

**DETAILED SYLLABUS FOR THE POST OF DRAFTSMAN GRADE II /
OVERSEER GRADE II (ELECTRICAL) IN HARBOUR ENGINEERING
DEPARTMENT (Cat.No.: 248/2021)**

1. Basics of Electrical Circuits (10 Marks)

Electric circuit - Current , potential difference, resistance, effect of temperature on resistance, Ohm's law, series circuit and parallel circuit, Kirchhoff's law, work , power, energy and simple network problems.

Batteries – primary and secondary cell, charging and discharging of lead acid cell, care and maintenance of battery.

2. AC Circuits (10 Marks)

Production AC voltage, different terms in AC- cycle, frequency, time period, amplitude, RMS value, average value, maximum value, power and power factor. AC through resistor, capacitor and inductor, AC series circuit and parallel circuit, simple problems.

Three phase AC generation- star and delta connections, relation of line and phase voltage and current, three phase power calculation, simple problems.

3. Electrostatics and electromagnetism (10 Marks)

Electrostatic – different terms related to electrostatic, charge, capacitance, charging of capacitor, series and parallel combination of capacitors.

Electromagnetism –flux, permeability, terms related to magnetism, B-H curve, hysteresis and eddy current loss, electromagnetic induction, Faraday's law, Lenz's law, self and mutual induction.

4. Materials (10 Marks)

Conducting materials – essential properties of conductor, properties of Copper , ACSR, Aluminum, tungsten, platinum, nichrome, lead, mercury, carbon and graphite.

Insulating materials – properties and uses of marble, slack, white clay, porcelain, ebonite, shellac, enamel, rubber, mica, asbestos, plastic, paper, PVC, effect of moisture on insulation, insulating oil,-testing on insulating oil.

5. Electrical measuring instruments and measurements (10 Marks)

Principle and working of - voltmeter, ammeter, wattmeter, tong tester, multi-meter. Working principle and operation of energy meter, single phase and three phase energy meter, working of megger

Three phase power measurement by two wattmeter method.

6. Power system (10 Marks)

Generation – sources of energy , types of generating station, hydroelectric stations based on head, principle and operation of power stations, components of power plant with schematic diagram, lay out of power plants, comparison of hydro, thermal, diesel and atomic plants.

Transmission – advantages of high voltage transmission, line supports, insulators, ground wire, UG cable, LT cables, Substation components- isolator, circuit breaker, fuse, HRC fuse, indoor and outdoor substation.

Distribution –feeder, distributor, service main, size of conductors, current carrying capacity of various conductors, permissible voltage drop, earthing, lighting arrestor.

Disadvantages of low power factor, Power factor improvement.

7. Transformer (10 Marks)

Transformer – principle and working, construction, features of ON load and OFF load condition, core construction, losses, maintenance of transformer oil, oil testing. Distribution transformers. Simple problems.

8. Electrical rotating machines (10 Marks)

DC machines- DC generator, working, construction, armature winding, commutator, classification of motors and generators. Starters for DC motor.

AC Motors – three phase and single phase induction motors, principle and operation, squirrel cage and wound rotor construction, starters for AC motor, testing for continuity, insulation and short circuit.

9. Estimation (10 Marks)

Wiring – types of wiring in residential building, theatre, auditorium, wiring accessories, estimating and costing of wiring.

Estimating of - AC motor installations, estimating of service connections for residential and workshops, HT and LT line, transformer installations.

10. Electrical power utilization (10 Marks)

Lamps – working of incandescent lamp, mercury, sodium, fluorescent lamps and tubes, LED and arc lamps. Application of industry type lamps.

Motors – selection and application of DC series motor, shunt motor, compound motor, single phase induction motor, synchronous and universal motors.

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.