AUTOMOBILE ENGINEERING AND MECHANICAL ENGINEERING
(DIPLOMA STANDARD)

SUBJECT CODE: 310

(a) AUTOMOBILE ENGINEERING

UNIT - I: MECHANICS OF MATERIALS:

Structure of metals - Ferrous alloys Non ferrous metals and alloys - Heat Treatment of steel and surface heat treatment or case hardening - Toughening - Normalising – refining-Mechanical properties of materials - Simple Stress and strain – Modulus of elasticity- Shear force, Twist, Theory of simple bending, deflection.

UNIT – II: PRODUCTION TECHNOLOGY:

Foundry - Patterns - Casting Techniques - Welding - Drilling - boring and Jig boring machines – Milling machines - Grinding machine - Cylinder Boring and honing machines. Lathes - Gas welding - Arc welding Brazing and soldering.

UNIT – III: ELECTRICAL AND ELECTRONICS ENGINEERING:

Units and symbols - AC and DC - Electro magnetisms - EMF - DC Circuits - Battery types Dry, Wet - DC Generators - DC Motors and Starters - Transistor - Capacitor - Diodes - Rectifiers - circuit breakers, Electronic components - symbols.

UNIT – IV: BASICS OF MECHANICAL ENGINEERING:

Fluid mechanics : Properties of fluids - flow of fluids - Flow of fluids in closed conduits - Reciprocating pumps - Centrifugal pump – Gear pumps and vane pumps - Hydraulic systems – Thermal Engineering - Properties of Gases - Expansion of Gases - Air cycles – Fuels- Fuel characteristics – Octane number and Cetane number – Lubricants Viscocity, Flash point, Fire point and Pour point - Air compressors performance - IC Engine performance.

UNIT – V: AUTOMOBILE ENGINES:

Principles of 2 stroke and 4 stroke engines - Engines Valve timing, - port timing - Valve arrangements - Engine blocks - cylinder heads - Wet and dry liner - Pistons - connecting rod - Crank shaft - Camshaft - timing gears - valve/ports - Firing order - Static balance - Dynamic balance - cooling systems - Radiators - Lubricating system - Lubricating oil characteristics Crank case ventilation - Engine testing/Fault finding, equipments - Carburation and Carburettors – MPFI - Diesel Engine for Automobile purpose - Combustion process of Diesel engines - Diesel knock – Diesel - combustion chamber types – CRDI - Injectors types - Feed pumps - - Fuel Injection Pumps - Phasing and Calibration - Governors' - Super charges and Turbo Chargers – EGR - Emissions Control system in engines - Maintenance and servicing.

UNIT – VI: AUTOTRONICS:

Battery lead acid - types - capacity - coil ignition system - Magneto ignition system and transistorised ignition system - ignition timing - spark plugs - starter motors - Alternators - voltage and current regulator - cutout unit. Flasher unit - wiring looms - circuits lighting - Auto cable - symbols –

UNIT – VII: TRANSMISSION AND CONTROLS:

Friction and Transmission of motion - Clutches - Gearboxes - Epicyclic gear box - Pre selector gear box - universal joints - Differential - Floating axles. Constant velocity joints - suspension system - independent front suspension systems - steering types - caster - camber - toe in – toe out

– power steering – types - wheel balancing - brakes - Testing its efficiency – Anti-lock braking systems - Tyres - tubes - Types and maintenance- Trouble shooting - Preventive Maintenance and servicing.

UNIT – VIII: INDUSTRIAL MANAGEMENT AND ROAD TRANSPORT ORGANIZATION:

Leadership - Morale – Motivation - Production planning and control - Personnel - Materials - Financial Management – Depreciation calculation using straight line method and sinking fund method – ABC analysis. Goods Transport, Passenger transport, Operational Layout of service station and garages - Bus stand - Classification - passenger transport organization and Administrative set up. Motor Vehicle act - Road signals - Traffic signals - Permit - Registering vehicle - Fitness certificate - Ticket system. Study to improve services, Accident claim. Market research - costing in Road transport Running cost.

UNIT – IX: BODY BUILDING TECHNOLOGY:

Terminology - classification of motor vehicle body - passenger transport - goods Transport - Cars - Chassis - frame principle - Aerodynamic body considerations. Body shape – NVH – definition - NVH elimination - Bus body construction. Goods vehicle construction - Tanker, Tipper Constructions - Ergonomics of Driver seat design - Painting - Body repairing - maintenance and safety on painting.

UNIT- X: COMPUTER INTEGRATED MANUFACTURING:

CAD – Definition – geometric modeling – wireframe, surface and solid modeling – graphic standards – GKS, IGES, PHIGS and DXF. CAM – definition – gropu technology – part families – parts classification and coding – CAPP – types. CNC – definition – components of CNC – ATC – CNC EDM. Part program – format – coordinate system – types of motion control – types of interpolation – G and M codes – sub program – canned cycles.

(b) MECHANICAL ENGINEERING

UNIT - I: INDUSTRIAL MANAGEMENT:

X and Y theories of Management, Contributions of Henry Fayol and F.W. Taylor for Management - job evaluation by Ranking method and factor comparison method - motivating techniques - fixing selling price of a product - break even analysis for make or buy decision - sinking fund method and straingt line method of calculating depreciation - ABC analysis – determination of economic order quantity – TQM – ISO standards - certification

UNIT - II: INDUSTRIAL ENGINEERING:

Factors influencing plant location - principles of layout - techniques used to improve layout - primary and secondary causes of an accident - personal protective devices - method study procedure - flow diagram, string diagram and two handed process chart - principles of motion economy-procedure for conducting stopwatch time study, production study and ratio delay study - objectives of preplanning, routing, scheduling, despatching and controlling - difference between inspection and quality control - types of plant maintenance - TPM

UNIT - III: PRODUCTION TECHNOLOGY:

Foundry - patterns - special casting techniques - welding - hot and cold working – drawing, rolling and forging - powder metallurgy - plastics - rubber - ceramics - refractories - lathe work - planner - shaper - slotter - drilling machine - milling machines - grinding machines - broaching - boring and jig boring - - Gears manufacturing practice - Heat treatment and metal finishing - press work

UNIT - IV: ELECTRICAL AND ELECTRONICS ENGINEEERING:

Units, Ohm's law, Kirchoff's law, Faraday's law - D.C. Circuits, batteries - electro magnetism - single phase and three phase A.C. circuits - Induction motors – Electronics – diodes – resisitors – capacitors – transistors – logic gates.

UNIT - V: MECHANICS OF MATERIALS:

Mechanical properties of metals - simple stresses and strains – modulus of elasticity - geometrical properties of sections - thin cylinders bending moment and shear force - theory of simple bending - torsion and springs - transmission of motion – gear drives and belt drives.

UNIT - VI: HEAT POWER ENGINEERING:

Working principle and comparison of otto and diesel cycles - construction and working of two stroke and four stroke engines - Heat balance test on I.C. engine - working principle of single and multistage compressors - Comparison of reciprocating and rotary compressors - classification of steam boilers - construction and working of steam turbines - working principle of steam power plant - Main elements of a nuclear power plant - Vapour compression cycle - factors affecting human comfort - working principle of a window air conditioner and central air conditioning system.

UNIT - VII: COMPUTER APPLICATIONS:

Working principle and constructional details of computer - classification of computer – Input / Output devices - flow charting – MS Office & Star Office – creating documents – presentations – sending emails.

UNIT - VIII: FLUID MECHANICS AND MACHINERY:

Working of differential manometer - use of venturimeter and orifice classification of mouth pieces meter - working of pelton wheel, francis turbine and kaplan turbine - construction and working principle of reciprocating pump, centrifugal pump and gear pump - quick return mechanism of shaping machine - table movement in a milling machine.

UNIT - IX: COMPUTER INTEGRATED MANUFACTURING:

CAD – Definition – geometric modeling – wireframe, surface and solid modeling – graphic standards – GKS, IGES, PHIGS and DXF. CAM – definition – group technology – part families – parts classification and coding – CAPP – types. CNC – definition – components of CNC – ATC – CNC EDM. Part program – format – coordinate system – types of motion control – types of interpolation – G and M codes – sub program – canned cycles.

UNIT - X: DESIGN OF MACHINE ELEMENTS:

Factors affecting selection of material – classification of bearings – sliding contact and rolling contact bearings – radial and thrust bearings – limits – fits – tolerance – classification of fits – cams and followers – types