LESSON PLAN 2023-24

SUBJECT :AUTO ENGINE (4TH SEM)

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Class No.	Topic	Subtopics	Teaching Aids/Activities
1	Working Principle – Two Stroke Engine	Intake, compression, power, exhaust strokes in 2-stroke engine	Animation, 2-stroke engine model
2	Working Principle – Four Stroke Engine	Otto cycle, stroke-by-stroke working of 4-stroke petrol engine	Animated diagram, cut-section of 4-stroke engine
3	Engine Components – Part 1	Piston, cylinder block, connecting rod, crankshaft, materials used	Real parts demo, labeled charts
4	Engine Components – Part 2	Valve, crank slot, cylinder head, spark plug location, materials	Component handling, material comparison
5	Cylinder Arrangement	Inline, V-type, flat engines, firing order in 4/6/8-cylinder engines	Chart of firing order, model engine block comparison
6	Valve Actuation Mechanisms – Part 1	Side valve mechanism, OHV mechanism	Diagrammatic representation, real valve train demo
7	Valve Actuation Mechanisms – Part 2	Difference between side valve and OHV, animations of valve action	Working models, video clips
8	Valve Arrangement Types	I, F, T type arrangements, valve placement and usage	Charts, case study of old and modern engines
9	Valve Clearance & Adjustment	Importance, feeler gauge use, signs of incorrect clearance	Workshop demo, hands-on clearance setting
10	Timing Gear & Manifolds	Camshaft timing, timing gear train, vibration damper, inlet & exhaust manifold	Crank-timing model, manifold demo, timing gear observation
11	Introduction & 2-Stroke Diesel Engine	Working of two-stroke diesel engine, ports and fuel injection system	Animation, cutaway engine model
12	4-Stroke Diesel Engine Working	Four strokes: suction, compression, power, exhaust	Chart, working model or simulation
13	Diesel vs Petrol Engine – Part 1	Fundamental differences: fuel system, ignition, efficiency	Comparison table, classroom discussion
14	Diesel vs Petrol Engine – Part 2	Advantages (fuel economy, durability), Limitations (noise, weight)	Case study, fuel consumption demo
15	Combustion Chamber – Introduction	Purpose, air-fuel mixing, pressure build-up	Whiteboard explanation, engine animation
16	Types of Combustion Chambers – Overview	Open, pre-combustion, turbulence, swirl chamber basics	Cross-section charts, physical models
17	Direct Injection Combustion Chamber	Construction, working, fuel spray pattern, injector location	Video demo, D.I. cylinder head model

18	Pre-Combustion Chamber	Purpose, energy loss, glow plug requirement	Real component demo, advantages/disadvantages chart
19	Turbulence Chamber	Swirl creation, working at lower pressure, cold start behavior	Live swirl simulation, schematic breakdown
20	Comparative Study of Chamber Types	Summary of D.I., P.C., and T.C. systems, application-wise selection	Chart, quiz or interactive comparison worksheet
21	Introduction to I.C. Engine Performance	Role of performance analysis, basic concepts overview	Charts, engine cutaway demo
22	Mechanical & Thermal Efficiencies	Definitions: Mechanical, Brake Thermal, Indicated Thermal, Relative, Overall Efficiency	Formula list, efficiency charts
23	Mean Effective Pressure (MEP)	Definition, types, significance in performance	Example calculations, pressure vs. volume diagrams
24	Specific Fuel Consumption (SFC)	BSFC, ISFC – Definitions, units, significance	Sample problems, real data worksheet
25	Air-Fuel Ratio (A/F Ratio) & Calorific Value	Stoichiometric mixtures, lean/rich conditions, calorific value of fuels	Fuel comparison chart, combustion animation
26	Morse Test – Theory	Purpose, procedure, assumptions, advantages	Diagram of test setup, step-by-step explanation
27	Morse Test – Lab Demonstration	Conducting test on multi-cylinder engine	Lab activity, observation sheet
28	Heat Balance Sheet – Concept	How to prepare, interpretation of results, efficiency zones	Sample heat balance table, calculations
29	Numerical Problems – Part 1	Efficiency-related problems (mechanical, brake thermal, indicated thermal)	Worksheet, problem-solving in class
30	Numerical Problems – Part 2	Problems on MEP, SFC, A/F ratio, Morse test	Individual or group practice activity, assessment quiz
31	Fuel Supply System – Petrol (Line Diagram)	Layout diagram of petrol fuel system	Whiteboard/printed diagram, animation
32	Components of Petrol Fuel System – Part 1	Fuel tank, fuel lines, mechanical & electric pumps	Physical components, labeled chart
33	Components of Petrol Fuel System – Part 2	Fuel filter types and functions	Filter demo, cut section model
34	Carburetor: Requirements & A/F Ratios	Air-fuel ratio for idle, acceleration, cruising, choke operation	Carburetor animation, chart on A/F ratio
35	Working of Carburetor & Types – Part 1	Working principle and simple diagram	Basic carburetor model, explanation videos
36	Working of Carburetor & Types – Part 2	Side draught & down draught carburetors, circuit explanation	Cross-sectional models, comparison table

37	Motorcycle Carburetor	Simple construction and function of motorcycle carburetor	Physical unit, tuning demo
38	Fuel Supply System – Diesel (Line Diagram)	Basic diesel fuel layout, injection pump, filters, injectors	System schematic, board diagram
39	Types of Fuel Injection Systems – Part 1	Air injection, solid injection, individual pump	Animated videos, injector demo
40	Types of Fuel Injection Systems – Part 2	Common rail system, MPFI, TBI, PFI, ECM control overview	Video lecture, control unit demo
41	ECM & Electronic Fuel Control	Sensors and ECU input/output in fuel system	ECU simulator, input/output flow chart
42	Fuel Pump – Construction and Working	Diesel & petrol fuel pump construction and comparison	Fuel pump cutaway model, working demo
43	Fuel Injector – Types & Working	Nozzle types, spray patterns, injector placement	Injector tester, fuel spray visualization
44	Fuel Governing Systems	Mechanical, pneumatic, hydraulic governors – function and types	Governor model demo, animation, worksheet activity
45	Necessity of Engine Cooling	Heat generation in I.C engines, effects of overheating	Heat flow diagram, short video on overheating in engines
46	Types of Engine Cooling	Air cooling, water cooling – introduction and comparison	Comparison chart, vehicle examples
47	Air Cooling System – Construction & Working	Fins, fan, airflow direction, engine design	Air-cooled cylinder demo, 3D animation
48	Water Cooling – Thermo Siphon System	Natural circulation, radiator working, limitations	Thermo siphon diagram, classroom model
49	Water Cooling – Pump Circulation	Working of water pump, thermostat function, controlled flow	Cutaway pump model, thermostat testing with hot water
50	Advantages & Limitations	Air vs water cooling pros and cons, selection based on vehicle type	Tabular comparison, group discussion
51	Radiator, Pump, and Thermostat – Overview	Construction and functions of radiator, pump, thermostat	Actual radiator model, pipe routing chart
52	Coolant Additives	Purpose of anti-freeze and anti-corrosion additives, types	Coolant sample bottles, chemical property demo
53	Introduction to Lubrication	Purpose, functions, importance in engine operation	Oil flow animation, lubrication failure video
54	Types & Properties of Lubricants	Types (mineral, synthetic), properties: viscosity, flash point, fire point	Oil samples, viscosity demo using glass tubes
55	Lubrication Systems – Part 1	Gravity type, splash type – construction, working	Diagram demonstration, engine model
56	Lubrication Systems – Part 2	Pressure, dry sump, semi-pressure types – advantages/disadvantages	Cut-section model, oil routing chart

57	Lubricating System Components	Oil sump, cooler, filter, pressure gauge, warning light, oil level indicator	Real parts demo, workshop identification activity
58	Oil Filters – Types & Function	Full flow filter, bypass filter – construction and difference	Filter cutaways, flow comparison diagram
59	Crankcase Ventilation	Purpose, closed/open systems, positive crankcase ventilation (PCV)	PCV diagram, animation or video explanation
60	Review & System Diagnosis	Common lubrication issues, oil pressure check, indicator malfunction	Fault diagnosis worksheet, component quiz