D. MARINE
Study Material

MEO CLASS 2 WRITTEN: EKG

(ENGINEERING KNOWLEDGE GENERAL)

FOR INDIAN COMPETENCY EXAM

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Study Material

JAN-2026

1.(a) Explain the Operational principle of a ship's stabiliser
(b) Describe with sketches Active and Passive types of stabilizers.
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2. With regards to **boiler water level control.** Explain the following
a) Shrink and swell phenomenon
b) Cascade control
c) Split control (16)
d) Condensing Chamber-Function and location.
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3. With reference to **Keyless Propeller:**
a) Sketch a section through a keyless sleeved propeller. (7)
b) State the advantages of using a keyless sleeved propeller
c) State with reason, Which metal sleeve should be made for contact with the forged mild steel tail shaft? (3)
d) State the material uses to bond the sleeve to the propeller and the general thickness of the bonding material. (3)
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4. With reference to **shaft alignment**
a) Explain the meaning of fair curve or rational alignment. (8)
b) Shaft alignment is often verified using hydraulic jacks to obtain a simple graph. Sketch such a graph, Indicating the following: Static load, (1) Hysteresis, Influence number: Explain the limitations of checking shaft alignment solely by hydraulic jacking methods. (8)
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5.With respect to **Energy efficient running of ships.**
a) Sketch and explain the optimization of propeller hull interface flow devices and Improvement of propulsion efficiency
b) sketch and explain the optimization of Auxiliary machinery using VFDS. (8)
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6.a) Examine in detail three common but entirely different reasons for loss of steering gear systems (5)
b) State how failure is inhibited in the design, operation and maintenance of steering gear systems (5)
c)Descnbe how a vessel may make port upon irreparable failure of the steering telemotor (6)
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7a) Draw a block diagram for a fully automated accommodation air conditioning unit, labelling the component parts and indicating the directions of air flow (9)
b) Explain why the unit includes means of dehumidification and humidification
c) A chart is used for ensuring that the accommodation conditions are within the so-caled Comfort Zone: what useful information does the chart give?
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8. Sketch and describe a **stockless anchor** illustrating the method or device used to attach it to the chain cable. When the anchor and cable are ranged during the ships underwater survey what parts require special attention and what defects are likely to be discovered (16)
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9.Explain how the ingress of sea water is prevented in an **oil lubricated stern bearing system.** Should the system fail, describe the corrective action possible whilst the vessel is afloat. State why two stern bearing oil header tanks are fitted in some Instances? (16)

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FEB-2026

(a) Sketch and explain a fully automated air conditioning system for accommodation spaces, annotating the relevant temperatures and relative humidity's throughout the system. (12)
(b) Describe how bacteria are prevented from multiplying to a harmful level in an air conditioning system. (4)

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2) Sketch and describe a high-pressure cut-out in a refrigeration system. (6)
b) The refrigeration compressor has stopped due to operation of the h. p. cut-out. Explain -
(i) The possible causes. (6)
(ii) How these causes would be found and possible remedies
c) What steps are taken if the compressor "short-cycle" on low pressure cut-out? (4)

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3)a. Briefly discuss the principle and the key components and elements of an ICCP system, outlining their functions in safeguarding the integrity of metal structures on ships. (10)

b) Enumerate the advancements in ICCP technology over the years and how these innovations contribute to more efficient and sustainable corrosion protection. (6)
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4.a) What different methods are used for preserving ship's hull during service. What type of Antifouling coats are used? (6)
b) State what materials are being banned by international regulation for use in Antifouling coats and the reason for banning. (5)
c) Discuss briefly how does paint coating on deck differ from that on super structure. (5)
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5. An engine room is operating in the unmanned (UMS) mode. In the event of a failure of the UMS systems explain the arrangements a second engineer officer should introduce to operate the machinery in manual mode for a passage of 10 days duration.
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6. Define creep and specify the conditions under which it occurs? (6)
b) Discuss three metallurgical/processing techniques that are employed to enhance the creep resistance of. metal alloys. (10)
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7. Explain EACH of the following metallurgical processes:
(a) Induction hardening
(b) Nitriding

(c) Case hardening (4)
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8 With reference to Boiler feed regulation:
a) Describe, with the aid of sketches, the operation of a boiler feed water regulator controlled by at least two other parameters besides water level in the drum. (6)
b) Give reasons for the inclusion of the other elements besides water level in controlling feed flow. (5)
c) Deduce the possible effects on the system when the drain valve in the constant leg in the level transmitter starts to leak.(4)
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9a) Sketch and describe a Pilgrim Nut for securing a propeller to the screw shaft.
b) Describe how this device is used to loosen the propeller on the shaft when removal or inspection becomes necessary. (5)
c) Give four reasons why this method is considered to be superior to all other methods.
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