D. MARINE
Study Material

MEO CLASS 4 WRITTEN: EKG

(ENGINEERING KNOWLEDGE GENERAL)

FOR INDIAN COMPETENCY EXAM

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JANUARY – 2024

Q1. With reference to control system state what is meant by (a) Two step action (6)
(b) Proportional control (5)
(c) Offset (5)
2023/AUG/Q5 **2024/JAN/Q1**
Click Here to See the Answer

Q2. (a) Sketch a line diagram showing a typical inert gas system used for inerting the cargo tanks of oil tankers labelling the component parts (6)
(b) Describe the system (8)
(c) State what oxygen content you would expect in the flue gases if good combustion is achieved (2)
2024/JAN/Q2
Click Here to See the Answer

Q3. Why engineering materials are tested prior manufacturing of their components (i) Describe the various destructive and non destructive tests carried out on materials for shipboard use (6)
(ii) Explain the purpose of each test and where the same is applied (10)
2024/JAN/Q3
Click Here to See the Answer

Q4. With reference to a typical shipboard refrigeration system (a) Sketch the arrangement which controls superheat temperature of refrigerant gas leaving the evaporator (8)
(b) Describe the operation of the arrangement assuming one of the HFC refrigerants is the working medium (4)
(c) Explain the purpose of the equalizing connection (4)
2024/JAN/Q4
Click Here to See the Answer

Q5. With regard to keeping the gas side of boilers in good condition discuss each of the following (1) The mechanism of combustion stating the factors which are important to good combustion (6)
(2) Oil fuel treatment (5)
(3) Soot removal equipment (5)
2024/JAN/Q5
Click Here to See the Answer

Q6. Explain why regular testing of water in auxiliary boilers is desirable For each test normally carried out state
(a) Reasons for making the test (6)
(b) Acceptable values for any particular type of auxiliary boiler (5)
(c) Action required when measured values differ appreciably from desired values (5)
2024/JAN/Q6
Click Here to See the Answer

Q7. With reference to electric arc welding
(a) Draw a labeled sectional sketch of a satisfactory butt weld (5)
(b) Briefly define the following defects that may occur and how they may have been caused
(i) Under cut
(ii) Splatter
(iii) Inclusion
(iv) Blow hole
(v) Incomplete root penetration
(vi) Lack of fusion (6)
(c) Why is alternating current generally more popular than direct current for metal arc welding (5)
2023/OCT/Q3 **2024/JAN/Q7**
Click Here to See the Answer

Q8. Compare the desirable qualities of the lubricating oil selected for each of the following duties and give reasons for the differing properties of the oils recommended for these three purposes
(a) Auxiliary diesel engines
(b) Stern tube bearings
(c) Refrigeration compressors (16)
2024/JAN/Q8
Click Here to See the Answer

Q9. Reverse osmosis is the contemporary alternative for shipboard production of drinking water
(a) Describe using simple diagrams where necessary the principle of
(i) Osmosis (3)
(ii) Reverse osmosis (3)
(b) Sketch a line diagram showing a single pass system for producing fresh water from seawater (4)
(i) Describe such a system (4)
(ii) State the safety features that may be incorporated into the plant (2)
2023/JUN/Q7 **2023/OCT/Q2** **2024/JAN/Q9**
Click Here to See the Answer

FEBRUARY – 2024

Q1. (a) What is meant by the term purification and what does it separate
(b) What are the basic methods of separation Explain the functioning of purifier and clarifier (3)
(c) What is meant by the term interface and what is the role of gravity disc in determining the same (4)
(d) What is nomogram and how is the correct gravity disc size selected (6)
2024/FEB/Q1
Click Here to See the Answer

Q2. (a) Draw a simple line sketch of a shell and tube cooler clearly labelling its parts (6)
(b) Describe the system (4)
(c) Name common defects found (3)
(d) What periodical maintenance needs to be carried out (3)
2024/FEB/Q2
Click Here to See the Answer

Q3. (a) What is meant by the term corrosion and how does it occur in nature (6)
(b) Name different types of wet and dry corrosion at least four of them with brief account of their occurrence and suitable preventive measures for their control (10)
2023/SEP/Q3 **2024/FEB/Q3**
Click Here to See the Answer

Q4. Write short notes on the following pertaining to the use of copper alloys in seawater systems
(a) Use of copper nickel and formation of protective film for use in seawater (4)
(b) Cavitation (4)
(c) Dezincification (4)

(d) Marine biofouling (4)
2023/SEP/Q1 **2024/FEB/Q4**
Click Here to See the Answer

Q5. (a) Name the safety devices fitted on 2 stage air compressors on ships Explain their functional purpose as well as location of fitment using a schematic diagram (12)
(b) State the maintenance and checks carried out periodically in order to keep them efficient (4)
2024/FEB/Q5
Click Here to See the Answer

Q6. (a) Describe the constructional features of plate type fresh water generator and its operational procedures for fresh water generation (6)
(b) State the temperatures and pressures at salient points (4)
(c) State some of the advantages and limitations that exist in using a plate type heat exchanger (6)
2024/FEB/Q6
Click Here to See the Answer

Q7. (a) Why is heat treatment necessary for carbon steel (6)
(b) Describe the various heat treatment processes and their benefits (10)
2024/FEB/Q7
Click Here to See the Answer

Q8. (a) Describe the functional components of a reefer plant for the domestic refrigeration system and temperatures to be maintained in different cold rooms (8)
(b) In reference to a domestic refrigeration system briefly describe the following (i) Pressure switches (ii) Tubular heat exchangers (iii) Oil separator (iv) Drier system (8)
2023/SEP/Q5 **2024/FEB/Q8**
Click Here to See the Answer

Q9. (i) Sketch and describe a biological sewage treatment system (6)
(ii) How does the biological sewage treatment plant work Explain (6)
(iii) What is understood by the term BOD What factors affect BOD (4)
2023/SEP/Q6 **2024/FEB/Q9**
Click Here to See the Answer

MARCH – 2024

Q1. (a) How does fouling affect the performance of a heat exchanger (4)
(b) Describe the types of plugs used to plug the ends of a leaky heat exchanger tubes (6)
(c) What is a differential pressure gauge Where is it used (6)
2024/MAR/Q1
Click Here to See the Answer

Q2. (a) Why are centrifugal pumps used for the sea and cooling water services with marine diesel engines What are their drawbacks (6)
(b) What do you understand by the term pump characteristics (6)
(c) What is net positive suction head (4)
2024/MAR/Q2
Click Here to See the Answer

Q3. (a) Explain the working principle of a plate type heat exchanger with neat sketch (8)
(b) State the advantages and disadvantages of plate type heat exchanger (8)
2024/MAR/Q3
Click Here to See the Answer

Q4. (a) Describe the working of a shell and tube heat exchanger with a neat sketch (8)
(b) Explain fouling and its effects on heat transfer efficiency (8)
2024/MAR/Q4
Click Here to See the Answer

Q5. (a) What is meant by cavitation in pumps and how does it affect pump performance (8)
(b) What are the causes and preventive measures for cavitation (8)
2024/MAR/Q5
Click Here to See the Answer

Q6. (a) Describe the construction and working of a centrifugal pump with neat sketch (8)
(b) What are the common faults and maintenance of centrifugal pumps (8)
2024/MAR/Q6
Click Here to See the Answer

Q7. (a) Explain the working of a fresh water generator (8)
(b) What are the causes of low output and how can it be improved (8)
2024/MAR/Q7
Click Here to See the Answer

Q8. (a) Explain the working of a refrigeration system used onboard ships
(b) What are the common faults and troubleshooting methods (8)
2024/MAR/Q8
Click Here to See the Answer

Q9. Write short notes on the following (a) Dynamic positioning system and its types (4)
(b) Deaeration tank in the HT jacket cooling water system (4)
(c) Thermostatic expansion valve (4)
(d) Proportional controller with examples (4)
2024/MAR/Q9
Click Here to See the Answer

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APRIL – 2024(PART-1)

Q1. (a) With a line diagram explain the working of the quick closing valve
(b) Why do you need the quick closing valves on the fuel and lube oil lines
(c) Explain how to reset the valve after a trial How is the periodic test carried out and what are the areas of concern that need special attention
2024/APR1/Q1
Click Here to See the Answer

Q2. (a) Describe the constructional features of plate type fresh water generator and its operational procedures for fresh water generation (6)
(b) State the temperatures and pressures at salient points (4)
2024/APR1/Q2
Click Here to See the Answer

Q3. (a) Explain the working of a plate type heat exchanger with neat sketch
(b) State the advantages and disadvantages of plate type heat exchanger (8)
2024/APR1/Q3
Click Here to See the Answer

Q4. (a) Describe the working of a shell and tube heat exchanger with a neat sketch (8)
(b) Explain fouling and its effects on heat transfer efficiency (8)
2024/APR1/Q4
Click Here to See the Answer

Q5. (a) What is meant by cavitation in pumps and how does it affect pump performance (8)
(b) What are the causes and preventive measures for cavitation (8)
2024/APR1/Q5
Click Here to See the Answer

Q6. (a) Describe the construction and working of a centrifugal pump with neat sketch (8)
(b) What are the common faults and maintenance of centrifugal pumps (8)
2024/APR1/Q6
Click Here to See the Answer

Q7. (a) Explain the working of a fresh water generator (8)
(b) What are the causes of low output and how can it be improved (8)
2024/APR1/Q7
Click Here to See the Answer

Q8. (a) Explain the working of a refrigeration system used onboard ships
(b) What are the common faults and troubleshooting methods (8)
2024/APR1/Q8
Click Here to See the Answer

Q9. Explain the following (a) Control air dryer working principle with diagram of any one type of dryer of your choice (8)
(b) Any two types of ballast water treatment system (8)
2024/APR1/Q9
Click Here to See the Answer

APRIL – 2024(PART-2)

Q1. (a) With a line diagram explain the working of the quick closing valve
(b) Why do you need the quick closing valves on the fuel and lube oil lines
(c) Explain how to reset the valve after a trial How is the periodic test carried out and what are the areas of concern that need special attention
2024/APR1/Q1
Click Here to See the Answer

Q2. (a) Describe the constructional features of plate type fresh water generator and its operational procedures for fresh water generation (6)
(b) State the temperatures and pressures at salient points (4)
2024/APR1/Q2
Click Here to See the Answer

Q3. (a) What are the advantages and disadvantages of the single coil type and the straight tube type of intercooler for air compressor (10)
(b) Why are the tubes and coils generally made of copper (6)
2024/APR2/Q2
Click Here to See the Answer

Q4. (a) With the aid of a sketch describe the working of a shell and tube type fresh water generator (10)
(b) What are the probable causes of fluctuating and unsteady vacuum in such an evaporator and what would be the consequence of such an unsteady vacuum (6)
2024/APR2/Q3
Click Here to See the Answer

Q5. (a) Make a detailed sketch of a ship's domestic refrigeration system (8)
(b) Give a full description of such a refrigeration system explaining the purpose of the relevant control and safety devices (8)
2024/APR2/Q4
Click Here to See the Answer

Q6. (a) Describe the effects of taking fresh water from the shore as feedwater for auxiliary boilers (5)
(b) Describe the measures taken to reduce these effects (5)
(c) What is the purpose of deaerator in the boiler feed water system How is the deaeration achieved (6)
2024/APR2/Q5
Click Here to See the Answer

Q7. Write short notes to explain the following fittings devices used in engine room and their applications (a) Low sea suction (4)
(b) Fretting corrosion (4)
(c) Caustic embrittlement (4)
(d) Air starting motor (4)
2024/APR2/Q6
Click Here to See the Answer

Q8. (a) Sketch a four ram steering gear arrangement capable of 100 percent redundancy (8)
(b) Describe the operation of the arrangement sketched in (a) (8)
2024/APR2/Q7
Click Here to See the Answer

Q9. (a) Sketch a line diagram showing a typical inert gas system used for inerting the cargo tanks of oil tankers labelling the component parts (6)
(b) Describe the system (8)
(c) State what oxygen content you would expect in the flue gases if good combustion is achieved (2)
2023/AUG/Q2 **2024/JAN/Q2** **2024/APR2/Q8**
Click Here to See the Answer

MAY – 2024

Q1. With reference to rotary vane steering gears
(a) Describe with the aid of a sketch how such a unit incorporates an integral rudder carrier (10)
(b) Explain how vertical rudder movement is accommodated (6)
2024/MAY1/Q1
Click Here to See the Answer

Q2. A main air compressor interstage air cooler has burst Put down a logical sequence of event that could have caused this accident Put down your analysis point by point and complete in technical detail (16)
2024/MAY1/Q2
Click Here to See the Answer

Q3. A distinguishing feature of an eductor when compared to other pumps is the
(a) Discharge end being smaller than the suction end
(b) Small size of impeller
(c) Lack of moving parts
(d) Ease at which the wearing rings may be changed Briefly justify your answer (16)
2024/MAY1/Q3
Click Here to See the Answer

Q4. Give an outline sketch of heavy fuel oil setting tank heating system and briefly explain the system Sketch only the low pressure steam inlet upto condensate collection tank (16)
2024/MAY1/Q4
Click Here to See the Answer

Q5. The auxiliary boiler of a ship periodically needs feed water and the rate of feed is gradually increasing everyday without an increase in demand

Suggest some causes for such a happening (16)
2024/MAY1/Q5
Click Here to See the Answer

Q6. Write short notes on the following
(a) Need to ensure that DO service tanks are not heated beyond a certain temperature (4)
(b) Importance of the level of the FW compensating tank for jacket cooling of main engines as an indicator of impending trouble (4)
(c) Need to check remote stop of all FO installations regularly (4)
(d) Necessity for a proper check of all engine room parameters before taking over of watch (4)
2024/MAY1/Q6
Click Here to See the Answer

Q7. The by-products of oxidation as a result of water contamination of hydraulic oil are generally
(a) Removed by cellulose type filters
(b) Gums varnishes and acids
(c) Always neutralized by oil additives
(d) Harmless and have no effect on system components Briefly justify your answer (16)
2024/MAY1/Q7
Click Here to See the Answer

Q8. Explain the following terms and give examples of where each condition might occur (a) Stress corrosion cracking (6)
(b) Creep cracking (5)
(c) Corrosion fatigue (5)
2023/DEC/Q6 **2024/MAY1/Q8**
Click Here to See the Answer

Q9. (a) Whilst on seawatch you observe that the oil mist detector OMD in the engine room has triggered an alarm and in feeling the crankcase doors

on the bottom platform you find that the unit in question feels warmer than the rest What pre emptive action will you take as watchkeeper to bring the situation under control (10)
(b) Draw a simple line diagram of an OMD and explain its working (6)
2023/DEC/Q4 **2024/MAY1/Q9**
Click Here to See the Answer

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JUNE – 2024

Q1. (a) What are the different types of coupling bolts used in practice Name at least 3 (3)
(b) Explain with the help of sketch as to how a pilgrim hydraulic bolt is fitted and removed (8)
(c) How are fitted bolts installed on the coupling (5)
2023/DEC/Q1 **2024/JUN/Q1**
Click Here to See the Answer

Q2. (a) Explain the working principle of a fuel oil purifier (8)
(b) Explain briefly the significance of the friction clutch mechanism (4)
(c) List the alarms and trips associated with a purifier (4)
2024/JUN/Q2
Click Here to See the Answer

Q3. (a) What is meant by corrosion and how does it occur in nature (6)
(b) Name different types of wet and dry corrosion with examples and preventive measures (10)
2023/SEP/Q3 **2024/JUN/Q3**
Click Here to See the Answer

Q4. (a) Describe the working of a shell and tube heat exchanger with neat sketch (8)
(b) Explain fouling and its effects on heat transfer efficiency (8)
2024/MAR/Q4 **2024/JUN/Q4**
Click Here to See the Answer

Q5. (a) What is cavitation in pumps Explain causes and prevention (8)
(b) Explain net positive suction head NPSH and its significance (8)
2024/MAR/Q5 **2024/JUN/Q5**
Click Here to See the Answer

Q6. (a) Explain the working of a plate type heat exchanger (8)
(b) State advantages and disadvantages of plate type heat exchanger (8)
2024/MAR/Q3 **2024/JUN/Q6**
Click Here to See the Answer

Q7. (a) Explain the working of a fresh water generator (8)
(b) What are the causes of low output and remedies (8)
2024/MAR/Q7 **2024/JUN/Q7**
Click Here to See the Answer

Q8. (a) Explain the working of a refrigeration system onboard ships (8)
(b) What are common faults and troubleshooting methods (8)
2024/MAR/Q8 **2024/JUN/Q8**
Click Here to See the Answer

Q9. Write short notes on the following (a) Dynamic positioning system and its types (4)
(b) Deaeration tank in HT jacket cooling water system (4)
(c) Thermostatic expansion valve (4)
(d) Proportional controller with examples (4)
2024/MAR/Q9 **2024/JUN/Q9**
Click Here to See the Answer

JULY – 2024

Q1. With reference to electric arc welding
(a) Draw a labeled sectional sketch of a satisfactory butt weld (4)
(b) Briefly define the following defects that may occur and how they may have been caused
(i) Under cut
(ii) Splatter
(iii) Inclusion
(iv) Blow hole
(v) Incomplete root penetration
(vi) Lack of fusion (12)
2024/JUL/Q1
Click Here to See the Answer

Q2. Make a diagrammatic sketch of an exhaust gas boiler Describe its construction and explain how it is maintained in an efficient condition (16)
2023/AUG/Q9 **2024/JUL/Q2**
Click Here to See the Answer

Q3. Explain the following briefly with reference to a domestic refrigeration system on board a ship
(a) Ingress of air into the freon system
(b) Loss of refrigerant from a condenser
(c) Water in the freon system
(d) Icing of condenser external surface (16)
2024/JUL/Q3
Click Here to See the Answer

Q4. (a) Sketch a water tight door and frame showing manner of attachment to bulkhead and the additional reinforcement carried by the bulkhead to compensate for the aperture (8)
(b) Explain how water tightness of the door and frame mating surface is

ensured with an hydrostatic pressure tending to force the laces apart (4)
(c) Describe the means of remote closing operation of the door and state how many closing stations there are and their position (4)
2024/JUL/Q4
Click Here to See the Answer

Q5. Sketch and explain the construction of a feed check valve Why is it known as double shut off arrangement (16)
2024/JUL/Q5
Click Here to See the Answer

Q6. With reference to auxiliary boiler water impurity define the effects of the following salts
(a) Calcium carbonate
(b) Sodium chloride
(c) Magnesium chloride
(d) Calcium sulphate Explain how the quantity of each is determined and controlled (16)
2024/JUL/Q6
Click Here to See the Answer

Q7. Write short notes on the following
(a) Ultrasonic testing (8)
(b) Shaft earthing device (8)
2024/JUL/Q7
Click Here to See the Answer

Q8. (a) Sketch a screw displacement pump and explain its operation (10)
(b) State the factors which affect its efficiency (6)
2024/JUL/Q8
Click Here to See the Answer

Q9. With reference to main air reservoirs

(a) Give a line sketch of the manner in which mountings are attached to the shell (6)
(b) Explain why regular internal inspection is advisable (4)
(c) What inspection and maintenance you will carry out on air reservoir (6)
2024/JUL/Q9
Click Here to See the Answer

AUGUST – 2024

Q1. (a) With a line diagram explain the working of the quick closing valve
(b) Why do you need the quick closing valves on the fuel and lube oil lines
(c) Explain how to reset the valve after a trial How is the periodic test carried out and what are the areas of concern that need special attention
2024/APR1/Q1 **2024/AUG/Q1**
Click Here to See the Answer

Q2. Write short notes on the following
(a) The need to monitor temperature of fuel in service tanks (4)
(b) The need to constantly monitor soundings of double bottom tanks (4)
(c) The importance of keeping bilges free of oil and other residues (4)
(d) The importance of ensuring proper ventilation of the engine room (4)
2024/AUG/Q2
Click Here to See the Answer

Q3. (a) With a diagram of the lubricating oil line explain the working of an automatic backflushing filter placed on the lubricating oil line of the main engine (10)
(b) List the main difference between such filter and a centrifugal separator
2024/APR1/Q3 **2024/AUG/Q3**
Click Here to See the Answer

Q4. (a) Describe TWO methods of tracing a superficial crack in a casting used as an engine component (8)
(b) Explain how propagation of a crack in a machinery component can be arrested (8)
2024/APR1/Q4 **2024/AUG/Q4**
Click Here to See the Answer

Q5. (a) How is the tensile strength of a metal determined What other information is obtained when a tensile test is made (8)
(b) Name the non-destructive tests used during the manufacture and

service of a diesel engine components and associated equipment's Give an example of where each test is used (8)
2024/MAR/Q5 **2024/APR1/Q5** **2024/AUG/Q5**
Click Here to See the Answer

Q6. Write short notes to explain the following fittings devices used in engine room and their applications
(a) Gear pump (5)
(b) Priming pump of emergency fire pump (5)
(c) PID controller (6)
2024/APR1/Q6 **2024/AUG/Q6**
Click Here to See the Answer

Q7. With reference to main air reservoirs
(a) Explain with line sketch the manner in which mountings are attached to the shell (6)
(b) Explain why regular internal inspection is advisable (4)
(c) What are the areas that need particular attention during the inspection and survey of a main air reservoir (6)
2024/APR1/Q7 **2024/JUL/Q9** **2024/AUG/Q7**
Click Here to See the Answer

Q8. With regard to the carriage of crude oil and its associated products
(a) Sketch an explosimeter suitable for testing pump rooms or tanks and give a brief description of the operation of this explosimeter (10)
(b) What periodic maintenance or checks are carried out on the P V breaker fitted on a tanker ship (6)
2024/APR1/Q8 **2024/AUG/Q8**
Click Here to See the Answer

Q9. (a) Sketch the engine room bilge system line diagram indicating the valves and the pumps that are part of the bilge system of a bulk carrier (6)
(b) What could be probable reasons for the designated engine room bilge pump to be incapable of taking suction from the bilge well (5)

(c) What are the options available to you as the watchkeeping engineer if the bilge pump fails to cope up with the flooding of the engine room (5) **2024/AUG/Q9**

Click Here to See the Answer

SEPTEMBER – 2024

Q1. (i) Discuss the use of nonmetals onboard ships and name some of the common nonmetals used (4)
(ii) What are their areas of application on ships (4)
(iii) Name the advantages and also the limitations in using nonferrous materials (8)
2023/MAY/Q2 **2024/SEP1/Q1**
Click Here to See the Answer

Q2. (a) Sketch a two-ram type hydraulic steering gear with a single electro hydraulic pumping unit Show the hunting gear arrangement and indicate valve positions (8)
(b) State the purpose of and describe the operation of
(i) Hydraulic shock buffer valves
(ii) Oil replenishing tank
(iii) Hunting gear (8)
2023/DEC/Q8 **2024/MAY2/Q2** **2024/SEP1/Q2**
Click Here to See the Answer

Q3. Explain how each of the following conditions contribute to the satisfactory performance of oil centrifuges
(a) Correct bowl speed (4)
(b) Cleanliness of bowl (4)
(c) Low rate of feed to bowl (4)
(d) Contaminated oil allowed to stand for an appreciable time prior to centrifuging (4)
2023/OCT/Q5 **2024/SEP1/Q3**
Click Here to See the Answer

Q4. Describe with the aid of suitable graph the discharge characteristics of a centrifugal pump Explain why it does not require a relief valve (16)
2024/MAY2/Q4 **2024/SEP1/Q4**
Click Here to See the Answer

Q5. With regard to a reciprocating refrigerator compressor
(a) Sketch the mechanical shaft seal showing its component parts and how it is lubricated
(b) Describe the sealing arrangement stating the materials used for the component parts (4)
(c) State the effect on the environment of the release of refrigerants into the atmosphere (4)
2024/MAY2/Q5 **2024/SEP1/Q5**
Click Here to See the Answer

Q6. (a) Sketch an auxiliary boiler blow down valve Explain how it differs from its shipside counterpart (10)
(b) Describe the sequence of blow down procedure (6)
2024/MAY2/Q6 **2024/SEP1/Q6**
Click Here to See the Answer

Q7. Submit a report to the Chief Engineer stating how the freshwater generator output onboard your ship was increased to near optimal values The report should specifically mention the adjustments corrections and improvements executed (16)
2024/MAY2/Q7 **2024/SEP1/Q7**
Click Here to See the Answer

Q8. (i) Sketch and describe a fuel system diagram for a 2 stroke marine diesel engine from storage service tank to fuel injectors Show the various components and fittings which are provided in the circuit What is the purpose of mixing columns and auto deaerating valve (16)
2023/MAY/Q6 **2024/SEP1/Q8**
Click Here to See the Answer

Q9. (a) Bunkering as a shipboard operation has its own significance List out the important aspects of a bunkering operation including the preparation and precaution to be taken to ensure a safe operation (8)

(b) What does the bunker specification include and how does it affect the engines adversely Name at least three such ingredients that you expect in a heavy fuel oil bunker and the effects on the engine operation (8)
2024/SEP1/Q9
Click Here to See the Answer

OCTOBER – 2024

Q1. With reference to rotary vane steering gears
(a) Describe with the aid of a sketch how such a unit incorporates an integral rudder carrier (10)
(b) Explain how vertical rudder movement is accommodated (6)
2024/MAY1/Q1 **2024/OCT/Q1**
Click Here to See the Answer

Q2. A main air compressor interstage air cooler has burst Put down a logical sequence of event that could have caused this accident Put down your analysis point by point and complete in technical detail (16)
2024/MAY1/Q2 **2024/OCT/Q2**
Click Here to See the Answer

Q3. A distinguishing feature of an eductor when compared to other pumps is the
(a) Discharge end being smaller than the suction end
(b) Small size of impeller
(c) Lack of moving parts
(d) Ease at which the wearing rings may be changed Briefly justify your answer (16)
2024/MAY1/Q3 **2024/OCT/Q3**
Click Here to See the Answer

Q4. Give an outline sketch of heavy fuel oil setting tank heating system and briefly explain the system Sketch only the low-pressure steam inlet upto condensate collection tank (16)
2024/MAY1/Q4 **2024/OCT/Q4**
Click Here to See the Answer

Q5. The auxiliary boiler of a ship periodically needs feed water and the rate of feed is gradually increasing every day without an increase in demand Suggest some causes for such a happening (16)
2024/MAY1/Q5 **2024/OCT/Q5**
Click Here to See the Answer

Q6. Write short notes on the following
(a) Need to ensure that DO service tanks are not heated beyond a certain temperature (4)
(b) Importance of the level of the FW compensating tank for jacket cooling of main engines as an indicator of impending trouble (4)
(c) Need to check remote stop of all FO installations regularly (4)
(d) Necessity for a proper check of all engine room parameters before taking over of watch (4)
2024/MAY1/Q6 **2024/OCT/Q6**
Click Here to See the Answer

Q7. The byproducts of oxidation as a result of water contamination of hydraulic oil are generally
(a) Removed by cellulose type filters
(b) Gums varnishes and acids
(c) Always neutralized by oil additives
(d) Harmless and have no effect on system components Briefly justify your answer (16)
2024/MAY1/Q7 **2024/OCT/Q7**
Click Here to See the Answer

Q8. Explain the following terms and give examples of where each condition might occur (a) Stress corrosion cracking (6)
(b) Creep cracking (5)
(c) Corrosion fatigue (5)
2023/DEC/Q6 **2024/MAY1/Q8** **2024/OCT/Q8**
Click Here to See the Answer

Q9. (a) Whilst on seawatch you observe that the oil mist detector OMD in the engine room has triggered an alarm and in feeling the crankcase doors on the bottom platform you find that the unit in question feels warmer than the rest What pre emptive action will you take as watchkeeper to bring the situation under control (10)
(b) Draw a simple line diagram of an OMD and explain its working (6)
2023/DEC/Q4 **2024/MAY1/Q9** **2024/OCT/Q9**
Click Here to See the Answer

NOVEMBER – 2024

Q1. (a) What are the different types of coupling bolts used in practice Name at least 3 (3)
(b) Explain with the help of sketch as to how a pilgrim hydraulic bolt is fitted and removed (8)
(c) How are fitted bolts installed on the coupling (5)
2023/DEC/Q1 **2024/NOV/Q1**
Click Here to See the Answer

Q2. (a) Explain the working principle of a fuel oil purifier (8)
(b) Explain briefly the significance of the friction clutch mechanism (4)
(c) List the alarms and trips associated with a purifier (4)
2024/JUN/Q2 **2024/NOV/Q2**
Click Here to See the Answer

Q3. Which of the materials listed is used as the dynamic seal material on mechanical seals installed on most centrifugal pumps used in water service
(a) Copper
(b) Copper and carbon
(c) Carbon
(d) Bronze Briefly justify your answer (16)
2024/JUN/Q3 **2024/NOV/Q3**
Click Here to See the Answer

Q4. (a) Sketch and describe a central cooling fresh water system for a motor ship (8)
(b) State the possible causes of corrosion in the closed system described in (a) (4)
(c) Explain how protections against corrosion is provided (4)
2024/JUN/Q4 **2024/NOV/Q4**
Click Here to See the Answer

Q5. (a) State why the presence of oil in boiler water is considered serious
(b) Suggest likely sources of oil contamination (4)
(c) Describe how the source is traced (4)
(d) Describe how the whole steam plant is restored to oil free conditions
2024/JUN/Q5 **2024/NOV/Q5**
Click Here to See the Answer

Q6. Describe the following metallurgical tests and explain why EACH is carried out (a) Impact test (4)
(b) Hardness test (4)
(c) Endurance test (4)
(d) Tensile test (4)
2024/JUN/Q6 **2024/NOV/Q6**
Click Here to See the Answer

Q7. If a radial piston hydraulic pump fails to deliver rated fluid volume the cause can be (a) Contaminated fluid (b) Pitted thrust rings (c) Worn pintle bearings (d) Obstructed suctions passage Briefly justify your answer (16)
2024/JUN/Q7 **2024/NOV/Q7**
Click Here to See the Answer

Q8. Write short notes on the following (a) Incinerators (5)
(b) Air line relief valve (5)
(c) Mixing column (6)
2024/JUN/Q8 **2024/NOV/Q8**
Click Here to See the Answer

Q9. (a) Make a detailed sketch of a direct expansion two room refrigeration system (10)
(b) Give a full description of such a refrigeration system explaining the purpose of the relevant control and safety devices (6)
2024/JUN/Q9 **2024/NOV/Q9**
Click Here to See the Answer

DECEMBER – 2024

Q1. (a) How does fouling affect the performance of a heat exchanger (4)
(b) Describe the types of plugs used to plug the ends of a leaky heat exchanger tubes (6)
(c) What is a differential pressure gauge Where is it used (6)
2024/MAR/Q1 **2024/DEC1/Q1**
Click Here to See the Answer

Q2. (a) Why are centrifugal pumps used for the sea and cooling water services with marine diesel engines What are their drawbacks (6)
(b) What do you understand by the term pump characteristics (6)
(c) What is net positive suction head (4)
2024/MAR/Q2 **2024/DEC1/Q2**
Click Here to See the Answer

Q3. (a) With a sketch of the fuel line diagram explain the bunkering process and the checks to be undertaken before during and after completion of the bunkering operation (10)
(b) What are the safety features of the fuel line (6)
2024/MAR/Q3 **2024/DEC1/Q3**
Click Here to See the Answer

Q4. (a) Explain the function of an eductor with the aid of a sketch Where do you find an eductor system on a ship Give two examples (8)
(b) Explain the working principle of an eductor What are the operational challenges that may affect the performance of the eductor (8)
2024/MAR/Q4 **2024/DEC1/Q4**
Click Here to See the Answer

Q5. (a) How is the tensile strength of a metal determined What other information is obtained when a tensile test is made (8)
(b) Name the non-destructive tests used during the manufacture and service of diesel engine components and associated equipment Give an

example of where each test is used (8)
2024/MAR/Q5 **2024/APR1/Q5** **2024/AUG/Q5** **2024/DEC1/Q5**
Click Here to See the Answer

Q6. Write short notes to explain the following fittings devices used in engine room and their applications
(a) Gate valve
(b) Butterfly valve
(c) Quick closing valve
(d) Valve actuators (16)
2024/MAR/Q6 **2024/DEC1/Q6**
Click Here to See the Answer

Q7. Sketch and describe how the torque is transmitted to the rudder stock in a rotary vane steering gear (16)
2024/MAR/Q7 **2024/DEC1/Q7**
Click Here to See the Answer

Q8. With reference to marine boiler operation answer the following
(a) What do you understand by accumulation of pressure test Explain (8)
(b) Why is a boiler water circulating pump required for ships fitted with an exhaust gas economiser Explain with a line diagram (8)
2024/DEC1/Q8
Click Here to See the Answer

Q9. Explain any four of the following
(a) Difference between crude oil washing and tank cleaning (4)
(b) Dynamic positioning system and its types (4)
(c) Deaeration tank in HT jacket cooling water system (4)
(d) Thermostatic expansion valve (4)
(e) Proportional controller with examples (4)
2024/MAR/Q9 **2024/DEC1/Q9**
Click Here to See the Answer