analyze the stresses in shafts
21AU53.3	Calculate specifications of springs/gears/clutches.
21AU53.4	Design connecting rods & crank shafts

Course Name	Automotive Transmission
Course Code	21AU54
Course outcomes (COs): At the end of the course the student will be able to:	
21AU54.1	Understand and explain the constructional, design and working principles of different types of ICE and EV transmission systems.
21AU54.2	Determine the various parameters of vehicle transmission systems. .
21AU54.3	Analyze the design parameters, necessity, advantages, constructional and principle of operation of different types of automatic transmissions and hydraulic control.
21AU54.4	Apply the concept of transmission systems to design new systems for ICE and EVs.

Course Name	- Automotive Engine and EV drive Components Lab
Course Code	21AUL55
Course outcomes (COs): At the end of the course the student will be able to:	
21AUL55.1	Thorough understanding of major components, their working and location identification of EVs and automobile engines .
21AUL55.2	Inspect and analyze the automobile components for functional defectiveness, wear and tear
21AUL55.3	Diagnose specific problems and make efforts to find the solution /troubleshooting.
21AUL55.4	Compare dimensional specifications of various but similar components of the automobile , both EVs and ICE from various manufacturers.

Course Name	Battery management system
Course Code	21AU584
Course outcomes (COs): At the end of the course the student will be able to:	
21AU51.1	Basics and functionalities of battery management systems
21AU584.2	Battery Pack sensing factors
21AU584.3	Knowledge on Battery Protection and Interface with Energy estimation
21AU584.4	Cost reduction calculation for BMS

Course Name	MANAGEMENT AND ENTREPRENEURSHIP
Course Code	21AU61
Course outcomes (COs): At the end of the course the student will be able to:	
21AU61.1	Understand and explain management functions of a management
21AU61.2	Identify various types of supporting agencies and financing available for an entrepreneur.
21AU61.3	Understand and plan a start-up ecosystem /enterprise
21AU61.4	Prepare project report and decide industrial ownership

Course Name	Automotive chassis and suspension
Course Code	21AU62
Course outcomes (COs): At the end of the course the student will be able to:	
21AU62.1	Explain different chassis layouts and frames, Suspensions, Wheels and Tires, Propeller Shaft, differential and Rear Axles, etc.
21AU62.2	Determine stability and weight distribution and suitability of frames.
21AU62.3	Calculate dimensions of major chassis components.
21AU62.4	Describe, about various Front Axles, factors of wheel alignment Steering Systems and Calculate dimensions of Front Axle.

Course Name	Vehicle Body Engineering and Safety
Course Code	21AU63
Course outcomes (COs): At the end of the course the student will be able to:	
21AU63.1	Classify the vehicles and define basic terms.
21AU63.2	Select appropriate body material.
21AU63.3	Calculate various aerodynamic forces and moments acting on the vehicle, load distribution in the vehicle body. .
21AU63.4	Explain the ergonomics, stability the vehicle

Course Name	Principles of Alternative Energies
Course Code	21AU642
Course outcomes (COs): At the end of the course the student will be able to:	
21AU642.1	Understand the role and significance of solar energy.
21AU642.2	Explain the importance of Wind Energy.
21AU642.3	Discuss the role of geothermal energy and ocean energy in the Energy Generation and its importance
21AU642.4	Illustrate the Utilization of hydrogen energy and hydroelectric energy.

Course Name	Modelling & ANALYSIS LAB
Course Code	21AUL66
Course outcomes (COs): At the end of the course the student will be able to:	
21AUL66.1	Demonstrate the basic features of an analysis package.
21AUL66.2	Use the modern tools to formulate the problem, and be able to create geometry, discretize, apply boundary conditions to solve problems of bars, truss, beams, plate to find stress with different loading conditions..
21AUL66.3	Demonstrate the deflection of beams subjected to point, uniformly distributed and varying loads further to use the available results to draw shear force and bending moment diagrams.
21AUL66.4	Analyze the given problem by applying basic principle to solve and demonstrate 1D and 2D heat transfer with conduction and convection boundary conditions

Course Outcomes of Fourth-Year Courses

Course Name	AI and ML in Automotive Vehicles
Course Code	21AU71
Course outcomes (COs): At the end of the course the student will be able to:	
21AU71.1	Understand the core concepts of Mechanical Systems in the context of Industry
21AU71.2	Apply AI, ML and Deep Learning concepts on Various Mechanical Systems
21AU71.3	Apply the statistical and optimization techniques on Mechanical Systems
21AU71.4	Evaluate the Mechanical System performance using simulation and experimental analysis

Course Name	Automotive Electrical and Electronic Systems
Course Code	21AU72
Course outcomes (COs): At the end of the course the student will be able to:	
21AU72.1	UExplain the construction of batteries used in automotive vehicles.
21AU72.2	Describe the construction and working of D.C. generator, alternator, cranking motor, ignition systems along with troubleshooting
21AU72.3	Discuss the faults arising in automotive wiring and lighting systems.
21AU72.4	Design layout of electrical systems.

Course Name	Hybrid Vehicle Technology
Course Code	21AU721
Course outcomes (COs): At the end of the course the student will be able to:	
21AU721.1	Understand the basics of electric and hybrid electric vehicles, their architecture, technologies and fundamentals.
21AU721.2	Analyze the use of different power electronics devices and electrical machines in hybrid electric vehicles.
21AU721.3	Explain the use of different energy storage devices used for hybrid electric vehicles, their technologies and control and select appropriate technology
21AU721.4	Interpret working of different configurations of electric vehicles and its components, hybrid vehicle configuration, performance analysis and Energy Management strategies in HEVs.

Course Name	Factory Physics
Course Code	21AU735
Course outcomes (COs): At the end of the course the student will be able to:	
21AU735.1	How engineers work with the natural tendencies of manufacturing systems
21AU735.2	Identify opportunities for improving existing systems
21AU735.3	Design effective new systems
21AU735.4	Make the trade-offs needed to coordinate policies from disparate area

2018 Scheme(UG)

Course Outcomes of Second -Year Courses Department of Automobile Engineering

Course Name	Transform Calculus, Fourier Series & Numerical Techniques
Course Code	18MAT31
Course outcomes (COs): At the end of the course the student will be able to:	
18MAT31.1	Illustrate the concepts of– Laplace, Fourier & Z transformation, Fourier series, Numerical solutions of ODE and Calculus of variation
18MAT31.2	Apply the above acquired knowledge to solve the problems in engineering.
18MAT31.3	Analyze the solutions of the real world problems using above techniques.
18MAT31.4	Interpret the overall knowledge gained to demonstrate the problems arising in practical situations.

Course Name	MATERIAL SCIENCE AND METALLURGY
Course Code	18AU32
Course outcomes (COs): At the end of the course the student will be able to:	
18AU32.1	Adequate knowledge on various materials used & their properties
18AU32.2	Understand the process of Heat Treatment for automotive metals and alloys.
18AU32.3	Understand the various aspects of battery materials used in Electric vehicles
18AU32.4	Understand the various material testing methods

Course Name	ENGINEERING THERMODYNAMICS
Course Code	18AU33
Course outcomes (COs): At the end of the course the student will be able to:	
18AU33.1	Define work, heat, and laws of thermodynamics, entropy, principle and working of refrigeration, jet
18AU33.2	Evaluates thermal performance of refrigeration cycles
18AU33.3	calculate the efficiency of gas power and vapor power cycles
18AU33.4	Analyse gas power cycles

Course Name	MECHANICS OF MATERIALS
Course Code	18AU34
Course outcomes (COs): At the end of the course the student will be able to:	
18AU34.1	Explain the basic concepts of stress, strain, behaviour of engineering materials
18AU34.2	Calculate principal stresses using analytical and graphical methods
18AU34.3	Plot shear force and bending moment diagrams for beams carrying different types of loads
18AU34.4	Determine deflection and slope of beams subjected to various type of loads

Course Name	MECHANICAL MEASUREMENTS AND METROLOGY
Course Code	18AU35
Course outcomes (COs): At the end of the course the student will be able to:	
18AU35.1	Understand the concepts of metrology and measurement
18AU35.2	Analyse the concepts of gauge design and application
18AU35.3	Understand the working and usage of measuring instruments
18AU35.4	Apply the process of measurements in gears and screw threads

Course Name	MANUFACTURING PROCESS – I
Course Code	18AU36
Course outcomes (COs): At the end of the course the student will be able to:	
18AU36.1	Define various terms associated with casting processes
18AU36.2	Explain methods of construction of moulds, different non-destructive testing methods
18AU36.3	Select moulding machine and moulding process based on material type
18AU36.4	Select appropriate joining process and type of joints.

Course Name	METALLOGRAPHY AND MATERIAL TESTING LABORATORY
Course Code	18AUL37
Course outcomes (COs): At the end of the course the student will be able to:	
18AUL37.1	Understand the significance, types and applications of various NDT methods
18AUL37.2	Understand the material surface properties for different materials
18AUL37.3	Understand the basic mechanical properties of aircraft materials
18AUL37.4	Understand the fatigue and creep property of aircraft materials

Course Name	FOUNDRY AND FORGING LABORATORY
Course Code	18AUL38
Course outcomes (COs): At the end of the course the student will be able to:	
18AUL38.1	Utilize various tools in the foundry, forging and welding process.
18AUL38.2	Demonstrate various skills in preparation of moulding
18AUL38.3	Conducting tensile, shear and compression test for moulding sand in sand testing machine
18AUL38.4	Create the forging models by using forging tools, which includes upsetting, drawing and bending operation

Course Name	Complex Analysis, Probability And Statistical Methods
Course Code	8MAT41
Course outcomes (COs): At the end of the course the student will be able to:	
18MAT41.1	Illustrate the concepts of– complex functions, transformation, Probability distributions and Statistical methods.
18MAT41.2	Apply the above acquired knowledge to solve the problems in engineering.
18MAT41.3	Analyze the solutions of the real world problems using above techniques.
18MAT41.4	Interpret the overall knowledge gained to demonstrate the problems arising in practical situations.

Course Name	FLUID MECHANICS
Course Code	18AU42

Course outcomes (COs): At the end of the course the student will be able to:	
18AU42.1	Define fluid properties; describe Pascal's law, Hydrostatic law.
18AU42.2	Calculate pressure given point and difference in pressure between sections of pipe, Buoyancy and Stability of floating objects.
18AU42.3	Apply Bernoulli's principle to solve fluid flow problems.
18AU42.4	Make dimensional analysis of fluid mechanics problems.

Course Name	KINEMATICS OF MACHINES
Course Code	18AU43
Course outcomes (COs): At the end of the course the student will be able to:	
18AU43.1	Define and explain the basic terms such as kinematic chain, kinematic pair, degree of freedom etc.
18AU43.2	Determine the mobility of given mechanisms.
18AU43.3	Determine the velocity and acceleration of links using graphical and analytical methods.
18AU43.4	Plot cam profiles using displacement diagram for various types of motions

Course Name	AUTOMOTIVE ENGINES
Course Code	18AU44
Course outcomes (COs): At the end of the course the student will be able to:	
18AU44.1	Explain need, constructional details and working of various auxiliary system used for internal combustion engine, scavenging systems for two stroke engines
18AU44.2	Calculate efficiency of theoretical , fuel air and actual cycles
18AU44.3	Choose cooling and lubrication system for internal combustion engine
18AU44.4	Analyse effect of supercharging and turbocharging on engine performance

Course Name	MANUFACTURING PROCESS -II
Course Code	18AU45
Course outcomes (COs): At the end of the course the student will be able to:	
18AU45.1	Explain the nomenclature of single point cutting tool, mechanics of chip formation, tool failure criteria
18AU45.2	Classify grinding and milling machines and explain their construction.
18AU45.3	Explain the principles of broaching
18AU45.4	Select non-traditional machining process for given application.

Course Name	COMPUTER AIDED MACHINE DRAWING
Course Code	18AU46
Course outcomes (COs): At the end of the course the student will be able to:	
18AU46.1	Use tools of drafting and modeling software
18AU46.2	Draw the sections of solids, orthographic views of simple machine parts using software
18AU46.3	Sketch and explain various thread forms and their application.
18AU46.4	Calculate parameters related to riveted joints and sketch them.

Course Name	MECHANICAL MEASUREMENT AND METROLOGY LAB
Course Code	18AUL47
Course outcomes (COs): At the end of the course the student will be able to:	
18AUL47.1	Understand Calibration of pressure gauge, thermocouple, LVDT, load cell, micrometre. profile using gear tooth Vernier/Gear tooth micrometre
18AUL47.2	Apply concepts of Measurement of angle using Sine Centre/ Sine Bar/ Bevel Protractor, alignment using Autocollimator/ Roller set.
18AUL47.3	Demonstrate measurements using Optical Projector/Tool maker microscope, Optical flats.
18AUL47.4	Analyse Screw thread parameters using 2-Wire or 3-Wire method, gear tooth profile using gear tooth Vernier/Gear tooth micrometre

Course Name	MACHINE SHOP
Course Code	18AUL48
Course outcomes (COs): At the end of the course the student will be able to:	
18AUL48.1	Apply the basic concepts of Manufacturing Process
18AUL48.2	Preparing various models using various machining operations on lathe machine
18AUL48.3	Preparing various models using various machining operations on a milling machine.
18AUL48.4	Preparing various models using various machining operations on shaping and drilling machine

Course Outcomes of Third-Year Courses

Department of Automobile Engineering

Course Name	MANAGEMENT AND ENTREPRENEURSHIP
Course Code	18AU51
Course outcomes (COs): At the end of the course the student will be able to:	
18AU51.1	Explain management functions of a manager.
18AU51.2	Explain planning and decision making processes
18AU51.3	Identify various types of supporting agencies and financing available for an entrepreneur.
18AU51.4	Prepare a project report and decide industrial ownership.

Course Name	DYNAMICS OF MACHINES
Course Code	18AU52
Course outcomes (COs): At the end of the course the student will be able to:	
18AU52.1	Calculate static and dynamic forces at various points in different types of mechanism, flywheel dimensions.
18AU52.2	Determine and take corrective action on imbalance due to rotating masses and reciprocating masses.
18AU52.3	Find controlling force in various governors.
18AU52.4	Describe fluctuation of energy in flywheel, various types of governors and to understand methods of finding.

Course Name	DESIGN OF MACHINE ELEMENTS - I
Course Code	18AU53
Course outcomes (COs): At the end of the course the student will be able to:	
18AU53.1	Define and explain basic terms related to the design of machine elements.
18AU53.2	Design various machine elements
18AU53.3	Knowledge of design on types of joints
18AU53.4	Knowledge on design of power screws

Course Name	AUTOMOTIVE FUELS AND COMBUSTION
Course Code	18AU54
Course outcomes (COs): At the end of the course the student will be able to:	
18AU54.1	List the available energy sources for internal combustion engine.
18AU54.2	Identify Different properties of engine fuel and examine its characteristics using various testing methods
18AU54.3	Illustrate stages of combustion in S.I. & C.I. engines
18AU54.4	Explain the difference between multi fuel, duel fuel and diesel engines

Course Name	AUTOMOTIVE TRANSMISSION
Course Code	18AU55
Course outcomes (COs): At the end of the course the student will be able to:	
18AU55.1	Explain the Constructional, design and working principles of different types of clutches, fluid couplings, torque convertors, different gearbox etc..
18AU55.2	Determine the gear ratio, speed of vehicle and number of teeth on driving and driven gears.
18AU55.3	Explain the construction and principle of operation of different types of epicyclic gear box, Calculation of gear ratio for epicyclic gear box.
18AU55.4	Explain the necessity, advantages, construction and principle of operation of different types of automatic transmissions and hydraulic control.

Course Name	HYDRAULICS AND PNEUMATICS
Course Code	18AU56
Course outcomes (COs): At the end of the course the student will be able to:	
18AU56.1	Introduce basics of Hydraulics and pneumatics.
18AU56.2	Describe Various components of hydraulic system and maintenance of hydraulic system
18AU56.3	Describe Various components of hydraulic system and maintenance of hydraulic system
18AU56.4	Describe layout and details of pneumatic systems

Course Name	AUTOMOTIVE ENGINE COMPONENTS LAB
Course Code	18AUL57
Course outcomes (COs): At the end of the course the student will be able to:	
18AUL57.1	Write technical specifications of different types of engines.
18AUL57.2	Dismantle and assemble the S. I and C.I Engines and to inspect the engine parts for wear, cracks, etc
18AUL57.3	Perform vaccum and compression test on diesel and Petrol engine.
18AUL57.4	dismantle and assemble different units of fuel system, cooling system, lubricating

Course Name	FLUID MECHANICS AND FUEL TESTING LAB
Course Code	18AUL58
Course outcomes (COs): At the end of the course the student will be able to:	
18AUL58.1	Determine coefficient of discharge of venturimeter and orifice meter
18AUL58.2	Determine major and minor losses in flow through pipes.
18AUL58.3	Investigate performance characteristics of various fluid pumps.
18AUL58.4	Determine flash point, fire point, calorific value, viscosity, cloud point, moisture content of fuel and lubricants

Course Name	AUTOMOTIVE CHASSIS & SUSPENSION
Course Code	18AU61
Course outcomes (COs): At the end of the course the student will be able to:	
18AU61.1	Explain different chassis layouts and frames, Suspensions, Wheels and Tyres, Propeller Shaft, Differential and Rear Axles, etc.
18AU61.2	Determine stability and weight distribution and suitability of frames.
18AU61.3	Calculate dimensions of major chassis components.
18AU61.4	Describe, about various Front Axles, factors of wheel alignment Steering Systems and Calculate dimensions of Front Axle

Course Name	HEAT AND MASS TRANSFER
Course Code	18AU62
Course outcomes (COs): At the end of the course the student will be able to:	
18AU62.1	Explain fundamental principles and laws of conduction, convection and radiation modes of heat transfer and mass transfer.
18AU62.2	Analyze all modes of heat transfer and mass transfer under different conditions.
18AU62.3	Calculate heat exchange through heat exchanger.
18AU62.4	Apply laws of radiation heat transfer to solve engineering problems

Course Name	DESIGN OF MACHINE ELEMENTS-II
Course Code	18AU63
Course outcomes (COs): At the end of the course the student will be able to:	
18AU63.1	Analyze the stresses in the critical section of a curved beam.
18AU63.2	Calculate specifications of springs/gears/clutches.
18AU63.3	Select suitable size, module & type of gears for a required velocity ratio.
18AU63.4	Verify suitability of a type and class of lubricant for a specific application

Course Name	AUTOMOTIVE POLLUTION AND CONTROL
Course Code	18AU643
Course outcomes (COs): At the end of the course the student will be able to:	
18AU643.1	Explain air pollution and pollutants, their sources & their effects.
18AU643.2	Describe different parameters responsible for pollutant formation.
18AU643.3	Choose instruments for pollution measurements.
18AU643.4	Analyze measurement of pollutants.

Course Name	AUTOMOBILE ENGINEERING
Course Code	18AU651
Course outcomes (COs): At the end of the course the student will be able to:	
18AU651.1	Explain construction and working of internal combustion engine, working of different fuel systems, etc,
18AU651.2	Calculate gear ratios for given power transmission.
18AU651.3	Describe emissions of pollutants from internal combustion engines and methods of controlling.
18AU651.4	Compare electrical and Electronic ignition system

Course Name	AUTOMOTIVE CHASSIS COMPONENTS LAB
Course Code	18AUL66
Course outcomes (COs): At the end of the course the student will be able to:	
18AUL66.1	Identify the various chassis frames of cars, bus (front engine & rear engine), truck and articulated vehicles.
18AUL66.2	List specifications of different two and four wheeled vehicles.
18AUL66.3	Disassemble / assemble, clean, inspect and service of chassis sub-systems like suspension, clutch /gearbox,
18AUL66.4	Disassemble / assemble, clean, inspect and service the final drive / differential, brake, steering and tyres / wheels.

Course Name	ENGINE TESTING AND EMISSION MEASUREMENT LAB
Course Code	18AUL67
Course outcomes (COs): At the end of the course the student will be able to:	
18AUL67.1	Determination of performance characteristics of various types of engines.
18AUL67.2	Determine finding FP, IP, BP of multi Cylinder engines by conducting Morse test.
18AUL67.3	Verify suitability of various alternative fuels for internal combustion engines.
18AUL67.4	Conduct emission tests on various engines

Course Outcomes of Fourth-Year Courses

Department of Automobile Engineering

Course Name	FINITE ELEMENT MODELLING AND ANALYSIS
Course Code	18AU71
Course outcomes (COs): At the end of the course the student will be able to:	
18AU71.1	Describe the fundamentals of structural mechanics and finite element method
18AU71.2	Develop an element stiffness matrix for different elements using various methods.
18AU71.3	Illustrate different methods of deriving shape functions for various elements
18AU71.4	Analyze one dimensional structural and thermal problems.

Course Name	AUTOMOTIVE ELECTRICAL AND ELECTRONIC SYSTEMS
Course Code	18AU72
Course outcomes (COs): At the end of the course the student will be able to:	
18AU72.1	Explain the construction of battery used in automotive vehicles
18AU72.2	Describe the construction and working of D.C. generator, alternator, cranking motor, ignition systems along with troubleshooting
18AU72.3	Discuss the faults arising in automotive wiring and lighting system and Design layout of electrical systems
18AU72.4	Explain various aspects of electrical and Hybrid vehicles

Course Name	EARTHMOVING EQUIPMENT & TRACTORS
Course Code	18AU732
Course outcomes (COs): At the end of the course the student will be able to:	
18AU732.1	Explain about various basic operations of EME
18AU732.2	Applications of earth moving equipment.
18AU732.3	Select undercarriage, hydraulics, steering systems of tractors.
18AU732.4	Select a suitable hauling machine depending on type of land, haul distance, climate, etc.

Course Name	TWO AND THREE WHEELED VEHICLE
Course Code	18AU743
Course outcomes (COs): At the end of the course the student will be able to:	
18AU743.1	Describe construction and working of different type of internal combustion engines for two and three wheeled vehicle
18AU743.2	Explain types of clutches, transmission and final drives used for two and three wheeled vehicles
18AU743.3	Lay down wiring diagram for two wheeler and three wheeled vehicles, maintenance schedule for two and three wheeled vehicle
18AU743.4	Describe types of frames, brakes and tires used for two and three wheeled vehicles

Course Name	NON- DESTRUCTIVE TESTING
Course Code	18AU753
Course outcomes (COs): At the end of the course the student will be able to:	
18AU753.1	Explain Principles of selection of non destructive Evaluation method (NDE)
18AU753.2	Use various inspection methods like Magnetic particle, Radiographic Inspection their Principle
18AU753.3	General procedure, advantages and limitations of the processes
18AU753.4	Verification of proper assembly and Inspect for in-service damage.

Course Name	AUTOMOBILE SCANNING AND RE-CONDITIONING LAB
Course Code	18AUL76
Course outcomes (COs): At the end of the course the student will be able to:	
18AUL76.1	Check and adjust ignition timing and tappet clearance
18AUL76.2	Align the given connecting rod
18AUL76.3	Rebore the given engine cylinders
18AUL76.4	Service the FIP and calibrate

Course Name	MODELING & ANALYSIS LAB
Course Code	18AUL77
Course outcomes (COs): At the end of the course the student will be able to:	
18AUL77.1	Describe procedure for FEA
18AUL77.2	Model and analyze bar, trusses subjected to various types of loads
18AUL77.3	Model and analyze bar, beam and trusses subjected to various types of loads
18AUL77.4	Analyze heat transfer and flow processes.

Course Name	VEHICLE BODY ENGINEERING AND SAFETY
Course Code	18AU81
Course outcomes (COs): At the end of the course the student will be able to:	
18AU81.1	Classify the vehicles and Select appropriate body material
18AU81.2	Understand various aerodynamic forces and moments acting on vehicle, load distribution in vehicle body
18AU81.3	Explain the ergonomics, stability of the vehicle.
18AU81.4	Identify various sources of noise and methods of noise separation and various safety aspects in a given vehicle

Course Name	MECHANICAL VIBRATIONS
Course Code	18AU82
Course outcomes (COs): At the end of the course the student will be able to:	
18AU82.1	Classify different types of vibration / damping associated with systems and vibration measuring instruments.
18AU82.2	Calculate natural frequency, damping, logarithmic decrement and other parameters of single degree of freedom undamped / damped free vibration systems
18AU82.3	Compute the response of a single degree of freedom damped vibrating systems to different excitation forces.
18AU82.4	Determine the natural frequencies and the modes of two degrees of freedom free vibrating systems.