

West Bengal State Council of Technical &  
Vocational Education and Skill  
Development  
(Technical Education Division)



Syllabus  
of

Diploma in Automobile Engineering [AE]

Part-III (6<sup>th</sup> Semester)

2023

**Semester-wise Detailed Curriculum**  
**Semester VI (Third year)**  
**Branch/Course: Automobile Engineering**

Sl. No.	Category	Code	Course Title	Hours per week			Total contact hours/ week	Credits
				Lecture	Tutorial	Practical		
1	Program Core Course	AEPC 601	Garage Practice	3	0	0	3	3
2	Humanities and Social Science Course	HS302	Entrepreneurship and Start-ups	2	1	0	3	3
3	Open Elective	AEOE 621	Engineering Economics and Project Management	3	0	0	3	3
4	Open Elective	AEOE 622/ 623/ 624/ 625	Any one Open Elective	3	0	0	3	3
5	Program Elective Course	AEPE 611/ 612	Any one Programme Elective	3	0	0	3	3
6	Program Core Course	AEPC 602	Garage Practice Lab	0	0	2	2	1
7	Program Core Course	AEPC 603	Driving Practice Lab	0	0	2	2	1
8	Major Project	PR602		0	0	6	6	3
9	Seminar	SE602		0	0	4	2	2
<b>Total</b>				<b>14</b>	<b>1</b>	<b>14</b>	<b>29</b>	<b>22</b>

**List of Programme Electives for Sixth Semester**

1. AEPE 611: Modern Vehicle Technology
2. AEPE 612: Vehicle Aerodynamics & Design
3. AEPE 613: Vehicle Body Engineering

**List of Open Electives for Sixth Semester**

1. AEOE 621: Engineering Economics and Project Management
2. AEOE 622: Electric Vehicle Technology
3. AEOE 623: Industrial Management
4. AEOE 624: Industrial Safety
5. AEOE 625: Disaster Management

## Syllabus of Garage Practice

<b>Course Code</b>	AEPC601
	Garage Practice
<b>Number of Credits and L-T-P</b>	3 [L - 3, T - 0, P - 0]
<b>Course Category</b>	PC
<b>Prerequisites</b>	Automotive Engines and Automotive Chassis

### Course Objectives:

1. To impart knowledge of importance of maintenance at regular intervals.
2. To impart adequate knowledge of maintenance and maintenance methods required in modern service station.
3. To impart knowledge of dismantling of various parts/ assemblies and check the parts for proper functioning.
4. To impart knowledge of proper maintenance of the components results in good fuel economy, least environmental pollution and reliability.

### Course Contents:

<b>Module No.</b>	<b>Description of Topic</b>	<b>Contact Hrs.</b>
01	<b>Auto Workshop Layout &amp; Equipments</b> 1.1 General safety precautions and procedures. 1.2 Equipment used in automobile repairing (Specification, Working, Application,): Shop-cutters, Pullers, Stud-extractor, Torque wrench, Piston ring expander, Piston ring groove cleaner, Wheel Balancer, Wheel Aligner, Arbor Press, Drill Press, Tyre Changer, Car Washer, Battery Charger, Battery Tester, Valve Grinder, Honing Machine, Cylinder Boring Machine, Pneumatic tools, lubrication equipment. 1.3 Measuring and Testing Equipments: Feeler gauge, Cylinder bore gauge, Compression gauge, Ignition timing tester, Spark plug tester, tyre inflator gauge, Micrometer, Callipers, Protectors and their maintenance. 1.4 Vehicle Service Equipment: Air Compressor, Oil Sprayer, Lubricators, Voltage current and resistor tester, Coil condenser tester, Tachometer, Exhaust Gas Analyzer, Diesel Smoke meter. 1.5 Lifts and Hoists: two post lift, four post lift, scissor type lift. 1.6 Service Station and Types. 1.7 Criteria for site selection of Service Station. 1.8 Layout of Modern Auto workshop.	10
02	<b>Maintenance Management and Record Keeping</b> 2.1 Necessity of maintenance 2.2 Types of maintenance (Breakdown, Preventive and Predictive) systems, their applications and comparison, 2.3 Total Productive Maintenance (concept only) 2.4 Vehicle maintenance schedules: Daily, weekly, monthly &	04

		<p>periodic maintenance. for various vehicles Replacement schedule of consumable items (like lubricants, coolant, Filters etc. )</p> <p>2.5 General servicing procedure. Decision to repair or replace.</p> <p>2.6 Workshop documents and records - Job Card.</p> <p>2.7 Operations and Procedures - Workshop activities, Manpower requirements and criteria, billing and warranty claim procedure, insurance claim procedure, customer feedback taking procedure, handling of customer complaints, study of customer service Index (CSI).</p>	
03	<b>Part 1</b> 3.1	<b>Engine Maintenance</b>  3.1.1 Checking and Servicing of following engine components: Cylinder head, Cylinder block, Cylinder liners, Piston, Piston Ring, Crank-shaft, Connecting rod, Valves etc.  3.1.2 Troubleshooting in: Cylinder head, Cylinder block, Cylinder liners, Piston, Piston Ring, Crank-shaft, Connecting rod, Valves etc.	06
	<b>Part 2</b> 3.2	<b>Engine System Maintenance</b>  3.2.1 Fuel feed system: Injector cleaning and testing, FIP phasing and calibration. 3.2.2 Lubrication system service: Change of oil filter, Check oil pump and diagnose causes for excessive oil consumption, external oil leakage and low oil pressure in an automobile engine. 3.2.3 Maintenance of cooling systems and its components: water pump, radiator, thermostat - anticorrosion and antifreeze additives. Bleeding and Flushing of cooling system. 3.2.4 Troubleshooting of Ignition System service and Electronic Ignition System. 3.2.5 Troubleshooting of Engine fuel system, Cooling system, Lubrication system.	08
04	<b>Part 1</b> 4.1	<b>Chassis Maintenance</b>  4.1.1 Troubleshooting of Clutch. 4.1.2 Troubleshooting of manual Gearbox. 4.1.3 Troubleshooting of Propeller shaft, Rear axle and Differential system. 4.1.4 Troubleshooting of hydraulic brakes, Bleeding of hydraulic brakes and parking brake adjustment. 4.1.5 Troubleshooting of Dependent and Independent suspension systems, Lubrication of leaf springs.	08
	<b>Part 2</b> 4.2	<b>Chassis frame, Steering, Wheels, Tyre and Body Maintenance</b>  4.2.1 Symptoms and possible faults in steering system. 4.2.2 Power steering diagnosis and troubleshooting. Fluid flushing, bleeding air out and pressure testing.	08

	4.2.3 Procedure of wheel alignment and procedure of wheel balancing.	
	4.2.4 Care of wheels and tyres, tyre rotation.	
	4.2.5 Defects in vehicle chassis and body - diamond, banana, twist, mash type damages.	
	4.2.6 Body repairs- denting, denting tools and equipments (jacks)	
	4.2.7 Chassis alignment equipment.	
	4.2.8 Repainting procedure, patch work.	
	4.2.9 Painting defects.	
	4.2.10 Adjustment of doors and locks.	
<b>Total Hours</b>		<b>42 Hrs</b>

**Weightage distribution in both objective, short and broad answer type questions:**

Group	Module Number	Weightage (%)
A	1 & 2	30
B	3	35
C	4	35

**Course Outcomes:**

At the end of the course, the student will be able to:

C01	Understand the use of relevant tools and equipments required in garage practices.
C02	Understand different types of maintenance methods/ techniques for vehicles.
C03	Identify different problems associated with different types of engine systems.
C04	Interpret troubles associated with transmission system of a vehicle.
C05	Recognize various difficulties associated with steering, wheels, braking and suspension systems.

**Text Books:**

1. Vehicle Maintenance and Garage Practice, Dhruv U. Panchal, Jayesh P. Maniar and Jigar A. Doshi, PHI Learning.
2. Automobile Maintenance Service and Repair, Mohd Saad Saleem and Saimah Khan, Bluerose Publishers Pvt. Ltd.
3. Dr. Kripal Singh, Automobile Engineering (Vol. – 1), Standard Publishers Distributors, New Delhi.

**Reference Books:**

1. S. Srinivasan, Automotive Mechanics, Tata McGraw Hill Education, New Delhi.
2. S.K. Gupta, Automobile Engineering, S.Chand, New Delhi.
3. R.B. Gupta, Automobile Engineering, Satya Prakashan, New Delhi.

## Syllabus of Modern Vehicle Technology

<b>Course Code</b>	AEPE611
	Modern Vehicle Technology
<b>Number of Credits and L-T-P</b>	3 [L - 3, T - 0, P - 0]
<b>Course Category</b>	PC
<b>Prerequisites</b>	Automotive Engine, Automotive Chassis, Automotive Powertrain

### Course Objectives:

1. Impart knowledge on the applications and working of different transducers, sensors & actuators used in automobiles.
2. Impart knowledge on the uses of modern peripheral systems in automobiles.
3. Impart knowledge on advanced technologies related to IC Engine.
4. Impart knowledge on advanced safety equipment used in automobiles.
5. Impart knowledge on different modern features of automobiles.

### Course Contents:

Module No.	Description of Topic	Contact Hrs.
01	<p><b>Applications of Transducers, Sensors &amp; Actuators</b></p> <p>1.1 Concept of general measurement system &amp; difference between Mechanical and electrical/ electronic instruments;</p> <p>1.2 Measurement of Temperature: Working of Thermocouple and Thermister;</p> <p>1.3 Measurement of Speed: Contact less electrical tachometer, Inductive, Capacitive type tachometer, Stroboscope;</p> <p>1.4 Measurement of Force: Strain gauge load cell</p> <p>1.5 Electrical method for moisture measurement;</p> <p>1.6 Electromechanical Type Transducer - Potentiometric resistance type, Inductive, Capacitive, Piezometric; Photoelectric.</p> <p>1.7 Basic requirement of Sensors, Functions, Applications and Circuitry arrangement of various Sensors such as Mass Air flow rate sensor, Exhaust gas Oxygen concentration, Throttle plate angular position, Crankshaft angular position, Coolant temperature, Intake air temperature, Manifold absolute pressure (MAP), Vehicle speed Sensor. Transmission gear selector position, Methanol sensor, Rain Sensor &amp; Rain sensing wiper.</p> <p>1.8 Working Principal and Functions of various Actuators such as Solenoid Actuators, Motorized Actuators, and Stepper motors.</p>	10

02	<p><b>Modernization in IC Engine Performance</b></p> <p>2.1. Concept of Fuel Injection System in SI Engine  2.2. Necessity of Fuel Injection System  2.3. Working principle and function of various fuel injection system in SI engine (MPFI, TBI &amp; GDI)  2.4. Advantages of Fuel Injection System w.r.t Pollution  2.5. Concept of Common Rail Direct Injection System  2.6. Necessity of CRDI System  2.7. Basic concept of single cylinder pump, Inline pump, Distributor or Rotary pump, Low pressure pump &amp; High-Pressure Pump  2.8. Working principle and function of CRDI System  2.9. Advantages of CRDI System w.r.t Pollution</p>	12
03	<p><b>Modernization in Peripheral systems</b></p> <p>3.1. Security Systems. Remote keyless entry, Anti-theft system, Alarm system.  3.2. Entertainment and peripheral systems. Integrated communications, Proximity sensors</p>	04
04	<p><b>Advance Safety Equipment</b></p> <p>4.1. Seat Belts, Seat Belts pre-tensioners, Smart seatbelt reminder.  4.2. Concepts of Crash test, Crash sensors.  4.3. Air bags - Introduction of air bags, Dual stage air bags, Side Airbags.  4.4. Tyre pressure monitoring system  4.5. Pedestrian Protection &amp; Night vision with pedestrian detection.</p>	06
05	<p><b>Modern Features in Automobile</b></p> <p>5.1. Power Sliding doors.  5.2. Electronic stability/ Skid-control system, Traction control system.  5.3. Advanced Driver Assistance System (ADAS), Adaptive cruise Control System (ACC)  5.4. Hill Hold Assist (HHA)  5.5. Telescopic steering wheel/ adjustable pedals.  5.6. Rear mounted Radar &amp; Cameras.  5.7. Electromagnetic suspension and levitation.  5.8. Automatic Lift Axle.  5.9. Regenerative Braking Systems.  5.10. Continuous Variable Transmission.  5.11. Intelligent Parking Assist System, Self-Parking</p>	10
<b>Total Hours</b>		<b>42 Hrs</b>

**Weightage distribution in both objective, short and broad answer type questions:**

<b>Group</b>	<b>Module Number</b>	<b>Weightage (%)</b>
<b>A</b>	1 & 2	40
<b>B</b>	3 & 4	30
<b>C</b>	5	30

**Course Outcomes:**

At the end of the course, the student will be able to:

<b>C01</b>	Describe construction, functions and applications of various sensors and actuators used in modern vehicle.
<b>C02</b>	Identify and describe the advanced features of IC Engine
<b>C03</b>	Identify and describe various advanced peripheral system used in automobile.
<b>C04</b>	Demonstrate various safety features and equipment used in modern vehicle.
<b>C05</b>	Identify various modern features for better functioning of vehicle.

**Text Books:**

1. S.K. Gupta, Automobile Engineering, S.Chand, New Delhi.
2. R.B. Gupta, Automobile Engineering, Satya Prakashan, New Delhi.
3. A.K. Babu, S.C. Sharma, T.R. Banga, Automobile Mechanics, Khanna Publishers

**Reference Books:**

1. S. Srinivasan, Automotive Mechanics, Tata McGraw Hill Education, New Delhi.
2. Dr. N.K. Giri, Automobile Technology, Khanna Publishers



## Syllabus of Vehicle Aerodynamics & Design

<b>Course Code</b>	AEPE 612
<b>Course Title</b>	Vehicle Aerodynamics & Design
<b>Number of Credits and L-T-P</b>	3 [L – 3, T – 0, P - 0]
<b>Course Category</b>	PE
<b>Prerequisites</b>	Fluid Mechanics

### Course Objectives:

1. To understand basic components of Aerodynamics.
2. To understand different aerodynamic effects on a vehicle.
3. To understand the ergonomic of vehicle
4. To understand the optimization process of aerodynamics drag and noise
5. To know about wind tunnel testing
6. To understand the different type vehicle body structure and material

### Course Contents:

<b>Module No.</b>	<b>Description of Topic</b>	<b>Contact Hrs.</b>
1.	<p><b>Introduction of Aerodynamics:</b></p> <p>1.1. Road Resistance- Air Resistance – Gradient Resistance Aerodynamic force – Drag force – Lift force – side force - effect of Aerodynamics force in car body</p> <p>1.2. Aerodynamics - pitching – yawing - Rolling moment</p> <p>1.3. Cross wind sensitivity – Recirculating flow - diffusers</p> <p>1.4. Definition of Aerofoil- vehicle as a bluff body - Mechanics of air flow</p> <p>1.5. Pressure distribution on a vehicle.</p> <p>1.6. Concept of visibility -</p> <p>1.7. Concept of blind sport</p> <p>1.8. vehicle ergonomic – importance – application – different ergonomic in different vehicle</p>	<b>10</b>
2	<p><b>Directional Stability:</b></p> <p>2.1. Concept of aerodynamic stability</p> <p>2.2. Distribution of weight -for three wheeled vehicle and four wheeled vehicle</p> <p>2.3. Driving with trailer</p> <p>2.4. Stability of vehicle on slope (derivation &amp; numerical problems).</p> <p>2.5. Stability of vehicle on turns (derivation &amp; numerical problems).</p>	<b>6</b>
3.	<p><b>Optimization of vehicle body design:</b></p> <p>3.1. Side wind problems- Dirt accumulation on the vehicle</p> <p>3.2. Wind noise – different type of noise – minimization process of wind noise in vehicle</p> <p>3.3. Front and rear wind shield angle – Boat tailing – Hatch back, fast back and square back</p> <p>3.4. Dust flow patterns at the rear – Effect of gap configuration – Effect of fasteners</p> <p>3.5. Various body optimization techniques for minimising drag</p>	<b>8</b>

4	<p><b>Wind Tunnels testing and other testing method</b></p> <p>4.1. Wind Tunnels for Automotive Aerodynamics Introduction – Principles of wind tunnel technology – Full scale wind tunnels - scale model testing</p> <p>4.2. Component balance to measure forces and moments– Stress with scale models — Measurement techniques – Equipment and transducers</p> <p>4.3. Road testing methods – Numerical methods –advantages – Limitation-application.</p>	6
5	<p><b>Vehicle structure</b></p> <p>5.1. Bus Body Details – Types - mini bus - single decker, two level, split level and articulated bus.</p> <p>5.2. Bus Body Lay Out: Floor height, engine location, entrance and exit location, seating dimensions.</p> <p>5.3. Constructional details - Frame construction, Double skin construction-Types of metal section used-Regulations-Conventional and Integral type construction.</p> <p>5.4. Commercial Vehicle Details - Types of body - Flat platform, drop side, fixed side, tipper body, tanker body.</p> <p>5.5. Light commercial vehicle body types, Dimensions of driver’s seat in relation to controls, driver’s cabin design.</p> <p>5.6. Body Materials, Trim And Mechanisms: Steel, timber, plastics, GRP, properties of materials-Corrosion anticorrosion methods, selection of paint and painting process, body trim items.</p>	12
	<b>Total Hours</b>	<b>42</b>

**Weightage distribution in both objective, short and broad answer type questions:**

Group	Module Number	Weightage (%)
A	1 & 2	45
B	3 &4	25
C	5	30

**Course Outcomes:**

At the end of the course, the student will be able to:

CO1	Identify the different aerodynamics forces on a vehicle.
CO2	Estimate the vehicle stability against aerodynamics force and slope.
CO3	Differentiate the various drag testing method.
CO4	Identify the different types of wind noise in a vehicle.
CO5	Classify different vehicle structure.

**Text book:**

1. Aerodynamics of Road vehicles, W. H. Hucho, Butterworths Co. Ltd., 1997
2. Vehicle Body Engineering, A.K. Babu, Publisher: Khanna Publisging House, 2021
3. Vehicle Body Engineering & Dynamics, Bheemasen S Korlahalli, Vinayak S Naik, Eastern Book Promoters Belgaum, 2022.

**References**

1. Automotive Aerodynamics: Update SP-706, SAE, 1987.
2. Vehicle Aerodynamics, SP-1145, SAE, 1996.

## Syllabus of Vehicle Body Engineering

<b>Course Code</b>	AEPE613
	Vehicle Body Engineering
<b>Number of Credits and L-T-P</b>	3 [L – 3, T – 0, P - 0]
<b>Course Category</b>	PC
<b>Prerequisites</b>	Engineering Mechanics and Automotive Chassis

### Course Objectives:

1. Impart knowledge on different car body assemblies, design and safety aspects.
2. Impart knowledge on different bus body assemblies, design and safety aspects.
3. Impart knowledge on different commercial vehicle body assemblies and design aspects.
4. Impart knowledge on aerodynamics approach of automobiles.
5. Impart knowledge on different body materials.

### Course Contents:

<b>Module No.</b>	<b>Description of Topic</b>	<b>Contact Hrs.</b>
01	<b>Car Body Details</b>  1.1 Car body assembly: underbody, upper body, closure (brief ideas only) 1.2 Types of Car body: Saloon, Hatchback, Convertible, Coupe, Estate Car, Limousine, Racing and sports car (brief ideas with diagram and example) 1.3 Visibility: Types, Regulations, Improvements in visibility, parameters influencing visibility, visibility tests 1.4 Different methods of improving space in cars: lowering floor level, position of spare wheel, compact design 1.5 Seat design: Driver seat design, passenger seat design 1.6 Car body construction: Requirements, methods of construction, various panels in car bodies 1.7 Safety aspect of car body design, Safety requirements for car (seat belt, ABS, TCS, Vehicle cruise control, Electronic stability control, Tyre pressure monitoring system, rear view camera, Supplementary restraint system)	10
02	<b>Bus Body Details</b>  2.1. Types of Bus body: based on capacity, based on distance travelled, based on construction, based on comfort, shape and style, engine location. 2.2. Types of material used: crowns, angles and flanges, sections	08

	<p>2.3. Regulation wise overall dimensions</p> <p>2.4. Constructional details: Components of body structure, design of integral bus, sequence of bus building operation, double skin construction, safety aspect</p> <p>2.5. Seat design: Driver's seat (with geometrical relations), passenger seat</p>	
03	<p><b>Commercial Vehicle Details</b></p> <p>3.1. Different vehicle bodies: Based on engine mounting, based on load-carrying platform, based on their functions, purposes, based on driver cab design</p> <p>3.2. Flat platform bodies: Trailer, Tipper, Tanker (different types according to type of liquid carrying, shape of the tanker and bulkheads)</p> <p>3.3. Dimensions of driver's seat in relation to controls, driver's cab design, regulations.</p>	06
04	<p><b>Vehicle Aerodynamics</b></p> <p>4.1. Introduction and importance of vehicle aerodynamics</p> <p>4.2. Aerodynamics forces and moments: Drag, cross wind force, lift. Rolling, pitching, yawing moments (definition and mathematical expression only, no derivation)</p> <p>4.3. Aerodynamic drag and types: Profile, induced, friction, interference, cooling and ventilation drag</p> <p>4.4. Drag co-efficient, aerodynamic lift and Pitching moment ((definition and mathematical expression only)</p> <p>4.5. Side wind effects on forces and moments: side wind on lift force, side wind on moments</p> <p>4.6. Various body optimization techniques for minimum drag</p> <p>4.7. Wind tunnels, types of wind tunnels, wind tunnel testing (brief idea)</p>	12
05	<p><b>Body Materials</b></p> <p>5.1. Materials used in body construction: steel sheet, aluminum alloy, timber, plastics, GRP, Textiles, Glass, Rubbers (uses, properties, pros and cons)</p> <p>5.2. Body trim materials: Exterior and Interior trim</p> <p>5.3. Body mechanisms: Window winder, windshield wiper, windshield washer, door lock mechanism, keyless entry.</p>	06
<b>Total Hours</b>		<b>42 Hrs</b>

**Weightage distribution in both objective, short and broad answer type questions:**

Group	Module Number	Weightage (%)
A	1 & 2	30
B	3 & 4	50

C	5	20
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**Course Outcomes:**

At the end of the course, the student will be able to:

<b>C01</b>	Classify vehicle body according to body shape
<b>C02</b>	Illustrate the different types and components of car body.
<b>C03</b>	Illustrate the different types and components of bus and commercial body
<b>C04</b>	Explain the concept, importance and testing of aerodynamics in vehicle body design.
<b>C05</b>	Explain different vehicle body materials with their merits and demerits.

**Text Books:**

1. A.K. Babu, Vehicle Body Engineering, Khanna Publishers
2. J. Powloski, Vehicle Body Engineering, Business Books Ltd, London

**Reference Books:**

1. J.G. Giles, Body Construction and Design, Butterworth and Co.
2. Dr. N.K. Giri, Automobile Technology, Khanna Publishers

## Syllabus of Garage Practice Lab

<b>Course Code</b>	AEPC 602
	Garage Practice Lab
<b>Number of Credits and L-T-P</b>	1 [L - 0, T - 0, P - 2]
<b>Course Category</b>	PC
<b>Prerequisites</b>	Automotive Engines and Automotive Chassis

### Course Objectives:

1. To impart knowledge service procedure in Automobile Workshop.
2. To impart adequate knowledge and skills of overhaul and reconditioning of various engine components.
3. To impart knowledge of overhaul and testing of Injector and FIP of diesel engine for proper functioning.
4. To impart knowledge of overhaul different chassis components for proper functioning of vehicle.

### Course Contents:

<b>Module No.</b>	<b>Description of Topic</b>	<b>Contact Hrs.</b>
01	<b>Study General service procedure in Authorize workshop</b> 1.1 Four wheeler service, 1.2 Two wheeler service.	02
02	<b>Overhaul and reconditioning procedures of multi-cylinder petrol/Diesel engine.</b> 2.1 Cylinder head for warpage and cracks, Refacing by grinding or cutting, Straightening cylinder heads. 2.2 Cylinder block for measurement of ovality and taperedness, Cylinder boring, Honing process, Changing of liners. 2.3 Piston and piston rings for wear, appearance, Piston head for signs of deposits and detonation, oversize piston, ring groove clearance, removing and refitting rings. 2.4 Valve refacing in valve refacer machine, Valve Seat cutting, setting and grinding to match with valves. Lapping of Valves. 2.5 Inspection of Crank Shaft, Assessment of workability and determination of undersize condition of journals. Setting procedure of Crank Shaft of Multi cylinder Engines in Crank Shaft regrinding machine for grinding both crank pin and main Journals, Check for eccentricity of cranks. 2.6 Dismantling and assembling of fuel injectors of a petrol engine, identifying components and refitting. 2.7 Removing the radiator from vehicle, checking it for leak, repairing, flushing, cleaning the radiator and refitting. Removing the thermostat valve, checking and refitting. 2.8 Checking of lubrication system – change oil filter, check oil pump, diagnose causes for excessive oil consumption, external oil leakage, and low oil pressure in an automobile engine.	12

03	<b>Overhaul and Testing</b> 3.1 Overhaul and testing of diesel fuel injector, 3.2 Overhaul and testing of single and multi- cylinder fuel injection pumps. 3.3 Calibration, phasing, and spray tests.	06
04	<b>Overhaul, dismantling and assembling procedures of different chassis components:</b> 4.1 Leaf springs, coil springs, torsion bar & Telescopic Shock absorber and McPherson strut. 4.2 Wheel Balancing: - Static and Dynamic. 4.3 Wheel alignment – Mechanical and Electronic method	08
<b>Total Hours</b>		<b>28 Hrs</b>

**Note:** Module 01, 03 & 04 is compulsory and minimum 04 job has to be done from module 02.

### Course Outcomes:

At the end of the course, the student will be able to:

C01	Illustrate the servicing procedure in Automobile workshop.
C02	Interpret maintenance methods/ techniques of multi-cylinder petrol/Diesel engine.
C03	Recognize various difficulties associated with diesel fuel injection system.
C04	Recognize various difficulties associated with suspension and wheel.

### Text Books:

1. Vehicle Maintenance and Garage Practice, Dhruv U. Panchal, Jayesh P. Maniar and Jigar A. Doshi, PHI Learning.
2. Automobile Maintenance Service and Repair, Mohd Saad Saleem and Saimah Khan, Bluerose Publishers Pvt. Ltd.
3. Dr. Kirpal Singh, Automobile Engineering (Vol. – 1), Standard Publishers Distributors, New Delhi.

### Reference Books:

1. S. Srinivasan, Automotive Mechanics, Tata McGraw Hill Education, New Delhi.
2. S.K. Gupta, Automobile Engineering, S.Chand, New Delhi.
3. R.B. Gupta, Automobile Engineering, Satya Prakashan, New Delhi.



## Syllabus of Major Project-II

<b>Course Code</b>	PR602
<b>Course Title</b>	Major Project-II
<b>Number of Credits and L-T-P</b>	6 [L – 0, T – 0, P - 6]
<b>Course Category</b>	Major Project
<b>Prerequisites</b>	All Subject Related to Automobile Engineering

### **Course objectives: -**

After completing this course, the students will be able

- To understand the solution process of real life problem
- To achieve the potentiality of doing team work
- To understand the gap between academic knowledge and actual real life problem solving knowledge.
- To prepare the project report in a skillful way.

### **Project group:-**

1. Formation of project group: Maximum 8 to 12 students per batch.
2. Each project group should select work by consulting the guide.

### **Course Content:-**

It is the *continuation of major project –I* (which is started on Semester V) during this major project-II, the project work have to be completed by each group.

After completion of the project, each students group should prepare *one* comprehensive report to indicate what are **observed, learnt and contribution** during the project work. The student may contact guide for completing the project and prepared the final report on the assigned topic. The project report should be signed by the guide and HOD of concerned department.

The format of the project report will be as following

<b>Sl. No.</b>	<b>Particulates</b>
1	Title page
2.	Deceleration page
3	Acknowledgement
4	Certificate from guide
5	Abstract
6	Objective
7	Literature review/ background survey/history
8	Present work
9	Methodology
10	Observation
11	Conclusion
12	Future Scope
12	References

### **Internal Assessment:**

1. Project Report: The project Report will be evaluated on the basis of following criteria (as applicable) **40 Marks**

Sl. No.	Criteria for evaluation of Project.
1	Originality
2	Adequacy and purposeful write up
3	Organizations, format, drawing, sketches, style, language
4	Practical applications and relationships with basic theory
5	Concept taught in the outcome

2. Attendance and work process

**20 Marks**

**External Assessment:**

Seminars must be arranged for the student based on the project report, in presence of project guide, Internal Committee constituted by the concerned department of the Institute and External examiner/s. The evaluation will be based on the following criteria;

**40 Marks**

Sl. No.	Criteria for evaluation of Report
1	Quality of content presented
2	Proper Planning for presentation
3	Effectiveness of presentation
4	Depth of knowledge and skills
5	Viva voce

**Course Outcome:**

**At the end of the course, the student will be able to:**

<b>CO1</b>	learn new skills and supplement knowledge
<b>CO2</b>	Learn & practice communication and teamwork skills.
<b>CO3</b>	Learn strategies like time management, multi-tasking, real time technical knowledge etc.
<b>CO4</b>	Can apply their knowledge to generate new idea for doing some application oriented work.
<b>CO5</b>	Gain practical experience in a real working environment.

### Syllabus of Driving Practice Lab

<b>Course Code</b>	AEPE603
	Driving Practice Lab
<b>Number of Credits and L-T-P</b>	2 [L - 0, T - 0, P - 2]
<b>Course Category</b>	PC
<b>Prerequisites</b>	None

#### Course Objectives:

1. To develop knowledge of behavior of driver.
2. To impart adequate knowledge of vehicles control and its responses.
3. To impart knowledge of Traffic signs and traffic rules to follow as per government.
4. To develop knowledge and skills of vehicle driving.

#### Course Contents:

Module No.	Description of Topic	Contact Hrs.
01	<p><b>Driving Theory:</b></p> <p><b>1.1 Qualities required for a good driver:</b> Good behavior, Patience, Responsibility, Self Confidence, Anticipation, Concentration, Courtesy, Consideration for other Road Users, Defensive Driving, Knowledge of Vehicle Controls, Maintenance, simple mechanism and effect of Competitiveness,</p> <p><b>1.2</b> Over-Confidence and impatience, avoid road rage.</p> <p><b>1.3</b> Legitimate dress code for driving.</p> <p>1.4 Right of way, yielding.</p> <p>1.5 Concept of blind spot.☐</p>	02
02	<p><b>2.1 Know Your Vehicle:</b> Simple introduction to Automobile Engines and their working. Location of VIN plate / Engine serial Number. On Board Diagnosis position, Several Air Bags position, Dual power mode driving, First Aid Kit, Jacking point.</p> <p><b>2.2 Vehicle Controls and its Response:</b></p> <p>2.1 Foot Control – Accelerator, Brake, Clutch</p> <p>2.2 Hand Control – Steering Wheel, Gear Shifting Lever, Hand Brake, Switches for direction Indicators, Head Lights, Horns, Ignition Switch, Dim-Bright Switch, and Wiper switch – Speed Control etc.</p> <p>2.3 Other Controls – Rear View mirrors – Types- adjustments, Audio controls, Air Condition controls, Instrument Cluster, Description of Speedo meter/Trip meter, RPM Gauge, Oil pressure Gauge, Temp Gauge, Fuel Gauge, and Ammeter other Gauges and Dials, Tail lamps, Audio warnings, Wind Screen – their location and operation.</p> <p>2.4 Adjustment of seat and seat belts, door locks, Spare key location.</p>	04
03	<p><b>2.1 Traffic signs:</b> Mandatory signs, Cautionary signs, Informatory</p>	02

	<p>signs, Traffic signals displayed on roads.</p> <p>2.2 Study of Traffic Rules as per State &amp; central Government specification.</p>	
04	<p><b>Driving Practice—</b></p> <p><b>4.1 Pre – Driving Checks:</b> Before sitting on driver seat, After sitting on driver seat Checking the document pertains to the driver and vehicle.</p> <p><b>4.2 Starting:</b> Precautions and Procedure to be followed while starting. Clutch down start. Accelerator: Proper use of Accelerator. Moving: Precautions to be followed while moving. Use of first gear.</p> <p><b>4.3 Clutch Practice:</b> Biting and Balance point.</p> <p><b>4.4 Steering practice:</b> In basic yard - In bare land and between tyres to develop Judgment Straight, Left and Right Turn, Steering in ‘8’, shaped bend.</p> <p><b>4.4 Gear Practice:</b> Selection of gears, up shifting, down shifting.</p> <p><b>4.5 Brake practice:</b> In level ground and in slope.</p> <p><b>4.6 Driving on the Road</b></p> <p><b>4.7 Overtaking Practice:</b> Overtaking stationary and Moving vehicles from Left and Right Side.</p> <p><b>4.8 Three Point Turn, Five Point Turn, ‘U’ Turn Practice</b></p> <p><b>4.9 Reverse Practice.</b></p> <p><b>4.10 Parking Practice.</b></p> <p><b>4.11 Other Maneuvers related to driving etc.</b></p> <p><b>4.12 Demonstrate safe, responsible and proper parking techniques and etc.</b></p>	20
<b>Total Hours</b>		<b>28 Hrs</b>

**Course Outcomes:**

At the end of the course, the student will be able to:

C01	Explain the responsible driving attitudes.
C02	Recognize various controls of vehicles.
C03	Demonstrate the traffic signs and traffic rules
C04	Develop competence in integrating the attitudes, skills and knowledge of safety and driving responsibilities into the correct execution of motor skills in traffic.

**Note:** Experiment no. 04 can be pursued by using suitable Driving Training Simulator.

## Syllabus of Seminar

<b>Course Code</b>	SE602
<b>Course Title</b>	Seminar
<b>Number of Credits and L-T-P</b>	2 [L - 0, T - 0, P - 4]
<b>Course Category</b>	Seminar
<b>Prerequisites</b>	Up to 5 <sup>th</sup> semester all subject knowledge

### Course Objectives:

1. Identify and compare technical and practical issues related to the area of course specialization.
2. Outline annotated bibliography of research demonstrating scholarly skills.
3. Prepare a well-organized report employing elements of technical writing and critical thinking.
4. Demonstrate the ability to describe, interpret and analyze technical issues and develop competence in presenting.

### Guideline

Each student has to select a recent topic of latest technology in the area of Automobile Engineering and present a seminar in front of all students of the class. He/ She has to prepare a PowerPoint presentation of the selected topic of minimum 10 slides are the total presentation will be approximately 10 minutes duration. There will be interactive session between the presenter and rest of the students including the faculty members of the dept at the end of presentation. A student has to present at least 2 nos. of seminar during a semester and to submit the report for evaluation.

The Seminar Report will be evaluated on the basis of following criteria (as applicable)

**60 Marks**

Sl. No.	Criteria for evaluation of Seminar Report
1	Originality
2	Adequacy and purposeful write up
3	Organizations, format, drawing, sketches, style, language
4	Practical applications and relationships with basic theory
5	Concept taught in the course outcome
6	Practical applications, relationships with basic theory and concept taught in the course
7	Attendance record, daily diary, quality of Internship Report.

Seminars must be arranged for the student based on his/her training report, before an Internal Committee constituted by the concerned department of the Institute. The evaluation will be based on the following criteria:

**40 Marks**

<b>Sl. No.</b>	<b>Criteria for evaluation of Seminar Report</b>
1	Quality of content presented
2	Proper Planning for presentation
3	Effectiveness of presentation
4	Depth of knowledge and skills
5	Viva voce

**Course Outcome:**

At the end of the course, the student will be able to:

<b>C01</b>	Establish motivation for any topic of interest and develop a thought process for technical presentation.
<b>C02</b>	Organize a detailed literature survey and build a document with respect to technical publications.
<b>C03</b>	Analysis and comprehension of proof-of-concept and related data.
<b>C04</b>	Effective presentation and improve soft skills.
<b>C05</b>	Make use of new and recent technology for creating technical reports