

**FURTHER DETAILS REGARDING MAIN TOPICS OF
PROGRAMME No. 05/2019 (Item No.1)**

TRAINING INSTRUCTOR(MMV)

(SCHEDULED CASTES DEVELOPMENT DEPARTMENT)

(Category No.572/2017)

PART - I

General Knowledge

Facts about India

Geography of India – Physical features – Climate – Soils – Rivers – Famous sites – etc.
Demography – Economic and social development – Poverty alleviation – Economy and planning
– etc. History of India – Period from 1857 to 1947 – National movement Five Year Plans

Facts about Kerala

Geographical Facts – Physical features – Climate – Soils – Rivers – Famous sites – Economic and
Social deve – Historical importance - etc.

Renaissance in Kerala

Important Events/Movements/Leaders

Brahmananda Swami Sivayogi, Chattampi Swami, Sree Narayana Guru, Vagbhatananda,
Thycaud Ayya, Ayya Vaikundar, Poikayil Yohannan (Kumara Guru), Ayyankali, Pandit
Karuppan, Mannathu Padmanabhan, V. T. Bhattathirippad, Dr. Palpu, Kumaranasan,
Vakkom Moulavi, Blessed Kuriakose Elias Chavara, Etc.

Current Affairs

Important world, national and regional events related to the political and scientific fields, sports,
cinema and literature etc.

PART - II

HYDRAULICS

Fluid pressure and method to measure Pressure. Pascal's law, terms pressure and pressure head,
absolute pressure, gauge pressure, atmosphere pressure, vacuum pressure, pressure measuring
instruments and its principles, piezometer tube, pressure gauge, manometer, 'U' tube manometer,
differential manometer, inverted type manometer and its simple problems, total pressure in different
conditions.

FLUID FLOW

Terms Cd, Cv, Cc, different types of flow measuring instruments, Orifice, Notches and venturimeter, types of fluid flow, steady flow, unsteady flow, uniform flow, non uniform flow, laminar flow, turbulent flow, discharge calculation, continuity equation, head losses, major losses, minor losses, loss of head due to friction, Darcy's and Chezy's formula, simple problems. Hydraulic Machines- Different types of pumps, centrifugal pump, Reciprocating pump, Stage pump, difference between each pumps, different types of turbines, working of turbines, Governing system, difference between impulse and reaction turbines, work done of turbines.

THERMAL ENGINEERING

Important laws- Zeroth law of thermodynamics, First law of thermodynamics, Second law of thermodynamics, thermodynamics process, Isothermal process, isentropic process and its work done equations and PV diagrams. Air standard cycles- Carnot cycles, Otto cycle, Diesel cycle and its PV diagrams.

IC engines - Two stroke petrol engine, Two stroke diesel engine, single cylinder engines and multi cylinder engines, four stroke petrol engine, four stroke diesel engine, performance of internal combustion engine, Brake power, Indicated power, frictional power, brake thermal efficiencies, indicated thermal efficiency, equations and graphs.

Compressors- working of compressors, use of compressors, different types of compressors, single stage compressor, multi stage compressor, single action and double action compressors, work done and efficiency equations and its graphs.

STRENGTH OF MATERIAL

Terms simple stress and strain, longitudinal strain, lateral strain, Poisson's ratio, Hook's law, Modulus of rigidity, shear stress, shear strain, Friction, sliding friction, rolling friction, cone of friction, centre of gravity, moment of inertia, simple equations.

Shear force and bending moment- Types of beams and its loading conditions, shear force and bending moment diagrams and equations in different types of beams and different types of loads, point load, uniform distributed load, cantilever beam, simply supported beam.

Rivets, nut and bolts- Types of rivets, use of rivets, types of riveted joints, single riveted joint, double riveted joints, lap joints, butt joints, strength of riveted joints, different types of bolt, use of bolts, different types of foundation bolts, use of foundation bolts.

BOILERS- Use of boiler, types of boiler, boiler mountings, boiler accessories, steam engine, working of steam engine, parts of steam engine.

Power plants- Different types of power plants, thermal power plant, Hydraulic power plant, diesel power plant, nuclear power plant and working.

Lathe and lathe works- Types of lathes, use of lathes, parts of lathes centre lathe, semi automatic lathe, automatic lathe, capstan and turret lathe, copying lathe, different types of lathe works, plain turning, stepturning, taper turning, drilling, boring, Broaches, types of broaches, use of broaches, jig and fixtures, use of jig and fixtures, reaming and grinding. Welding, types of welding, different types of welding joints.

ENGINE CONSTRUCTION AND RELATED SYSTEMS

Constructional details of IC Engines

Cylinder block - Single cylinder and multi cylinder, materials, cylinder liners. Cylinder head – Materials, cylinder head gasket. Pistons -Type of pistons, Piston rings - Materials, Types of rings - compression ring, oil ring. Connecting rod - Function, materials used, big end and small end bearings. Crank shaft -different shapes, Main bearings. Fly wheel-functions. Types of valves, sodium vapour cooled valves. Valve operating mechanisms - side cam shaft and overhead cam shaft, Inlet and exhaust valve materials, valve timing diagram. Cam shaft - functions and drives

Fuel System

Different fuel feed systems, A.C. mechanical pump, S U Electrical pump , petrol filters and air Cleaners, Carburetors, Simple carburetors - parts, principle of working, compensation, mixture strength requirement, modern carburetors, float system, idle and slow speed system, high speed system,Acceleration pump and choke system. Manifolds, silencer types. Various components in Diesel fuel system - types of fuel. Distributor type pump, rotary type pumps, Fuel feed pump and hand priming, diesel fuel filters. Governors - purpose, types - mechanical, pneumatic and hydraulic governors, Fuel injectors-types

Lubrication and Cooling System

Types of engine lubrication- wet and dry sump lubrication, splash and pressure feed systems. Oil pumps, pressure relief valve, oil pressure indicator Oil coolers, oil filters, oil seals, Crank case ventilation.

Air and water cooling, thermo-syphon and pump circulation system, thermostat, Radiators -types, pressure cap, types of coolants, pump, antifreeze solution , cooling fan – types.

CHASSIS SYSTEMS

Chassis and frame

Chassis Constructional details, Types of frame. Frame sections, bumpers, sub frames. Materials used, Front Axle- Introduction, Types - dead & live axle, Construction - material - cross section, Stub axle - different arrangements

Suspension System

Types of front suspension for two, three & four wheeler, Rear Suspension system. Introduction to springs and Shock absorbing devices-Types, Leaf, coil springs & their arrangements, Helper spring, spring shackle, shackle pin, Telescopic type Shock - absorber.

Steering System

Principles of steering, Ackerman , Davis fifth wheel, Steering gear box - types, Worm & roller, worm & sector, Re-circulating ball, Rack & pinion, Steering linkages - arrangement - components. Power steering - integral - linkage type, Collapsible type steering column. Factors affecting wheel alignment.

Brake System

Types of brakes-mechanical, hydraulic, pneumatic, servo brake, Air brake. Drum and disc brake system - Internal expanding and externally contracting, Master cylinder, types - working principle, Wheel cylinder, brake bleeding, brake shoe. Air brake- working, working of servo brake - types, disc brake -working.

TRANSMISSION AND ELECTRICAL SYSTEMS

Transmission system

Principle of friction clutches. Constructional features and working of-Single plate dry clutch, Diaphragm clutch, Cone clutch, Centrifugal clutch, Semi centrifugal clutch, Vacuum clutch, Hydraulic clutch, Electromagnetic clutch, Multiplate clutch (dry & wet), Fluid fly wheel, Clutch disc,, Pressure plate.

Constructional features & working of - Sliding mesh gearbox, Constant mesh gearbox, Synchro mesh gearbox, Progressive type gearbox, Epicyclic gearbox, Torque converter, Gear selector and shifting mechanism, 2 Wheeler transmissions, Gear drive-Chain drive, CVT & Automatic transmission.

Propeller shaft and universal joint, Torque tube drive, Hotchkiss drive, Constant velocity joints, Front wheel drive, Differential mechanism, Rear Axles-types.

Wheels - spoked wheel, disc wheel, and alloy cast wheel, composite wheel, Tyre construction (cross sectional details),Tubeless tyre, Tyre treads patterns, Inflation pressure and its effects, Factors affecting tyre performance.

Electrical System

Constructional details of automobile dynamo, Constructional details of alternator, Charging System - necessity, Types of Regulators. Starter switch, Starter motor - constructional features, Starter Motor Drives-Necessity, Types of starter motor drives, mechanisms of - Bendix drive (inboard & Outboard), Over running Clutch, Axial starter (sliding armature), Pre engaged type.

Types of ignition system, coil ignition, Components-Ignition coil, Contact breaker points, Cam angle, Condenser, Distributor, Spark plug - types, Spark advance & retard mechanism (centrifugal & vacuum),Magneto ignition system - Low tension & high tension, Rotating armature & rotating magnet type, CD.ignition system, Electronic ignition systems, Transistorized ignition, Computer controlled ignition, Distributorless ignition system.

TRANSPORTATION MANAGEMENT AND MODERN VEHICLE TECHNOLOGY

Transportation Management

Features of M.V. Act - definition of terms -test for drivers and conductors - registration of vehicles -duties of drivers and conductors - traffic signs -M.T.O and functional wings - organization chart. Road geometry-width of high way -gradient - cross section of road - super elevation and sight distance – road intersection. Insurance surveying - companies - classification of policies- factors involved in assessing.

Fuel injection system in Petrol engine and Diesel engine

Fuel injection systems in petrol and diesel engines, E.F.I-types, MPFI, Gasoline direct injection system, Throttle Body Injection, Sensors-types and construction, actuators, Common Rail Diesel Fuel System, ECM, electronic fuel injectors.

Automobile pollution and control.

Effect of pollutants, sources of pollution, methods to control petrol engine and diesel engines emissions, Reduction of compression ratio, blow by control system, PCV system, After burner, catalytic converter, control of oxides of nitrogen, EGR, Evaporative emission control system-Charcoal canister, Diesel smoke and its control, emission norms.

Modern vehicle accessories and safety devices

Vehicle accessories-cruise control- electric seat and mirror- intelligent wind screen wiper- automatic climatic control- adaptive noise control system- Parking distance control. Restraint systems-Seat belt -Air bag, electronic stability control- ABS-key less entry & Vehicle immobilizer- automatic traction control system – GPS.

NOTE: - It may be noted that apart from the topics detailed above, questions from other topics prescribed for the educational qualification of the post may also appear in the question paper. There is no undertaking that all the topics above may be covered in the question paper