D. MARINE
Study Material

ELECTRO TECHNICAL OFFICER : WRITTEN

FOR INDIAN COMPETENCY EXAM

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JAN-2026

1. 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)
2024/APR/01 **2025/SEP/02** **2026/JAN/01**
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2.Sketch and describe the method of speed control of synchronous motors by variable frequency. State the advantages of this method over the other methods of speed control. (16)
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3. What is soft starting of an Induction motor? Describe with a circuit using thyristors used for soft starting. Discuss its advantages and dis-advantages. (16)
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SECTION II

4.a) Why is it important to maintain high efficiency of operation? And low values of voltages regulation for power transformers? (6)
b) A shunt motor supplied at 230 V runs at 900 rpm. When the armature current is 30 A, the resistance of the armature circuit is 0.4 Ω, calculate the resistance required in series with the armature circuit to reduce the speed to 500 rpm. Assume that the armature current is 25 Amps. (10)
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5.a) What is back emf? Derive the relation for the back emf and the supplied voltage in terms of armature resistance

b) The earth-lamps on a main switchboard comprise two 240V 60W lamps connected in the usual manner. The potential difference at the busbars is 220V. Damage by sea water occurs to a distribution cable so that the insulation resistance to the earth is reduced to 16 ohms and 6 ohms for +ve and -ve cables respectively. Find by calculation
(a) which of the two lamps burns the brighter; and
(b) the additional load on the generators occasioned by the fault. The resistance of the cables and the ship's structure may be neglected, and that of the lamps taken as constant at the value corresponding to the 60W rating (10)
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6. A coil of inductance 2 H and unknown resistance is connected to a D.C. supply of 100 volts. After 4 ms the current has risen to 75% of its final steady state value. Calculate EACH of the following:
(a) the resistance by the coil;
(b) the energy stored in the coil when the current has reached its steady state value; (6)
(c) the time taken for the current to fall to 50% of its steady state value when the supply is switched off. (4)
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SECTION-III

7. Discuss the following with respect to International Safety Management (ISM) Code:
a) Emergency preparedness, drills & training. (6)
b) Reporting of near miss, non-conformities, accidents/incidents, and hazardous occurrences. (5)
c) Risk assessment, Identification of critical equipment, tests, and minimum spares requirement (5)
2024/APR/07
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8. With reference to a recent ILO notice on the health hazards from asbestos.
a) state where asbestos may be found on board ship. (6)
b) state the health risks from asbestos (5)
c) outline the precautions necessary to minimize exposure to asbestos during an emergency repair. (5)
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9. Petroleum vapours are dangerous substances and when mixed with air can be ignited.
a) i) sketch an explosimeter or combustion gas indicator which can be used to check the atmosphere of a tank or pumproom. (5)
ii) describe the explosimeter and its operation
iii) state one reason that may cause the explosimeter to give a false reading (5)
b) for flammable mixtures, explain the meaning of the terms lower and upper flammable limits
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