

**DETAILED SYLLABUS FOR THE POST OF  
OVERSEER/DRAFTSMAN GRADE-1  
IN PWD/IRRIGATION (Cat.No.: 198/2020)  
DRAFTSMAN GRADE I/OVERSEER GRADE I(ELECTRICAL) IN  
HARBOUR ENGINEERING (Cat.No .: 377/2020)  
PLANT ENGINEER (ELECTRICIA IN KERALA STATE CO-OPERATIVE  
COIR MARKETING FEDERATION LIMITED (Cat.No .: 464/2021)**

## **MODULE 1**

### **Fundamentals of Electrical engineering**

**15marks**

Electrical supply sources -DC. AC, Electrical circuits with resistance, inductance and capacitance. Power, power factor and energy. Electrostatics-Permittivity, laws, definitions, different type of capacitors. Magnetism and electromagnetism - magnetic properties, magnetic circuits and laws. Faraday's law of electromagnetic induction, Fleming's right hand rule, statically and dynamically induced EMF's ,self and mutual inductance, coefficient of coupling, energy stored in magnetic field, Electrical measurement-Voltage, current, power and energy. Electrical wiring- types, both domestic and industrial Grading of cable and wires Current rating, accessories and earthing. Testing of installation by megger

## **MODULE 2**

### **Electrical Machines**

**20 marks**

DC machines - principle, classification and application-generator types- construction, emf equation, windings, characteristics,armature reaction, commutation, trouble shooting and application. DC motor-voltage equation, speed and torque, starting methods ,speed control& starters. Transformer-single phase and three phase-equivalent circuits. phasor diagrams. tests. regulation and efficiency, connections, parallel operation, autotransformer-principle. Induction motor- Squirrel cage and slip ring principle and operation, slip, rotor current frequency and rotor emf. Torque- equation, max torque,characteristics, power stages, Speed control-starting methods, starters and applications.

Synchronous Generator- construction- salient pole & non salient pole, excitation methods, emf equation,armature reaction, armature reactance, leakage reactance, circle diagram,Vector diagram, voltage regulation, cooling system, Synchronous Motor- methods of starting. characteristic, application,Phaser diagram, hunting.

## **MODULE 3**

### **Power system & Utilization**

**15 marks**

Power generation Types-hydel, thermal, nuclear. layouts, sight selection, advantages and disadvantages of different systems. Transmission -line constants, line insulators, string efficiency. sag, skin, corona and Ferranti effect and DC transmission system. Cables-terms and definitions, types. Distribution- systems, over head-Radial, ring. & connected. Protection -primary and secondary fuses breaker-.principle, operation and types. Protection of alternator, transmission line and neutral earthing.

Utilisation -electric heating- materials advantages, types, devices. Electrical welding- principle and types. Traction- terms, definitions. speed characteristic. tractive effort, efficiency. Electric Braking- Methods. advantages and - terms and definitions, types. Circuit time applications.

## **MODULE 4**

### **Electrical Measurements & Estimating**

**20 marks**

Electrical measuring Instruments Function-terms and definitions. Principle of operation,construction and application. Instruments used for current, voltage, power, power factor, frequency and energy measurements. Digital instruments- Digital voltmeter, digital multimeter, and cathode ray oscilloscope (CRO),wave analyser, spectrum analyser Transducers and gauges- semiconductor strain gauge, LVDT, burden tube, capacitor transducer, piezo electric transducer, Bellows

Illumination- terms and definitions, laws of Illumination. lighting schemes, design and calculation. Bus-bar design. industrial electrification, Lamps- different types, construction. connection diagram, working, applications. IS code and IE.

## **MODULE 5**

### **Electronics and Operational Amplifier**

**15 marks**

Transistor-characteristics. configuration and application..equivalent parameters. Amplifier-classification, working, circuit diagram and application. Oscillator- negative feed back,concept of Barhusins's criteria, types.Multi Vibrators- types, circuit diagram and application.

Number system- conversion of decimal, octal and hexa decimal in to binary and vice versa. Binary- addition, subtraction and division.BCD addition Systems of signed binary number- true magnitude form. 1's complement, 2's complement, Logic gates basic logic gates, verification of Truth table. Boolean algebra, axioms and postulates, universal logical gates. K- Map. Dc Morgan's theorem, half adder, full adder. multiplexing and demultiplexing. Flip flop -circuit. and clocked flip -flop circuits. Operational amplifier working, characteristic and applications.

## **MODULE 6**

### **Power Electronics and Microcontroller**

**15 marks**

Power semiconductor devices PNP diodes, DIACS Thyristors, TRIACS, G.T.O. devices. Power Transistors, Power MOSFET, Rating, Losses and Cooling. Triggering circuits for SCR's, UJT, Uncontrolled and controlled Rectifiers : Single phase and poly phase Bridge rectifiers. Transformer ratings. Inductive load, free wheeling diodes. D.C. Choppers : Principles, classification, use. Frequency conversion : Cycloconverter single and three phase circuits, Single phase and three phase inverters, constant voltage source and constant current source inverters- Electric Drives- DC, single phase , semi converter, single full converter, and single phase dual converter. Speed control of single phase induction motor- stator control. voltage and frequency.

Micro controller-8051 microcontrollers- features, block diagram. Architecture, register structure, special function registers, Internal and external memory, pin details, ports, Counters and timers in 8052. Serial I/O S. associated registers, interrupts. PLC- applications, importance, block diagram, operation, types of PLCs. programming methods, ladder diagram.

**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.**