

DETAILED SYLLABUS FOR THE POST OF
MECHANIC IN KERALA AGRO MACHINERY CORPORATION LIMITED
(Category No. 414/2019)

(Total – 100 Marks)

Module-I (10 Marks)

HAND TOOLS - MEASURING - CUTTING TOOLS AND OPERATIONS

Hammers- Types of vice-C clamp- types of Spanners-pliers-screw driver-Types of Steel rules-

Try square and its types -jenny callipers-straight edge-system of units -Measurements of angles-Angular measuring instruments (Semi - precision) -Measuring standards (English & metric) Elements of a file- Cut of files –Grades-shapes- - Types of files- Needle files- Special files- Pinning of files -Care and maintenance -Convexity of files- Filing techniques- Hacksaw frames and blades-types of chisels-scraper-drilling-types of drills-drilling machines-reamers –hand taps-threading dies-Drilling - Cutting speed, feed and r.p.m - drill holding devices -Counter sinking-Radius/Fillet gauge, feeler gauge- grinding-standard grinding wheel marking system-grinding machines.

Module-II (10 Marks)

PRECISION INSTRUMENTS AND FASTENERS

Micrometres –dial callipers- Vernier callipers - Vernier height gauge- types- working principle-vernier bevel protractor-comparator-measuring errors, Gauges-types-slip gauges-angle gauge-sine bar-, Jigs and fixtures- Limits and fits-interchangeability-tolerance-allowances-shaft and hole basis system. Types of screw threads-fastners-keys-bolts-washers-studs-setscrews-cotters-pins-couplings-circlips-soldering-brazing-rivetting-types of rivets-defects in riveting-taper-springs

Module-III (10 Marks)

FORGING- SHEETMETAL WORK- WELDING

Forge-Refractory materials-forging hand tools- cuttings tools-anvils-forging of steels-forging operations-defects in drawing out-defects in upsetting. Types of snips-mallet-sheet metal hand tools-compass- stakes-types-uses - metals used in sheet metal work-sheet metal operations-joints-bending machines- General safety-tools and equipment used in gas welding-gases used in welding-types and uses of oxy-acetylene flames- acetylene gas generators-welding nozzles-melting points of common metals-flashback-backfire-gas welding techniques-joints-arc welding machines-welding defects-inspection of welds

Module-IV (10 Marks)

ENGINE

Introduction to Engine-internal & external combustion engines- Classification of IC engines- Principle & working of 2&4-stroke engines- Compression ignition & Spark Ignition

Engines-

Technical terms used in engine- starting and stopping method of Diesel& Petrol Engines- Engine Components: Cylinder head- Type of Petrol and Diesel combustion chambers – Head gaskets- Engine Valves, different types, materials, Type of valve operating mechanism- Valve trains, Valve- timing diagram, concept of Variable valve timing. Description of Camshafts & drives, Description of Overhead camshaft- Description & functions of different types of pistons, piston rings and piston pins and materials- connecting rod- Description and function of Crank shaft- Engine bearings- classification and location – materials used- fly wheel and vibration damper- Crank case- Description of cylinder block and Different type of Cylinder sleeves (liner).

Module-V (10 Marks)

COOLING, LUBRICATION, INTAKE & EXHAUST SYSTEM

Need for Cooling systems- Heat transfer method-Boiling point & pressure-Centrifugal force-Coolant properties- Different type of cooling systems-Basic cooling system components- Radiator- Coolant hoses- Water pump-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 - Oil additives- Types of lubrication system Lubrication system components - Description and function of Sump, Oil tank, Pickup tube, different type of Oil pump & Oil filters Oil pressure relief valve, Spurt holes & galleries, Oil indicators & Oil cooler. Intake system components- Description, function & types of Air cleaners- Description of Intake manifolds and material- Exhaust system components- Description and function of Exhaust manifold- Exhaust pipe-Mufflers-Catalytic converter

Module-VI (10 Marks)

FUEL SYSTEM AND EMISSION CONTROL

Diesel Fuel Systems- Diesel fuel injection- fuel characteristics, concept of quiet diesel technology & Clean diesel technology.

Diesel fuel system components – Description and function of Diesel tanks & lines, Diesel fuel filters, water separator, Lift pump, Plunger pump, Priming pump,

Inline injection pump, Distributor-type injection pump, Diesel injectors, Glow plugs, Cummins & Detroit Diesel injection. Electronic Diesel control- Electronic Diesel control systems, CRDI system, HEUI diesel injection system. Sensors, actuators and ECU.

Description of Gasoline fuel, Gasoline fuel characteristics- Stoichiometric ratio, Air density, Fuel supply system and components, carburetor Function, type& circuits. Types of emissions: Characteristics and Effect of Hydrocarbons, Hydrocarbons in exhaust gases, Oxides of nitrogen, Particulates, Carbon monoxide, Carbon dioxide, Sulphur content in fuels Description of Evaporation emission control, Catalytic conversion, Crankcase emission control, Exhaust gas recirculation (EGR) valve, Controlling air- fuel ratios, Charcoal storage devices, Diesel particulate filter (DPF). Selective Catalytic Reduction (SCR).

Module-VII (10 Marks)

TRANSMISSION SYSTEMS

Clutch – Types, Construction, Function of each component, dual clutch, fluid coupling, Dual mass flywheels. Operating mechanisms

Gearbox – Function, types, Function of each component, Baulk-ring synchromesh unit, Gear shift mechanism, Gear ratios, Automatic Transmissions- epicyclic gear box, simple and compound planetary gears, torque converter, Continuously variable transmission, transfer case.

Propeller shaft, Slip joint & Universal joint – types, function.

Differential & Final Drive, differential lock, function and types of power take off mechanism (PTO), all wheel drive and four wheel drive, Freewheeling hubs.

Axle – types of front and rear axles, axle shafts.

Module-VIII (10 Marks)

CONTROL SYSTEM, WHEELS & TYRES

Steering system – Description, function and components of Steering systems, Principles of steering, Steering geometry, Types of steering gearbox, Power Assisted steering, Electric power assisted steering, Basic electric power steering operation, Hydraulic power steering system.

Suspension system – Types of suspension systems, Types of Springs, Types of Shock absorbers.

Brake system-Brake-Drum and disc brake- Lever/ Mechanical advantage-hydraulic pressure and force- brake fade- Types of brake- principles of brake- Air brakes- park brake system- Brake pedal- Brake lines-Brake fluid-Bleeding- Master cylinder- Divided system-Tandem master cylinder- Power booster or brake unit- Types of power brake-hydraulic brake booster- applying brakes- brake force - brake light switch - drum brake system- drum brake operation- shoes-backing plate- wheel cylinder- disc brake operation - disc brake rotors- disc brake pads- disc brake calipers- proportioning valves - proportioning valve operation- brake friction material .

Wheels & Tyres – Construction, function & types of wheel, Types & size of tyres, Tyre construction, materials, tyre rating & TWI, Tyre pressure monitoring & aspect ratio. wheel balancing- wheel alignment.

Module-IX (10 Marks)

IMPLEMENTATIONS & MACHINERIES

Harrows- cultivator - disc plough - ridger - seed drill - Trailer - Hitching of equipment - Tractor accessories(Draw bar, top link, belly pulley) - use of hydraulic lift - mould board plough- Method of hitching- Chisel plough - Rotavator- slasher -pulverising roller Leveler- scraper- blade terracer - ditcher- bund former - bund maker - laser leveler - planter-trencher - dozer - dumper - post hole digger- onion digger - potato digger- ground nut digger-Power tiller- centrifugal pump- sprayer- duster-Reaper-Paddy transplanter-Thresher- Maize sheller- ground nut decorticator- combine harvester- Mower- folder harvester- silage cutter-Rotary harvester - Haybailer - winnower - Types of

cleaner and grader - Rice huller - Polisher - Feed grinder cum mixer - Hammer mill- Oil extractor - Sugarcane crusher -Grain drier

Module-X (Marks- 10)

BASIC ELECTRICITY, CHARGING & STARTING SYSTEM

Basic electricity, Electricity principles, Ground connections, Ohm's law, Voltage, Current, Resistance, Power, Energy. Voltmeter, ammeter, Ohmmeter Multimeter, Conductors & insulators, Wires, Shielding, Length vs. resistance, Resistor rating Fuses & circuit breakers, Ballast resistor, Stripping wire insulation, cable colour codes and sizes, Resistors, Electrostatic effects, Capacitors and its applications, Description of Chemical effects, Batteries & cells, Lead acid batteries & Stay Maintenance Free (SMF) batteries, Magnetic effects, Heating effects, Thermo electric energy, Thermistors, Thermocouples, Electro chemical energy, Photo-voltaic energy, Piezo- electric energy, Electromagnetic induction, Relays, Solenoids, Primary & Secondary windings, Transformers, stator and rotor coils. Description of charging circuit operation and construction 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.

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