



D. MARINE
Study Material

MEO CLASS 4

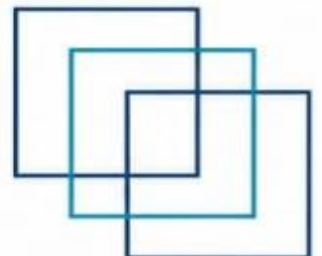
WRITTEN: EKG

(ENGINEERING KNOWLEDGE GENERAL)

FOR INDIAN COMPETENCY EXAM

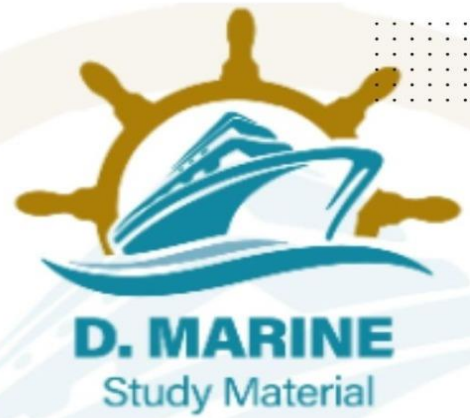


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JANUARY - 2026

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** **2025/FEB/Q1** **2026/JAN/Q1**

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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 (8)
(b) Describe the system (8)

2024/SEP2/Q3 **2025/APR1/Q3** **2026/JAN/Q2**

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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** **2025/FEB/Q3** **2026/JAN/Q3**

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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** **2025/FEB/Q4** **2026/JAN/Q4**

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Q5) (a) How is the tensile strength of a metal determined? What other information is obtained when a tensile test is made? (8)



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(b) Name the non-destructive tests used during the manufacture and service of a diesel engine component and associated equipment's. Give an example of where each test is used. (8) **

2024/MAR/Q5 **2024/APR1/Q5** **2024/AUG/Q5** **2024/DEC1/Q5**
2025/FEB/Q5 **2025/JUN/Q5** **2026/JAN/Q5**

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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** **2025/FEB/Q6** **2026/JAN/Q6**

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Q7) Write short notes on the following:

- (a) Need for draining F. O. Services tanks regularly (4)
- (b) Need to ensure engine control room temperature is correctly maintained (4)
- (c) Need to ensure that service air is kept dry by all means (4)
- (d) To ensure that all guard rails are in place properly secured in the engine room (4)

2024/MAY2/Q8 **2025/FEB/Q7** **2025/MAR/Q8** **2026/JAN/Q7**

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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** **2025/FEB/Q8** **2026/JAN/Q8**

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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 **2024/SEP2/Q9** **2025/FEB/Q9** **2025/APR1/Q9**

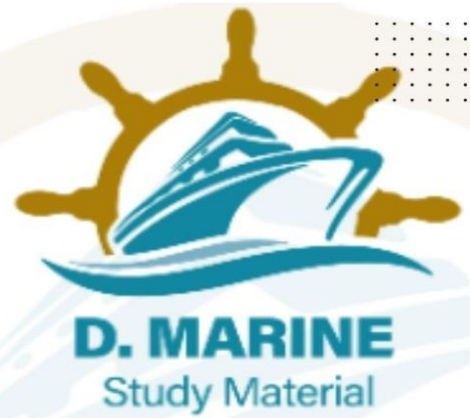
2026/JAN/Q9

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FEBRUARY - 2026

- Q1) (a) Using a line diagram, show the arrangement of 'emergency bilge suction' for a general cargo ship (8)
(b) State the purpose of 'bilge injection valve' and to which pump or pumps it is connected. Give reasons. (4)
(c) State requirements with respect to the dimensions of the bilge injection valve and the main sea suction valve on the sea chest. (4)

2023/NOV/Q7 **2024/APR2/Q1** **2025/JAN2/Q1** **2026/FEB/Q1**

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- Q2) (a) What are the advantages and disadvantages of the single-coil type and the straight-tube type of inter-cooler for air compressor? (10)
(b) Why are the tubes and coils generally made of copper? (6)

2024/APR2/Q2 **2025/JAN2/Q2** **2026/FEB/Q2**

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- Q3) (a) With the aid of a sketch describe the working of a shell and tube type freshwater 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 **2025/JAN2/Q3** **2026/FEB/Q3**

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- Q4) (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)

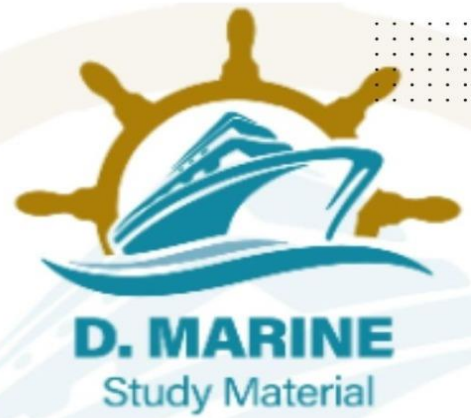
2024/APR2/Q4 **2025/JAN2/Q4** **2026/FEB/Q4**

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- Q5) (a) In the context of auxiliary boiler. Explain what do you understand by the term 'foaming'. List the measures you would consider to prevent it? Is it different from 'priming' in the auxiliary boiler context? (6)



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(b) Explain any one of the following with a sketch. (6)

(i) Composite boiler

(ii) Exhaust gas economiser

(c) What is the significance of 'de-aeration' of the boiler water? How is it achieved and what are the effects if ignored? (4)

2025/JAN2/Q5 **2026/FEB/Q5**

[Click Here to See the Answer](#)

Q6) Write short notes to explain the following fittings/devices used in engine room, and their applications: (16)

(a) Low sea suction

(b) Fretting corrosion

(c) Caustic embrittlement

(d) Air starting motor

2024/APR2/Q6 **2025/JAN2/Q6** **2026/FEB/Q6**

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Q7) (a) Sketch a four-ram steering gear arrangement capable of 100% redundancy. (8)

(b) Describe the operation of the arrangement sketched in (a). (8)

2024/APR2/Q7 **2025/JAN2/Q7** **2025/SEP/Q7** **2026/FEB/Q7**

[Click Here to See the Answer](#)

Q8) (a) Sketch a line diagram showing a typical 'Inert Gas System' used for inerting the cargo tanks of oil tankers, labelling the component parts (8)

(b) Describe the system (8)

(c) State what oxygen content you would expect in the flue gases if good combustion is achieved

2024/JAN/Q2 **2024/APR2/Q8** **2025/JAN2/Q8** **2025/OCT/Q2**

2026/FEB/Q8

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Q9) (a) Sketch a nozzle/flapper device used for the generation of a pneumatic signal, labelling the component parts (10)



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(b) Describe the operation of the device in (a) above (6)

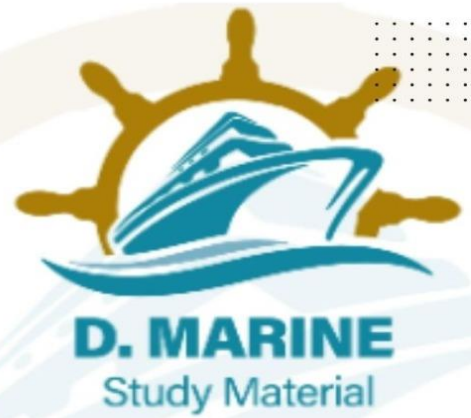
2024/APR2/Q9 **2025/JAN2/Q9** **2026/FEB/Q9**

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MARCH - 2026

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 2024/NOV/Q1 2025/APR2/Q1

2025/SEP/Q1 2026/MAR/Q1

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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 2025/APR2/Q2 2026/MAR/Q2

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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? (16)

(a) Copper.

(b) Copper and carbon.

(c) Carbon.

(d) Bronze.

Briefly justify your answer.

2024/JUN/Q3 2024/NOV/Q3 2025/APR2/Q3 2026/MAR/Q3

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Q4. (a) Sketch and describe a central cooling fresh system for a motor ship.

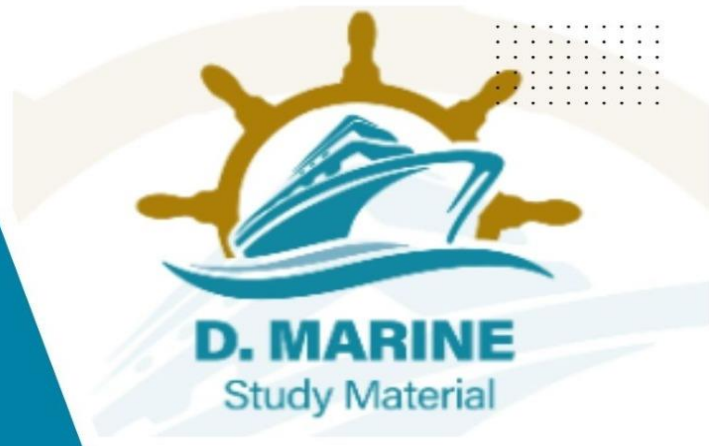
(b) State the possible causes of corrosion in the closed system described in (a). (4)

(c) Explain how protections against corrosion is provided? (4)

2024/JUN/Q4 2024/NOV/Q4 2025/APR2/Q4 2026/MAR/Q4



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- 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** **2025/APR2/Q5** **2026/MAR/Q5**

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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** **2025/APR2/Q6** **2026/MAR/Q6**

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Q7. If a radial piston hydraulic pump fails to deliver rated fluid volume, the cause can be (16)

- (a) Contaminated fluid
(b) Pitted thrust rings
(c) Worn pintle bearings
(d) Obstructed suction passage

Briefly justify your answer.

2024/JUN/Q7 **2024/NOV/Q7** **2025/APR2/Q7** **2026/MAR/Q7**

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Q8. Write short notes on the following:

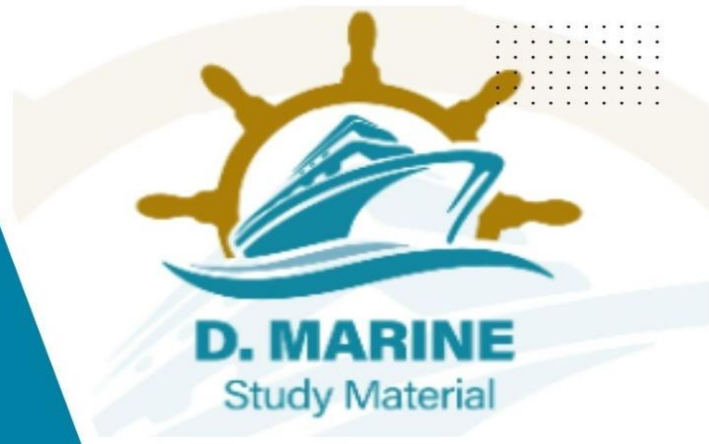
- (a) Incinerators (5)
(b) Airline relief valve (5)
(c) Mixing column (6)

2024/JUN/Q8 **2024/NOV/Q8** **2025/APR2/Q8** **2026/MAR/Q8**

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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)

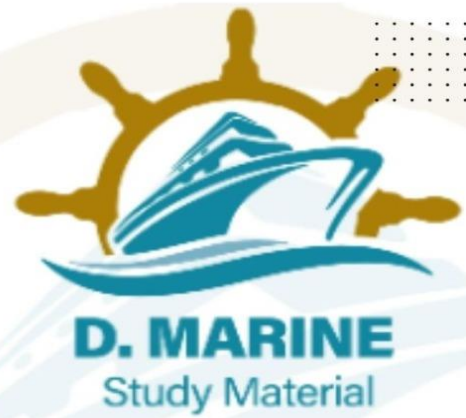
2024/JUN/Q9 **2024/NOV/Q9** **2025/APR2/Q9** **2026/MAR/Q9**

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APRIL - 2026

- Q1) (a) Describe the constructional features of plate type freshwater generator and its operational procedures for freshwater 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)

2022/JUL/Q2 **2022/NOV/Q2** **2023/APR/Q2** **2024/FEB/Q6**
2024/APR1/Q2 **2024/SEP2/Q1** **2024/DEC2/Q6** **2025/FEB/Q2**
2026/APR/Q1

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- Q2. State the causes and remedial actions to be taken in case of the following detected on a reciprocating air compressor: (a) Water mixed in the crankcase oil (4) (b) L.P. safety valve blowing (4)
(c) Bursting disc rupture (4)
(d) Defective piston rings (4)

2024/SEP2/Q2 **2026/APR/Q2**

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- Q3. (a) Sketch a line diagram showing a typical 'Inert Gas System' used for inerting the cargo tanks of oil tankers, labelling the component parts (8)
(b) Describe the system (8)

2024/SEP2/Q3 **2026/APR/Q3**

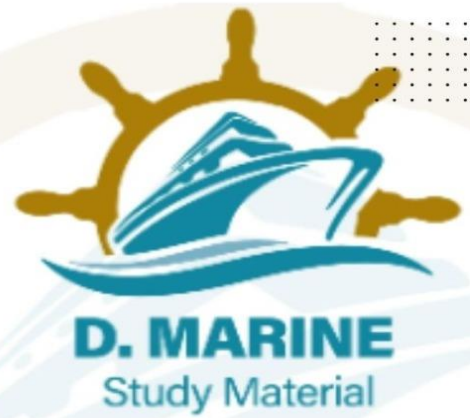
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- Q4) A distinguishing feature of an eductor, when compared to other pumps, is the (16)

- (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.



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2024/MAY1/Q3 **2024/SEP2/Q4** **2024/OCT/Q3** **2025/APR1/Q4**
2026/APR/Q4

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Q5. (a) Whilst on 'Sea watch' 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 Watch-keeper to bring the situation under control (10)

(b) Draw a simple line diagram of a 'OMD' and explain its working (6)

2023/DEC/Q4 **2024/MAY1/Q9** **2024/SEP2/Q5** **2024/OCT/Q9**
2025/APR1/Q5 **2026/APR/Q5**

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Q6. With reference to control system explain in brief,

a) Two step action. (6)

b) Proportional control. (5)

c) Offset. (5)

2023/AUG/Q5 **2024/JAN/Q1** **2024/SEP2/Q6** **2025/APR1/Q6**
2026/APR/Q6

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Q7. (a) Why Engineering Materials are tested prior manufacturing of their components. (6)

(b) Describe the various 'destructive' and 'non-destructive' tests carried out on materials for shipboard used. Explain the purpose of each test and where the same applied. (10)

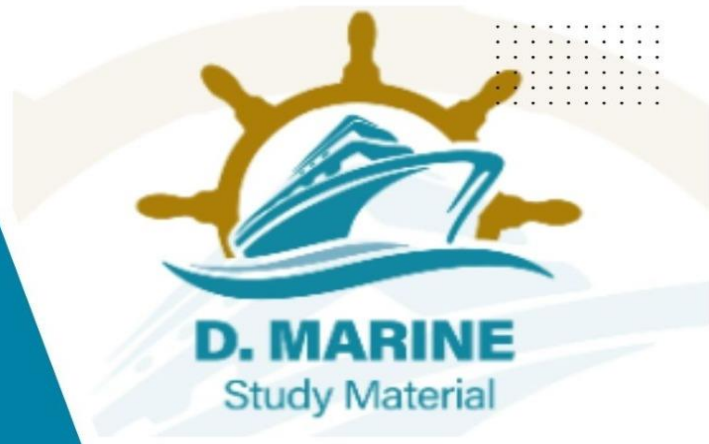
2023/FEB/Q1 **2024/JAN/Q3** **2024/SEP2/Q7** **2025/APR1/Q7**
2026/APR/Q7

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Q8. (a) Explain 'short cycling' in the context of refrigeration and air conditioning systems onboard ship. State its causes and how it can be avoided. (6)



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(b) State the symptoms of 'overcharging' and 'undercharging' in refrigeration system. What are its effects and state remedial measures (5)
(c) What are the visible indicators of oil in refrigeration system. What would be its effects? State remedial measures (5)

2023/FEB/Q7 **2024/SEP2/Q8** **2025/APR1/Q8** **2026/APR/Q8**

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Q9) Write short notes on: (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 **2024/SEP2/Q9** **2025/FEB/Q9** **2025/APR1/Q9**
2026/APR/Q9

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