

**FURTHER DETAILS REGARDING MAIN TOPICS OF**

**PROGRAMME NO. 12/2015 (Item Nos. 1, 2 & 3)**

**WORK ASSISTANT**

**(NCA NOTIFICATION)**

**KERALA STATE ROAD TRANSPORT CORPORATION**

**(CATEGORY Nos. 226/2014, 227/2014 & 400/2014)**

**Part- I**

**MODULE – I**

**Safety Precautions & First Aid**

General Safety, Personal Safety, Auto shop Safety, Fuel Safety, Safety in the use of hand tools, Fire & classification of Fire, Fire Extinguishers, Type of portable Fire Extinguishers, Method of operation of Fire Extinguishers, First aid, duties of first aider, First aid contents, Electric shock, Safety Signs.

**Hand Tools, Power Tools & Workshop Equipments**

Common hand Tools, Measuring Tools, Marking Tools, Precision Measuring Instruments, Cutting tools, Drilling Machines- Types & uses, Tap & Dies, Flaring Tools, Wrenches, Torque wrenches, Air impact wrenches, Air ratchet wrenches. Hydraulic press, Hydraulic Jack, Screw Jack, Car washer, Hydraulic lift, oil can, grease gun, Mechanical press, Pullers- gear & bearings, Air compressor, Hydraulic & Pneumatic Tools, Welding Transformers, Gas welding equipment, Fasteners, locking devices.

**MODULE – II**

**Engines**

History & development of Engines, Types of Engines, Classification of Engines, Technical terms used in Engines, Stroke, Bore, Cycle, Swept volume, Clearance volume, Total volume TDC, BDC, Otto cycle, Diesel cycle, Two stroke & Four stroke- Diesel & Petrol Engines – Comparison, compression ratio, HP, BHP, IHP, FHP, MEP, Power, work, energy, Friction losses, specific fuel consumption, thermal efficiency, volumetric efficiency, mechanical efficiency, throw, Firing order, Specifications, Piston & rings – types, connecting rod, piston pin, crank shaft, cam shaft, cylinder block, liner types, cylinder head, timing chain, fly wheel, vibration damper, valves, materials, push rod, rocker arm, Starting methods,

Cylinder head designed with respect to valve, arrangement of cylinder, advantage of multi cylinder engine, Suction Stroke, compression, power, exhaust, super charger, Turbo charger, working, advantages & disadvantages, scavenging, main components & parts of Engine, Materials, Vibration, Valve operating mechanism, valve clearance, tappet clearance, hydraulic valve lifter, valve fault identification, Air cleaner, reasons for fitting air cleaner, types, maintenance, pre-cleaner, intake & exhaust manifold, muffler- types, service

### **MODULE – III**

Cooling System – Air cooling, water cooling, radiator- types, parts of cooling system & anti-freeze solution, Maintenance of cooling system, Advantages of water cooling system, Thermosyphon system, water pump, Fan belt tension.

Lubrication System –Types of lubricant- Purpose, Advantages, Viscosity, Main parts of lubricating system types, Oil filter- types, full flow, bypass system, crank case ventilation, sludge formation, low oil pressure, high oil pressure, high oil consumption, Oil pressure gauge, Types of oil pump.

Fuel System – Classification of fuels, specification & characteristics of fuel, Cetane number, octane rating & knock control, engine knocking. Petrol engine fuel system-Fuel tank, lines, feed pump, electrical, mechanical type, carburettor- Solex, Su, working of carburettor, ventury effect MPFI, Fuel delivery system, comparison of various fuel supply system, fuel pressure regulator, throttle body injection, engine control system, engine control module, engine sensors, fuel injection control system. Diesel engine fuel system- High pressure, low pressure, fuel feed pump, FIP- types, calibration, phasing, injectors & types, Testing, CRDI, advantages, compressing chamber design, timing of FIP, bleeding system, maintenance of fuel system, automatic injection advanced mechanism.

Ignition System – Battery ignition, Magneto ignition, Ignition coil, Distributor- construction, & working, spark plug- function, types, spark advanced mechanism, maintenance, contact breaker point gap, Hot and cold plug, Heater plug, HT leads, Ignition timing, pre ignition, Detonation-Reasons, effect, transistorised ignition, electron ignition system

### **MODULE – IV**

Chassis Construction – Body, chassis, main component of frame, functions of frame, types of frame, chassis repair & alignment, chassis maintains, frame materials & fault, measurement of vehicles, classification of chassis

Security system – Anti theft device- working, Air bags, ABS, Seat Belt,

### **MODULE –V**

Suspension System – Types, functions, suspension spring- types, shackle- types, Air bag & rubber spring, advantages & disadvantages, Sprung & unsprung weight, shock absorber- types & function, testing, Front axle – functions, Steering geometry, steering system- main parts, working, types, steering ratio, steering windages, hydraulic assisted steering, troubles, Rear

axle function & types, type of axle drive, differential assembly, type of crown wheel & pinion drive, backlash, tyres & rings – types, construction, tread design, tube vulcanizing, Ply rating, storing of tyres, rotation of tyres, wheel alignment, maintenance, tyre pressure.

### **MODULE –VI**

Transmission & Brake System – Clutches, requirements, types, operation, clutch facing material, fluid fly wheel, gear box- types, selector mechanism, transfer case, torque convertor, automatic transmission, drive line, universal joint types, propeller shaft types, final drive. Types of brakes & requirements, master cylinder, wheel cylinder, servo brake, Engine exhaust brake, Brake bleeding, Power brake, Hand Brake Air brake.

Air Conditioner system – Vehicle heating, ventilation & cooling system, Basic air condition principle, Air conditioning capacity, control device, Air conditioning compressor.

### **MODULE – VII**

Soldering, Brazing, Electrical units, Electrical quantities - EMF, Potential Difference, Current, Resistance, Electrical Power & Electrical Energy. Ohm's Law, Kirchoff's Law, Faraday's Law of Electrolysis, Physical effect of electric current, Chemical effect of electric current, Heating Effect of electric current, Magnetic effect of electric current, Piezo Electric Effect, Temperature co-efficient of resistance. Series circuit, Parallel circuit, Series-parallel circuit. Fuse & circuit breakers, cut outs, Thermo couples, Conductors & Insulators, Types of Wires, Types of wire Joints, Colour code of wires, Measurement of size of wires, Magnetism & Electro-Magnetism, Faraday's Law of Electromagnetic Induction. Volt meter, Ammeter, Ohm meter and Multimeter.

### **MODULE – VIII**

Lead Acid Battery –Parts, Chemical action of charging & discharging, Charging methods, Defects & Maintenance.

Alkaline Cells –Parts, Chemical action of charging & discharging, Charging methods, Defects & Maintenance.

DC Series Motors – Working Principle, Parts, Construction, Starting & Characteristics.

Dynamo – Working Principle, Parts, Construction, Starting methods, Characteristics and voltage regulators.

Alternators - Working Principle, Parts, Construction & Characteristics.

Machines - Servo Motor

Types & Uses of Switches in Automobile Vehicles, Solenoid Switches, Self-starters & Types, common troubles and remedies in starter circuit, Testes.

Lighting System- Types of Bulbs used in Automobile Vehicles and their characteristics,

Basic Electronics – Semiconductors, Diodes, Transistors, Thyristors, UJT, MOSFETS, Logic gates, Half wave rectifier, Full wave rectifier, Full wave Bridge rectifier, Capacitors, Low Voltage Transformer - working principle & parts,

## **Part II - General Knowledge, Current Affairs and Renaissance in Kerala**

### **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

#### **Facts about Kerala**

Geographical Facts – Physical features – Climate – Soils – Rivers – Famous sites – 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.

***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.***