Electrical Part

Module 1

Fundamentals of Electricity

Voltage, Current, Resistance, Energy, Power-Definitions and Units, Ohm's Law Statement, Simple problems related to Ohm's law, Power and Energy, Resistance in series and Parallel-Simple problems. Kirchhoff,s law-KCL and KVL.

Module 2

Electrostatics and Electromagnetism

Laws of Electrostatics, Permittivity, Electic Flux, Flux Density, Potential, Potential Difference-equations and simple problems, Lightning Phenomenon, Potential Gradient, Dielectrical Strength, Capacitors in series and parallel, Energy stored in a Capacitor, Coulomb's law, Permeability, Magnetic Flux, Flux density, Reluctance, mmf, Faraday's law of Electromagnetic Induction, Lenz's law. Self Inductance, Mutual Inductance, Energy stored in an inductor, Fleming's Laws.

Module 3

Fundamentals of AC Systems

Generation of ac voltage, Equation of voltage, Basic terms-amplitude, frequency, cycle, time period, average value, instantaneous value, rms value, from factor, peak factor equations and related simple problems, ac through resistance, inducatance and capacitance, star and delta connections in 3 phase ac systems – line and phase relationship in star and delta systems.

Module 4

DC Machines

DC generator – Construction, working, classification, emf equation, wave and lap windings, characteristics, simple problem

DC motor – construction, working, types, emf equation, torque-simple problems, various starters, speed control, testing MG set.

Module 5

AC Machine

Transformer- construction, principle, types, emf equation, transformation ratio, losses and efficiency, all day efficiency-simple problems

Three phase induction motor-principle, construction, types, slip, troque, losses, efficiency, power stages, speed control, three phase motor starters

Altrnators-construction, principle, emf equation, losses and efficiency,

Three phase synchronous motor.

Single phase and FHP motors-single phase induction motor, universal motor, ac series motor, servomotor, stepper motor, split phase motor

Automobile Part

Introduction to Engine:Description of ¯internal combustion engines. Classification of IC engines, Principle & working of 2&4-stroke diesel engine, differentiate between 2-stroke and 4 stroke

Diesel Engine Components: Description and Constructional feature of Cylinder head, Type of Diesel combustion chambers, Effect on size of Intake & exhaust passages, Head gaskets. Description and Function of Engine Valves, materials, Type of valve operating mechanism, Importance of Valve seats , importance of Valve rotation, Valve stem nil seals size of intake valves Valve trains, Valve- timing diagram, concept of Variable valve timing. Description of Camshafts & drives , Description of Overhead camshaft, importance of Cam lobes, Timing be. & chains, Timing belts & tensioners. Description & functions of different types of pistons, piston rings and piston pins and materials. Used recommended clearances for the rings and its necessity precautions while fitting rings, common troubles and remedy. Compression ratio. Description & function of connecting rod, importance of big- end split obliquely. Materials used for connecting rods big end & main bearings. piston pins and locking methods of piston pins. Description and function of Crank shaft, camshaft, Engine bearings classification and location- materials used & composition of bearing materials- Shell bearing and their advantages- special bearings material for diesel engine application bearing failure & its causes- care & maintenance. Crank-shaft balancing, Firing order of the engine. Description and function of the fly wheel and vibration damper. Crank case & oil pump, gears timing mark, Chain sprockets, chain tensioner etc. Description of Cylinder block, Cylinder block construction, and Different type of Cylinder sleeves (liner).

Need for Cooling systems. Heat transfer method, Boiling point & pressure, Vehicle coolant properties and recommended change of interval. Different type of cooling systems,Radiator. Coolant hoses, Water pump, Cooling system thermostat, Cooling fans,Temperature indicators, Radiator pressure cap, Recovery system, Thermo-switch

Need for lubrication system. Functions of oil, Viscosity and its grade as per SAE Qj. l Additives Synthetic oils. The lubrication syaLem, Splash system, Pressure system Description and function of Oil tank. Pickuo tube, different type of Oil pump & Oil filters Oil pressure relief valve, Spurt holes & galleries, Oil indicators, Oil cooler

Intake & exhaust systems - Description of Diesel induction & Exhaust systems. Description & function of air compressor, exhauster. Super charger, Intercoolers, turbo charger, variable turbo charger mechanism. Description and function of Air cleaners, Different type air cleaner, Description of Intake manifolds and material. Description and function of Exhaust manifold, Exhaust pipe, Extractors, Mufflers- Reactive, absorptive, Combination., Catalytic converters. Flexible connections. Ceramic coatings. Back-pressure, Electronic mufflers.

Diesel Fuel Systems- Description and function of Diesel fuel injection, fuel characteristics. Description and function of Diesel tanks &lines, Diesel fuel filters, water separator, Lift pump, Plunger pump, Priming pump, lnline

injection pump, Distributor-type injection pump, Diesel injectors, GAw plugs, Cummins & Detroit Diesel injection. Electronic Diesel control systems, Common Rail Diesel Injection (CRDI) system. Hydraulically actuated electronically controlled unit injector (HEUI) diesel injection system. Sensors, actuators and ECU (Electronic Control Unit) used in Diesel Engines.

Emission Control:- Combustion, Combustion chamber design. Characteristics and Effect of Hydrocarbons, Hydrocarbons in exhaust gases, Oxides of nitrogen, Carbon monoxide, Carbon dioxide. Sulphur content in fuels Description of Evaporation emission control, Catalytic conversion, Closed loop, Crankcase emission control, Exhaust gas recirculation (EGR) valve. Controlling air-fuel ratios,

Description of charging circuit operation of alternators, regulator unit, ignition warning lamp-troubles and remedy in charging system. **Description of starter motor circuit,** Constructional details of starter motor solenoid switches, common troubles and remedy in starter circuit. Troubleshooting : Causes and remedy for Engine Not starting - Mechanical &Electrical causes, High fuel consumption, Engine overheating, Low Power

Generation, Excessive oil consumption, Low/High Engine Oil Pressure, Engin Noise.

Braking Systems :- Principles of braking, Drum & disc brakes, Hydraulic pressure & force, Brake pad, Regenerative braking. Brake type - principles, Air brakes, Exhaust brakes, Electric brakes, Parking brakes, Engine brakes,Park brake system Brake pedal, Brake lines, Brake fluid, Bleeding, Master cylinder, Divided systems, Tandem master cylinder, Power booster or brake unit, Hydraulic

brake booster, Electro hydraulic braking (EHB), Brake light switch ,Drum brake system, Brake linings & shoes, Back plate, Wheel cylinders

Steering Systems: - function of Steering systems, Rack-and-pinion steering system, Recirculation ball & nut steering system

Clutches & Manual Transmissions- Single-plate clutches, Multi-plate clutches, Operating mechanisms, Pressure plate, Throw-out bearing. Gear ratios, Compound gear trains, Gear selection, Bearings, Oil seals & gaskets, Automated Manual Transmission (AMT), Gearbox layouts, Transaxle designs, Gearbox operation, Transaxle, Synchromesh unit. Gear shift mechanism, Final Drive & Drive Shafts - Basic layouts Front-wheel drive layout, Rear-wheel drive layout, Four-wheel drive layout, All-wheel drive layout, Front-wheel drive, Front-wheel drive shafts, Front-wheel final drives, differentials

Rear-wheel drive- Propeller shaft, Hydraulic system & controls, Spool valves, Regulating or flow control valves, Control valves, Orifices Valve types & functions- Basic valve action, Regulator & control valves, Shift& governor valves Pressure regulation- The primary regulating valve, Line pressure variation, Modulator valve pressure,

Suspension Systems:-Principles of suspension, Suspension force, Un sprung weight, Wheel unit location, Dampening. Types of suspension-Suspension systems, Solid axle, Dead axle,