DETAILED SYLLABUS FOR THE POST OF PUMP OPERATOR IN UNIVERSITIES IN KERALA

(Cat.No. : 557/2021)

(TOTAL MARKS - 100)

Module 1 Workshop Safety & Basic Workshop Practice (8 marks)
Workshop Safety

Occupational health and safety safety practice personal safety and general precautions observed in the shoptypes of fires fire extinguishers types of fire extinguishers elementary first aid handling of fuel spillage safe handling and periodic testing of lifting equipments energy conservation process

Basic Workshop Practice

Drilling machines portable type drilling Machines cutting speed and RPM work holding devices drill holding devices drill bits hand taps and wrenches tap drill size die and die stock reamers hole size for reaming lapping rivets types and uses riveted joints brazing soldering principles of arc welding –arc welding machines oxyacetylene gas welding air impact wrench air ratchet wrenches – jointsgrinding machines –

Module 2 Workshop Tools and Equipments, Engineering Measurement

(8 marks)

Workshop Tools and Equipments

Files classification of files Scrapers surface plates measuring tape engineer's steel rule try square hacksaw blades and frames types of calipersdividers surface gauges scriber hand tools chisel angles of chisels hammers wooden mallet - screwdrivers allen keys bench vice types of vices –C clamps and toolmaker's clamps spanners and their uses pliers .

Engineering Measurement

Outside micrometer depth micrometer vernier calipers universal vernier caliper and its application telescope gauge dial bore gauge dial test indicators straight edges feeler gauge & uses screw pitch gaugewire gaugesvacuum gaugepressure gauge.

Module 3 Basic Electrical (10 marks)

Conductorsinsulators semiconductors EMFpotential differencecurrent and resistance ohm's law close circuitopen circuit short circuit AC and DC meters connection of an ammeter in circuit use of an ammeterconnection of a voltmeter

use of a voltmeter connection of an ohmmeter use of an ohmmeter electric series circuits & parallel circuitstypes of resistors, construction and power rating tolerance in resistorsresistor colour code resistance symbols used in wiring diagram multimeters and digital multimeter application of multimeterelectric soldering ironnecessity of earthing system and equipment earthing need of a fuse in the circuit construction of a fuse types of fuses working of fuses circuit breakerscapacitor function of capacitor units of capacitance parallel and serial connection of capacitors–transformer AC motors DC motors –AC generators DC generatorsstarters and types.

Module 4 Basic Electronics, Battery (10 Marks)

Basic electronics

semiconductors P and N materials property of a PN junction classifications of diodes uses of transistors classifications of transistors thyristor and characteristics of SCR working of SCR thermistor and its usage relay classification of relaysfunction of current sensing relay and voltage sensing relay solenoid and its application construction and symbol of UJT application of UJT bi polar transistors and field effect transistors JFET construction and working MOSFET’s operation principle and types.

Battery

classification of cellsconstruction of a lead acid batterychemical action during discharging and charging testing of a lead adid battery battery rating –different battery charging methods maintenance free battery thermo couple thermo electric energy piezo electric energy.

Module 5 Hydraulic and Pneumatics (10 marks)

Hydraulics

Pascal's law concept of force multiplicationHydraulic oilsfunctions of hydraulic fluids viscosity hydraulic systemsreservoir external gear pump internal gear pump pumps and typesworking of hydraulic pumpdifferent types of hydraulic actuatorssingleacting hydraulic cylinders –double acting hydraulic cylinders - double rod end hydraulic cylinders2/2way directional control (DC) hydraulic valve 3/2 directional control (DC) hydraulic valve4/2 directional control (DC) hydraulic valvesymbol and working of hydraulic DC valves symbol and working of nonreturn valve symbol and working of an adjustable type throttle valve.

Pneumatics

Pneumatic System Boyle's law reciprocating piston compressor FRL or air service unit pneumatic actuators valves in fluid power system symbols for dc valves working of pneumatic cylinders.

Module 6–I C Engines, Engine components (14 marks)

Engines

Internal and external combustion engine classification of I.C. engines basic technical terms used in relation to engines two stroke engine fourstroke engine differentiate between a four stroke and a two stroke engine OTTO cycle diesel cycle diesel engine spark ignition engineDirect and indirect fuel injection systems starting and stopping methods of engine petrol engine basics scavenging.

Engine components

Construction of cylinder head cylinder head designtypes of cylinder headscylinder head gasket gasket materials cylinder block construction of cylinder block crankcase function of the valve constructional features of valves different types of valves and their material types of valve operating mechanism parts of the valve mechanism valve seats function of valve rotation size of intake and exhaust valve valve trains valve timing variable valve timingfunction of the camshaft - construction and material of the camshaftdifferent types of camshaft drive mechanismspiston constructional features of a piston different types of pistons different types of piston rings –construction of piston rings material of piston rings function of connecting rod various types of piston pins locking method and material of the piston pin function of the crankshaft –construction of crankshaft - material of crankshaft crankshaft balancing function of firing orderfunction of flywheel construction of flywheelfunctions of a vibration damper timing gear drive timing chain drive.

Module 7 Cooling and Lubrication System (12marks)

Engine cooling system

Necessity of the cooling system different types of cooling systems forced type of cooling system function of the water pumpradiator temperature indicator pressure cap need and function of the thermostat valve vapour recovery system constructional features of a radiator temperature indicatorthermo switchcoolant properties engine coolant change interval lanti Freeze mixtures.

Engine Lubrication system

Need of lubricating an engine different types of engine lubricating systemscomponents of the pressure lubrication system functions of lubrication systemfunction of pressure relief valvetypes of the pressure relief valve different types of crankcase ventilation positive crankcase ventilation oil level indicatoroil pressure indicator oil pressure indicating lightoil pumps gear type oil pump rotor type oil pump vane type oil pump plunger type oil pumpproperties of lubricating oilsSAE oil grades.

Module 8,Fuel System (8 marks) Intake and exhaust systems

Fuel systems

specification and characteristics of fuel different types of fuel system petrol engine fuel system and componentsDiesel Engine fuel systems function of the

fuel tank part of fuel tank function of fuel pipes need of a fuel filter types of fuel filter systems need for bleeding the fuel system function of water separators - function of a feed pump construction of a feed pump working of a feed pump function of F.I.P constructional features of F.I.P need of calibration types of fuel injection system need of a governor types of governors constructional features of governors injectorsdifferent types of injectors glow plugs.

Electrical Accessories

Various gauges in a vehicle fuel gauge oil pressure gauge different type of meters and their uses warning lights lighting circuit

Module 9 - **Electrical Machines (10 Marks**)

DC Generators and Type emf equation, Description of series, shunt and compound Generator DC motors

and type Starters 3 point, 4 point and speed control machine

Basic principle of Transformer, Cooling, Protective Device

AC motors and starters single phase and 3 phase DOL, Star delta, slip ring motor starter

Auto transformer starter AC motor, panel wiring, phase sequence.

Power Generation And Transmission

Generation Source of energy, Various types of power generation,Transmission and Distribution

comparison of AC and DC transmission

Module 10 - Electrical& Electronics systems, Accessories (10 Marks)

Electrical & Electronics systems (5 marks)

Electrical circuits in automobiles. sensor used in EFI principle of alternator - functions of the various parts of an alternator working of an alternator starting system principle of starting motor

construction of starting motor operation of bendix drive operation of over running

clutch drive sliding armature drive.

Pump (5 marks)

- Principle of centrifugal pump. Construction and operation of centrifugal pump in series and parallel

- Finding defects and method to recondition centrifugal pump submersible pump construction, operation and selection of appropriate typesworking Procedure to recondition, install and test of submersible pumps. Causes of failures and remedial measures
- Priming of pump sets
- Air cleaners – description and functions, different types of air cleaners
- Extraction Mufflers

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.