India
(2026)

Sr. No. 21X26-ETO

EXAMINATION OF ELECTRO TECHNICAL OFFICER

Grade: E.T.O.

Function: Electrical, Electronic & Control Engineering

Subject:MARINE ELECTROTECHNOLOGY & SSEP

(Time allowed :3 hours) Total Marks: 100

Note:
1) Answer **SIX** Questions only. Not more than **TWO** from each Section.
2) All Questions carry equal marks.
3) Neatness in handwriting and clarity in expression carries weightage
4) Illustration of an Answer with clear sketches/diagrams carries weightage.
5) Start answering from the backside of the front cover page.
6) Blank pages whether part or full, to be striked off by (X) at the end of each question.

Section: I

1 Under what conditions, can you produce sustained oscillations? Classify oscillations with respect to frequency range, principal involved, etc. It is possible to produce oscillations with RC networks in phase shift oscillator. Discuss in detail. [16]

2 List the factors that cause deterioration of the frequency response of a transistor amplifier. Explain how each factor affects the performance of the amplifier and the portion of the frequency range where it is effective. [16]

3 With reference to the provision of a shore electrical supply to a ship:

(a) Sketch an arrangement for taking A.C. shore supply and checks to be carried out prior taking shore connection? [8]

(b) Describe the method of safely connecting the arrangement sketched in (A) to the shore Supply? [8]

Section: II

4 (a) Explain the potential hazards if liquid-cooled transformers are used. [6]

(b) A total load of 8000 kW at 0.8 power factor is supplied by two alternators in parallel. One alternator supplies 6000kW at 0.9 power factor. Find the kVA rating of the other alternator and the power factor. [10]

5 (a) Sketch an arrangement showing the principal of a proportional plus integral (P + I) control loop. [6]

(b) Compare the series and parallel resonance circuits. Find the frequency at which the following circuit resonates. [10]



6 (a) With the aid of delta and star connection diagrams, state the basic equation from which the delta-star and star- delta conversion equation can be derived. [6]

(b) What are the losses in transformers? Mention the various factors which affect these losses. In a 25 KVA, 3300/233 V, single phase transformer, the iron and full-load Cu. losses are respectively 350 and 400 watts. Calculate the efficiency at half-full load, 0.8 power factor. [10]

Section: III

7 (a) The UMS monitoring, and control system of your ship has recently started to give false alarms and incorrect data printouts. State, with reasons, possible causes if the false alarms and reading are: [6]
(i) Localized to a particular area of engine operation; (ii) General to the engine room

(b) State, with reasons, the action you, as Electrical Engineer, would take to ensure continued safe operation of the vessel if the defects were general to the engine room. [5]

(c) Explain the procedure you, will propose to the Second Engineer, in order to locate and rectify the general fault in the UMS system. [5]

8 (a) Describe information which is available in the record which is attached as a supplement to the IOPP Certificate, for a bulk carriers and oil tanker. [5]

(b) Discuss the important regulations related to the machinery space of a large ocean going vessel under MARPOL 73/78 Annex 1. [8]

(c) What is IBC Code ? What Certificates are issued under the Code and to which types of ships? [3]

9 With reference to an automatic water sprinkler, fire detecting alarm and extinguishing system for accommodation spaces:

(a) Sketch a typical system. [4]
(b) Describe the operation of this system. [4]
(c) State the source of water for such a system. [2]
(d) Describe the sprinkler head and its operation. [3]
(e) State how the temperature rating of the sprinkler head is determined. [3]