LESSON PLAN 2026-27

NAME OF THE TEACHER : LOKESH PATTNAIK (SR. LECT. , AUTOMOBILE)

Subject: Electric and Hybrid Vehicles (AEPE301A)

Program: Diploma in Automobile Engineering
Semester: 5th
Total Contact Hours: 45
Total Marks: 100
Assessment: Progressive – 30, End Term – 70
Credits: 3

COURSE OUTCOMES:

After successful completion of the course, the student will be able to:

CO1 (L2 Understand):
Explain the need, advantages, disadvantages, challenges, and major components of electric vehicles, including motor, battery, charger, controller, DC converter, and energy management system.

CO2 (L2 Understand):
Explain the requirements, selection criteria, types, working principles, advantages, and disadvantages of batteries, ultra-capacitors, and flywheel energy storage systems used in electric vehicles.

CO3 (L2 Understand):
Explain the classification of electric vehicles such as Battery Electric Vehicles (BEV), Hybrid Electric Vehicles (HEV), and Plug-in Hybrid Electric Vehicles (PHEV), along with their applications and energy sources.

CO4 (L2 Understand):
Explain the requirements, construction, working principles, and applications of different electric motors used in electric vehicles, including DC motors, BLDC motors, switched reluctance motors, and AC induction motors.

CO5 (L2 Understand + L3 Apply):
Explain the construction, components, working principles, advantages, and disadvantages of hybrid electric vehicles and fuel cell electric vehicles, and relate different hybridization concepts to practical vehicle applications.

Class No.	Topic	Subtopics	Teaching Aids / Activities	Course Outcome
Unit I – Introduction to Electric Vehicles (9 Classes)				
1	Introduction to Electric Vehicles	Need for electric vehicles, evolution of EVs	PPT, video presentation	CO1
2	Environmental Impact of EVs	Pollution control, energy conservation, sustainability	Discussion, case studies	CO1
3	Problems of Electric Vehicles-I	Range anxiety, battery limitations	PPT, group discussion	CO1
4	Problems of Electric Vehicles-II	Charging issues, infrastructure challenges	Charts, videos	CO1
5	Problems of Electric Vehicles-III	Performance, purchase price, safety and reliability	Case studies	CO1
6	Advantages of Electric Vehicles	Environmental and economic benefits	PPT, comparison charts	CO1
7	Disadvantages of Electric Vehicles	Technical and operational limitations	Discussion activity	CO1

8	Major Components of EV-I	Motor, battery, charger	EV component models	CO1
9	Major Components of EV-II	Controller, DC converter, energy management system	Animation, PPT	CO1
Unit II – Battery and Energy Storage Systems (9 Classes)				
10	EV Battery Requirements	Characteristics and performance requirements	PPT	CO2
11	Battery Selection Criteria	Capacity, voltage, efficiency, life cycle	Numerical examples	CO2
12	Deep Cycle Batteries	Construction and applications	Charts, battery samples	CO2
13	Lead-Acid Battery	Construction, working, advantages and disadvantages	Battery model	CO2
14	Lithium-Ion Battery	Construction, working, advantages and disadvantages	PPT, videos	CO2
15	Comparison of EV Batteries	Lead-acid vs Lithium-ion batteries	Comparative analysis	CO2
16	Ultra Capacitors	Construction, working principle and applications	Animation	CO2
17	Flywheel Energy Storage System	Construction and working principle	PPT, videos	CO2
18	Flywheel Advantages & Disadvantages	Comparison with batteries and capacitors	Group discussion	CO2
Unit III – Classification of Electric Vehicles (9 Classes)				
19	Classification of EVs	Overview of EV categories	PPT	CO3
20	Battery Electric Vehicle (BEV)	Construction and working principle	Diagrams, videos	CO3
21	BEV Advantages, Disadvantages & Applications	Practical examples	Case studies	CO3
22	Hybrid Electric Vehicle (HEV)	Construction and working principle	Animation	CO3
23	HEV Advantages, Disadvantages & Applications	Examples and comparison	Discussion	CO3
24	Plug-in Hybrid Electric Vehicle (PHEV)	Construction and working principle	PPT	CO3
25	PHEV Advantages, Disadvantages & Applications	Real-world examples	Videos	CO3
26	Energy Sources for EVs	Batteries, ultra capacitors, flywheels, fuel cells	Charts	CO3
27	Requirements of EV Energy Sources	Performance, efficiency, storage requirements	Group activity	CO3
Unit IV – Electric Motors Used in EVs (9 Classes)				
28	Introduction to Electric Motors	Function and importance in EVs	PPT	CO4
29	Requirements of EV Motors	Torque, speed, efficiency, reliability	Discussion	CO4
30	Brushed DC Motor	Construction and working principle	Motor model	CO4

31	Brushless DC (BLDC) Motor	Construction and working principle	Animation	CO4
32	Comparison of DC and BLDC Motors	Advantages and disadvantages	Comparative charts	CO4
33	Switched Reluctance Motor	Construction and operation	PPT	CO4
34	AC Induction Motor	Construction and working principle	Videos	CO4
35	Comparison of EV Motors	Selection criteria and applications	Group discussion	CO4
36	Indian Electric Vehicles	Electric 2-wheelers, 3-wheelers and 4-wheelers	Case studies, videos	CO4
Unit V – Hybrid Vehicles and Fuel Cell Vehicles (9 Classes)				
37	Introduction to Hybrid Vehicles	HEV concept and need	PPT	CO5
38	Components of HEV	Engine, motor, battery, controller	Hybrid vehicle diagrams	CO5
39	Working of Hybrid Vehicles	Energy flow and power management	Animation	CO5
40	Advantages and Disadvantages of HEV	Comparison with BEV	Discussion	CO5
41	Hybridization Concepts-I	Micro hybrid vehicles	PPT	CO5
42	Hybridization Concepts-II	Mild hybrid and full hybrid vehicles	Charts, videos	CO5
43	Fuel Cell Electric Vehicle (FCEV)	Introduction and components	PPT	CO5
44	Working Principle of FCEV	Hydrogen fuel cell operation	Animation, videos	CO5
45	Advantages & Disadvantages of FCEV and Course Revision	Applications, comparison and recap	Seminar, discussion	CO5

30/6/25

Signature of Teacher

30/6/25

Signature of HOD

LESSON PLAN 2026-27

NAME OF THE TEACHER : LOKESH PATTNAIK (SR. LECT. , AUTOMOBILE)

Subject: UNIVERSAL HUMAN VALUES (OE 301A)

Program: Diploma in Automobile Engineering

Semester: 5th

Total Contact Hours: 45

Total Marks: 100

Assessment: Progressive – 30, End Term – 70

Credits: 3

COURSE OUTCOMES:

After successful completion of the course, the student will be able to:

CO1 (L2 Understand):

Explain the concept, need, and importance of value education, human values, and basic human aspirations such as happiness and prosperity.

CO2 (L2 Understand):

Explain the relationship between the Self (I) and the Body, their needs, and the importance of harmony for mental and physical well-being.

CO3 (L2 Understand):

Explain the role of trust, respect, and other human values in maintaining harmony within the family, society, and the universal human order.

CO4 (L2 Understand):

Explain the interconnectedness among the four orders of nature and the importance of co-existence and environmental balance in sustaining harmony in nature.

CO5 (L2 Understand + L3 Apply):

Apply universal human values and professional ethics in personal, social, and professional life to address ethical issues and fulfill social responsibilities.

Class No.	Topic	Subtopics	Teaching Aids / Activities	Course Outcome
Unit I – Introduction to Value Education and Human Values (8 Classes)				
1	Introduction to Value Education	Meaning, concept and need for value education	PPT, discussion	CO1
2	Importance of Value Education	Personal, social and professional relevance	Case studies	CO1
3	Values and Skills	Difference between values and skills	Group discussion	CO1
4	Human Values	Meaning and significance of human values	PPT, examples	CO1
5	Basic Human Aspirations	Happiness and prosperity	Brainstorming activity	CO1
6	Understanding Happiness	Sources and misconceptions of happiness	Reflection exercise	CO1
7	Understanding Prosperity	Material and non-material prosperity	Discussion, case examples	CO1
8	Achieving Human Aspirations	Right understanding and right relationships	Interactive session	CO1
Unit II – Harmony in the Human Being (8 Classes)				
9	Understanding the Self	Concept of 'Self' (I)	PPT, self-reflection	CO2

10	Self and Body	Difference between Self and Body	Classroom discussion	CO2
11	Needs of the Self	Happiness, trust, respect and values	Examples and discussion	CO2
12	Needs of the Body	Physical facilities and requirements	PPT	CO2
13	Relationship Between Self and Body	Interdependence and harmony	Case studies	CO2
14	Harmony of Self with Body	Importance of balance in life	Group activity	CO2
15	Mental Well-being	Practices for mental health and self-discipline	Guided reflection	CO2
16	Physical Well-being	Healthy lifestyle and habits	Video, discussion	CO2
Unit III – Harmony in Family and Society (8 Classes)				
17	Family as Basic Unit of Society	Role and importance of family	PPT	CO3
18	Human Relationships	Values in relationships	Discussion	CO3
19	Trust in Relationships	Meaning and importance of trust	Activity-based learning	CO3
20	Respect in Relationships	Understanding respect and mutual dignity	Role-play activity	CO3
21	Other Human Values	Affection, care, guidance, gratitude	Group discussion	CO3
22	Harmony in Family	Building strong family relationships	Case studies	CO3
23	Harmony in Society	Concept of undivided society	PPT, discussion	CO3
24	Universal Human Order	World family and global harmony	Seminar presentation	CO3
Unit IV – Harmony in Nature and Existence (8 Classes)				
25	Interconnectedness in Nature	Understanding natural systems	PPT	CO4
26	Four Orders of Nature	Material order and plant order	Charts, videos	CO4
27	Four Orders of Nature	Animal order and human order	PPT	CO4
28	Mutual Fulfillment Among Orders	Interdependence in nature	Discussion	CO4
29	Co-existence in Existence	Concept and significance	Case examples	CO4
30	Harmony in Existence	Holistic perception of life	Reflection exercise	CO4
31	Environmental Balance	Human role in environmental protection	Video presentation	CO4
32	Sustainable Living	Conservation and responsible resource use	Group activity	CO4
Unit V – Professional Ethics (8 Classes)				
33	Introduction to Professional Ethics	Meaning and importance	PPT	CO5
34	Ethical Human Conduct	Values in professional life	Discussion	CO5
35	Professional Accountability	Responsibility and accountability	Case studies	CO5
36	Ethical Decision Making	Approaches to resolving ethical	Problem-solving	CO5
37	Professional Values	Honesty, integrity and transparency	Interactive discussion	CO5

38	Ethical Dilemmas	Understanding conflicting situations	Case analysis	CO5
39	Case Studies in Professional Ethics-I	Engineering and workplace ethics	Group activity	CO5
40	Case Studies in Professional Ethics-II	Solutions based on universal values	Presentation and discussion	CO5
Unit VI – Personal Development and Social Responsibility (5 Classes)				
41	Self-Reflection and Self-Exploration	Importance and methods	Reflection exercise	CO5
42	Personal Growth	Goal setting and value-based living	Workshop activity	CO5
43	Social Responsibility	Understanding responsibilities toward society	PPT, discussion	CO5
44	Community Service and Social Initiatives	Participation and contribution	Case studies	CO5
45	Course Review and Value Integration	Integrating universal values in life and profession	Seminar, open discussion	CO5

30/6/25

Signature of Teacher

30/6/25

Signature of HOD

LESSON PLAN 2026-27

NAME OF THE TEACHER : SAMBIT KUMAR SAHOO, LECT. (STAGE-I, AUTOMOBILE)

Subject: Automobile Component Design (AEPC303)

Program: Diploma in Automobile Engineering

Semester: 5th

Total Contact Hours: 45

Total Marks: 100

Assessment: Progressive – 30, End Term – 70

Credits: 3

COURSE OUTCOMES:

After successful completion of the course, the student will be able to:

CO1 (L2 Understand):

Explain the basic concepts of machine design including design procedure, design considerations, stress analysis, theories of failure, factor of safety, stress concentration, material selection, fasteners, bearings, and ergonomic aspects of automobile component design.

CO2 (L3 Apply):

Apply design principles to determine the dimensions of machine elements such as cotter joints, knuckle joints, and turnbuckles used in automobile applications.

CO3 (L3 Apply):

Apply design procedures for shafts, rear axles, keys, and couplings by considering torsional, bending, and combined loading conditions in automobile systems.

CO4 (L3 Apply):

Design automobile components such as levers, clutch assemblies, and springs by applying strength and functional requirements.

CO5 (L3 Apply):

Design engine components including cylinder head, piston, piston rings, piston pin, connecting rod, and determine cylinder dimensions based on engine specifications and design considerations.

Class No.	Topic	Subtopics	Teaching Aids / Activities	Course Outcome
UNIT-I: Basic Concepts of Design (12 Classes)				
1	Introduction to Design	Definition, classification of design, design considerations	PPT, discussion	CO1
2	Design Procedure	Steps in machine design, design methodology	PPT, flowchart	CO1
3	Stress Analysis	Types of external loads and induced stresses	Charts, numerical examples	CO1
4	Tensile, Compressive & Shear Stress	Crushing and bearing pressure	Problem-solving	CO1
5	Bending, Torsional & Thermal Stresses	Applications in automobile components	PPT, examples	CO1
6	Stress-Strain Diagram	Ductile and brittle materials, proof stress, resilience, creep	Charts, videos	CO1
7	Variable Stresses & Fatigue	Endurance limit, stress-time diagrams	Numerical examples	CO1
8	Working Stress & Factor of Safety	Selection of factor of safety	Tutorial problems	CO1
9	Stress Concentration	Causes, effects and remedies	Case studies	CO1

10	Theories of Failure	Maximum principal stress, maximum shear stress, distortion energy theory	PPT	CO1
11	Material Selection & Fasteners	Automobile materials, advanced materials, screw fasteners	Samples, charts	CO1
12	Bearings & Ergonomic Design	Bearing classification, selection, aesthetics and ergonomics	Bearing samples	CO1
UNIT-II: Design of Machine Elements (6 Classes)				
13	Cotter Joint Introduction	Types and applications in automobiles	PPT, examples	CO2
14	Design of Socket and Spigot Cotter Joint	Design procedure and calculations	Numerical problems	CO2
15	Knuckle Joint	Construction and applications	Model demonstration	CO2
16	Design of Knuckle Joint	Design calculations	Tutorial exercises	CO2
17	Turnbuckle	Construction, working and applications	Actual model/PPT	CO2
18	Design of Turnbuckle	Design calculations and automobile applications	Problem-solving	CO2
UNIT-III: Design of Shafts, Keys and Couplings (9 Classes)				
19	Shafts, Axles and Spindles	Concepts and classification	PPT, charts	CO3
20	Design of Shaft for Torsion	Strength and rigidity considerations	Numerical examples	CO3
21	Design of Shaft for Bending	Bending moment calculations	Tutorial exercises	CO3
22	Combined Bending and Torsion	Equivalent torque and moment	Numerical problems	CO3
23	Hollow and Solid Shafts	Comparison and applications	Charts, discussion	CO3
24	Propeller Shaft & Critical Speed	Whirling and critical speed concepts	Animation, PPT	CO3
25	Rear Axle Design	Design procedure and calculations	Problem-solving	CO3
26	Keys and Keyways	Rectangular sunk key, Woodruff key, effect of keyway	Samples	CO3
27	Couplings	Muff coupling, flange coupling, bush pin flexible coupling design	Models, calculations	CO3
UNIT-IV: Design of Levers (3 Classes)				
28	Types of Levers	Classification and applications	Charts, PPT	CO4
29	Rocker Arm & Bell Crank Lever	Design procedure and calculations	Numerical examples	CO4
30	Hand Lever & Pedals	Design of rectangular section and fulcrum pin	Tutorial exercises	CO4
UNIT-V: Design of Chassis Components (6 Classes)				
31	Clutch Fundamentals	Single plate and multi-plate clutch	Clutch model	CO4
32	Design of Single Plate Clutch	Torque transmitting capacity calculations	Numerical problems	CO4

33	Design of Multi Plate Clutch	Design calculations	Problem-solving	CO4
34	Semi-Elliptical Leaf Spring	Construction and design calculations	Spring model	CO4
35	Helical Compression Spring	Design procedure	Numerical examples	CO4
36	Helical Torsion Spring	Design calculations and applications	Tutorial exercises	CO4
UNIT-VI: Design of Engine Components (9 Classes)				
37	Engine Design Fundamentals	Engine specifications and cylinder dimensions	PPT, examples	CO5
38	Cylinder Dimensions Calculation	Bore, stroke and power relationships	Numerical problems	CO5
39	Cylinder Head Design	Thickness and bolt design	Tutorial calculations	CO5
40	Piston Crown Design	Bending strength considerations	Numerical examples	CO5
41	Piston Crown Design	Thermal considerations	Problem-solving	CO5
42	Piston Rings and Skirt Length	Design calculations	Tutorial exercises	CO5
43	Piston Pin Design	Bearing, bending and shear considerations	Numerical problems	CO5
44	Connecting Rod Design	I-section design and calculations	Problem-solving	CO5
45	Design Review & Numerical Practice	Comprehensive design problems and revision	Assignment, discussion	CO5

30/06/2026

Signature of Teacher

30/6/26

Signature of HOD

LESSON PLAN 2026-27

NAME OF THE TEACHER : Nilakantha Nayak, LECT. (STAGE-II, AUTOMOBILE)

Subject: Automobile Engines - II (AEPC301)

Program: Diploma in Automobile Engineering

Semester: 5th

Total Contact Hours: 45

Total Marks: 100

Assessment: Progressive – 30, End Term – 70

Credits: 3

COURSE OUTCOMES:

After completion of the course, the students will be able

CO1 (L2 Understand):

Explain the construction, materials, manufacturing processes, functions, failures, symptoms, causes, and remedies of engine components such as cylinder block, cylinder head, crankcase, oil pan, manifolds, cylinder liners, pistons, and piston rings.

CO2 (L2 Understand):

Explain the construction, working, types, valve operating mechanisms, gaskets, seals, mufflers, and common failures of crankshaft, flywheel, valves, and connecting rod assemblies.

CO3 (L2 Understand):

Explain the functions, properties, classification, viscosity requirements, additives, lubrication systems, and crankcase ventilation used in automobile engines.

CO4 (L2 Understand):

Explain the need, construction, working, components, advantages, and limitations of various engine cooling systems, radiators, thermostats, water pumps, cooling fans, coolants, and cooling additives.

CO5 (L2 Understand + L3 Apply):

Explain engine performance parameters such as IHP, BHP, efficiencies, fuel consumption, air consumption, mean effective pressure, and specific fuel consumption, and perform basic calculations related to engine testing, Morse test, and heat balance sheet preparation.

Class No.	Topic	Subtopics	Teaching Aids / Activities	Course Outcome
UNIT-I: ENGINE DETAILS – I (9 Classes)				
1	Introduction to Engine Components	Overview of cylinder block, cylinder head, crankcase, oil pan	PPT, engine model	CO1
2	Cylinder Block	Material, construction, manufacturing process	Charts, specimen	CO1
3	Cylinder Block Failures	Causes, symptoms and remedies	Case study, discussion	CO1
4	Cylinder Head	Material, construction and manufacturing process	PPT, cut section model	CO1
5	Cylinder Head Failures	Causes, symptoms and remedies	Fault diagnosis activity	CO1
6	Crankcase and Oil Pan	Materials, construction, manufacturing, failures	Actual components	CO1
7	Inlet & Exhaust Manifolds	Construction, materials, failures, remedies	Engine model, charts	CO1
8	Cylinder Liners	Materials, construction, manufacturing process, comparison, failures	Samples, PPT	CO1

9	Pistons & Piston Rings	Types, functions, heat dissipation, slots, failures, ring types	Piston assembly demonstration	CO1
UNIT-II: ENGINE DETAILS – II (9 Classes)				
10	Crankshaft	Construction, manufacturing, working and location	Engine model	CO2
11	Crankshaft Failures & Flywheel	Failures, flywheel construction, function and working	Charts, videos	CO2
12	Engine Valves	Sleeve, poppet, disc, rotary and reed valves	Valve specimens	CO2
13	Valve Seats, Guides & Springs	Construction and functions	Actual components	CO2
14	Valve Failures	Symptoms, causes and remedies	Fault analysis exercise	CO2
15	Valve Actuating Mechanisms	Cam-in-block and OHC arrangements	Animation, PPT	CO2
16	Connecting Rod	Construction, manufacturing, working and location	Model demonstration	CO2
17	Connecting Rod Failures	Symptoms, causes and remedies	Group discussion	CO2
18	Gaskets, Seals and Mufflers	Types of gaskets, seals, mufflers and acoustic devices	Samples and charts	CO2
UNIT-III: ENGINE LUBRICATION (9 Classes)				
19	Introduction to Lubrication	Need and functions of lubrication system	PPT, video	CO3
20	Functions of Lubricating Oil	Friction reduction, cooling, cleaning, sealing	Discussion	CO3
21	Viscosity of Lubricants	Definition, importance, viscosity grades	Charts	CO3
22	Properties of Lubricating Oil	Flash point, fire point, cloud point, pour point	PPT	CO3
23	Lubricant Additives	Types and functions of additives	Samples, charts	CO3
24	Low Viscosity Oils	Importance and advantages	Case examples	CO3
25	Classification of Lubricating Oils	SAE and API classifications	Charts, manuals	CO3
26	Lubrication Systems	Splash, pressure-feed and combined systems	Engine lubrication diagrams	CO3
27	Crankcase Ventilation	Need, working and advantages	Animation, discussion	CO3
UNIT-IV: ENGINE COOLING (9 Classes)				
28	Introduction to Cooling Systems	Need and objectives of cooling	PPT	CO4
29	Air Cooling System	Construction, working, advantages and limitations	Engine model	CO4
30	Water Cooling System	Principle and components	Charts, video	CO4
31	Thermosiphon Cooling	Construction and working	Animation	CO4
32	Pump Circulation Cooling	Working and applications	Demonstration	CO4
33	Advanced Cooling Systems	Thermostatic, pressurized and evaporative cooling	PPT	CO4

34	Cooling Components-I	Water jackets, hoses, joints, water pump	Actual components	CO4
35	Cooling Components-II	Thermostat, cooling fan, fan belts	Demonstration	CO4
36	Radiator and Coolants	Radiator types, radiator cap, coolants, additives	Samples and charts	CO4
UNIT-V: ENGINE TESTING (9 Classes)				
37	Engine Testing Fundamentals	Air-fuel ratio, calorific value of fuel	PPT, numerical examples	CO5
38	Performance Parameters	IHP, BHP, fuel and air consumption	Problem-solving session	CO5
39	Measurement of Indicated Power	Indicator diagrams and calculations	Numerical exercises	CO5
40	Measurement of Brake Power	Friction dynamometer	Charts, videos	CO5
41	Hydraulic Dynamometer	Construction and working	PPT	CO5
42	Electrical Dynamometer	Swing field and eddy current dynamometers	Animation	CO5
43	Engine Efficiencies	Mechanical, indicated thermal, brake thermal, relative and overall efficiencies	Numerical problems	CO5
44	Mean Effective Pressure & SFC	MEP and specific fuel consumption calculations	Tutorial problems	CO5
45	Morse Test & Heat Balance Sheet	Morse test procedure, heat balance sheet preparation, course revision	Numerical exercises, recap	CO5

30/6/25

Signature of Teacher **Signature of HOD**

LESSON PLAN 2026-27

NAME OF THE TEACHER : Nilakantha Nayak, LECT. (STAGE-II, AUTOMOBILE)

Subject: AUTOMOTIVE ELECTRICAL AND ELECTRONICS SYSTEM (AEPE303A)

Program: Diploma in Automobile Engineering
Semester: 5th
Total Contact Hours: 45
Total Marks: 100
Assessment: Progressive – 30, End Term – 70
Credits: 3

COURSE OUTCOMES:

After successful completion of the course, the student will be able to:

CO1 (L2 Understand):
Explain the construction, working principles, rating, charging methods, testing, and maintenance of lead-acid, lithium-ion, and alkaline batteries used in automobiles.

CO2 (L2 Understand):
Explain the construction, working, and applications of battery coil ignition systems, magneto ignition systems, spark advance mechanisms, and electronic ignition systems used in automobiles.

CO3 (L2 Understand):
Explain the principle, construction, and working of starting and charging systems, including starter motors, starter drives, generators, alternators, current regulators, voltage regulators, and cut-out relays.

CO4 (L2 Understand):
Explain the construction, working, and applications of automotive lighting systems, accessories, gauges, wiring systems, symbols, and standards used in two-wheelers and four-wheelers.

CO5 (L2 Understand + L3 Apply):
Explain the working principles and applications of automotive sensors used for engine management, emission control, vehicle safety, ADAS, and electric vehicle battery management systems, and relate sensor outputs to vehicle functions.

Class No.	Topic	Subtopics	Teaching Aids / Activities	Course Outcome
Unit I – Batteries (8 Classes)				
1	Introduction to Automotive Batteries	Functions, types and applications of batteries in automobiles	PPT, battery samples	CO1
2	Lead-Acid Battery	Construction and working principle	Battery model, charts	CO1
3	Lead-Acid Battery Maintenance	Charging, testing and maintenance procedures	Demonstration, video	CO1
4	Lithium-Ion Battery	Construction, working and applications	PPT, animation	CO1
5	Lithium-Ion Battery Characteristics	Advantages, limitations and maintenance	Discussion, charts	CO1
6	Alkaline Battery	Construction, working and applications	PPT	CO1
7	Battery Rating and Charging Methods	Capacity, CCA, charging methods	Numerical examples	CO1

8	Battery Testing and Maintenance	Hydrometer test, voltmeter test, troubleshooting	Practical demonstration	CO1
Unit II – Ignition System (9 Classes)				
9	Introduction to Ignition	Purpose and requirements of	PPT	CO2
10	Battery Coil Ignition System	Construction and working principle	Ignition circuit diagram	CO2
11	Components of Battery Ignition System	Coil, distributor, spark plug, condenser	Component demonstration	CO2
12	Magneto Ignition System	Construction and working principle	Animation, charts	CO2
13	Comparison of Ignition Systems	Battery ignition vs magneto ignition	Group discussion	CO2
14	Spark Advance Mechanisms	Centrifugal and vacuum advance systems	Models, diagrams	CO2
15	Transistorized Coil Ignition System	Construction and working	PPT	CO2
16	Capacitor Discharge Ignition (CDI) System	Working principle and applications	Animation	CO2
17	Distributor-less Ignition System (DIS)	Construction, working and advantages	Videos, discussion	CO2
Unit III – Starting and Charging System (9 Classes)				
18	Introduction to Starting	Need and principle of engine	PPT	CO3
19	Starter Motor	Construction and working principle	Starter motor model	CO3
20	Starter Drive Mechanisms	Bendix drive, overrunning clutch drive	Demonstration	CO3
21	Starting System Circuit	Components and operation	Circuit diagrams	CO3
22	Generator	Construction and working principle	Charts, videos	CO3
23	Alternator	Construction and working principle	Cut-section model	CO3
24	Generator vs Alternator	Comparison and applications	Group discussion	CO3
25	Current and Voltage Regulators	Construction and working	Circuit diagrams	CO3
26	Cut-Out Relay	Working principle and applications	Demonstration, PPT	CO3
Unit IV – Lighting System, Accessories and Wiring (9 Classes)				
27	Automotive Lighting System	Types and requirements of	PPT	CO4
28	Headlights and Side Lights	Construction and working	Vehicle lighting model	CO4
29	Headlight Dazzling	Causes and preventive methods	Videos, discussion	CO4
30	Automatic Headlights & DRL	Daytime running lamps and automation	PPT, case study	CO4
31	Automotive Accessories-I	Electric horn and screen wiper	Actual components	CO4
32	Automotive Accessories-II	Sunroof and defrosters	Videos, diagrams	CO4
33	Automotive Gauges	Fuel gauge, oil pressure gauge, water temperature gauge	Gauge samples	CO4
34	Wiring Diagram of Two-Wheeler	Circuit layout and symbols	Wiring charts	CO4

35	Wiring Diagram of Four-Wheeler	Symbols, standards and troubleshooting	Practical wiring exercise	CO4
Unit V – Automotive Sensors (10 Classes)				
36	Introduction to Automotive	Sensor applications, analog vs	PPT	CO5
37	Sensor Signal Processing & ECU Interface	Signal conditioning and ECU communication	Animation	CO5
38	Air & Fuel Management Sensors-I	MAF Sensor and MAP Sensor	Sensor models, videos	CO5
39	Air & Fuel Management Sensors-II	IAT Sensor and applications	PPT, case study	CO5
40	Engine Position & Speed Sensors	Crankshaft, camshaft and engine speed sensors	Sensor demonstration	CO5
41	Exhaust & Emission Sensors	Oxygen (O_2), NOx and EGR sensors	Charts, videos	CO5
42	Throttle & Knock Sensors	TPS and knock sensor working	Sensor models	CO5
43	Safety & Stability Sensors	Wheel speed sensor (ABS), steering angle sensor, airbag sensor	ABS animation	CO5
44	ADAS Sensors	Radar, LiDAR, ultrasonic, lane departure and blind spot sensors	Videos, case studies	CO5
45	EV Battery Sensors & Course Revision	BMS sensors, role in EVs, ADAS overview and recap	Seminar, discussion	CO5

30/6/25

Signature of Teacher **Signature of HOD**