

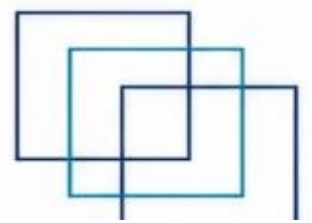


# MEO CLASS 4

# WRITTEN: EKM

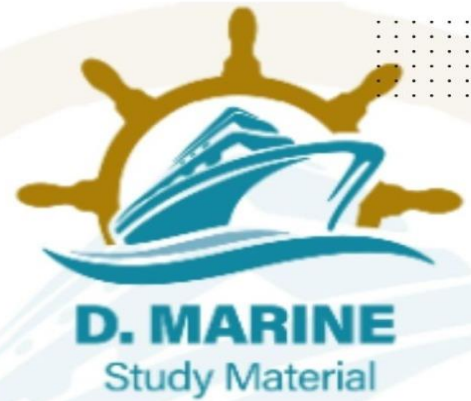
(ENGINEERING KNOWLEDGE MOTOR)

FOR INDIAN COMPETENCY EXAM





www.dmarinestudy.com



## JANUARY - 2024

- Q1. (a) Sketch a main engine jacket water cooling system (8)  
(b) State why chemical treatment of such system is necessary (4)  
(c) What tests are carried out to ascertain the level of the concentration of the chemicals in the jacket cooling water system (4)

**2023/AUG/Q2** **2024/JAN/Q1**

[Click Here to See the Answer](#)

- Q2. (a) Describe with suitable sketches how lubricating oil is conveyed to top end bottom end and main bearings in a large bore slow speed engine  
(b) List the causes leading to sudden loss of lubricating oil pressure in the engine (6)

**2023/AUG/Q6** **2024/JAN/Q2**

[Click Here to See the Answer](#)

- Q3. (a) What is the function of charge air cooler on 2 stroke diesel engine  
(b) Draw diagrammatic sketch of charge air cooler Describe each part (8)  
(c) How the efficiency of charge air cooler can be checked (4)

**2023/JULY/Q4** **2024/JAN/Q3**

[Click Here to See the Answer](#)

- Q4. (a) By drawing a block diagram describe how on a large 2 stroke marine diesel engine fuel quantity and timing is controlled (8)  
(b) What are disadvantages of VIT system (4)  
(c) What actions are required in case of VIT system failure (4)

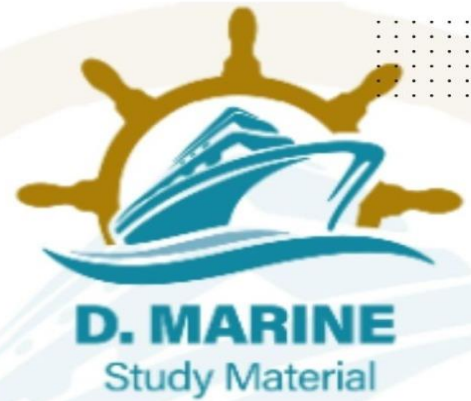
**2023/JULY/Q8** **2024/JAN/Q4**

[Click Here to See the Answer](#)

- Q5. (a) In modern electronic type 2 stroke main engines which components are replaced by electronic equivalents (8)  
(b) Describe by drawing a simple sketch fuel injection system on electronic type engine (6)



www.dmarinestudy.com



(c) How fuel is injected at right moment in electronic type engine (2)

**2024/JAN/Q5**

[Click Here to See the Answer](#)

Q6. (a) With help of a diagrammatic sketch describe feed water system for the boiler (8)

(b) What is the function of the cascade tank or hot well (4)

(c) Why the water in the hot well is kept heated What is the temperature of hot well normally maintained and how (4)

**2024/JAN/Q6**

[Click Here to See the Answer](#)

Q7. (a) Draw diagrammatic sketch describing each part of thrust block (8)

(b) Describe how propeller thrust is transmitted to hull (4)

(c) How to measure thrust clearances on the block (4)

**2024/JAN/Q7**

[Click Here to See the Answer](#)

Q8. (a) Draw lubricating oil piping diagram with all fittings for a trunk type 4 stroke diesel engine (8)

(b) What properties are required for a lubricating oil used in a 4 stroke diesel engine (4)

(c) What is the effect on lubricating oil due to various contaminants during operation of engine (4)

**2024/JAN/Q8**

[Click Here to See the Answer](#)

Q9. For 2 stroke marine diesel engine (a) Describe problems in achieving good lubrication of cylinder liner (6)

(b) What are the properties of good cylinder oil (4)

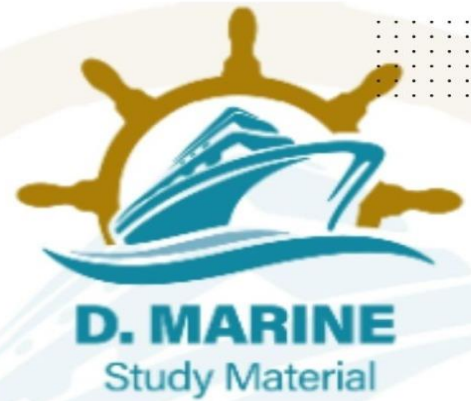
(c) What are the consequences of under and over lubrication of liner (6)

**2023/NOV/Q7** **2024/JAN/Q9**

[Click Here to See the Answer](#)



www.dmarinestudy.com



## FEBRUARY - 2024

- Q1. (a) Describe the procedure for taking crankshaft deflection of Auxiliary Engine explaining all precautions that must be observed (8)  
(b) Explain what deflection readings actually mean and suggest the action which must be taken should readings be outside values recommended by the engine manufacturer (8)

**2023/SEP/Q5** **2024/FEB/Q1**

[Click Here to See the Answer](#)

- Q2. (a) Describe in detail a four stroke cycle Why it is called so (5)  
(b) Draw 4 stroke engine cycle with crank position of each stroke (6)  
(c) What is scavenging Show the scavenging step in the cycle diagram what is its importance (5)

**2023/MAY2/Q1** **2023/JUN/Q1** **2023/SEP/Q1** **2024/FEB/Q2**

[Click Here to See the Answer](#)

- Q3. Describe following terms with respect to diesel engine with suitable diagram (a) Natural aspiration (4)  
(b) Scavenging (4)  
(c) Supercharging (4)  
(d) Types of supercharging in two stroke engine (4)

**2023/MAY2/Q2** **2023/SEP/Q2** **2024/FEB/Q3**

[Click Here to See the Answer](#)

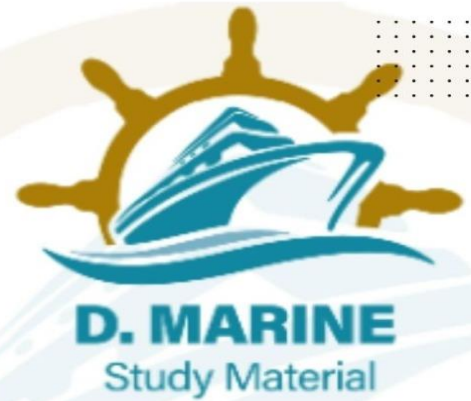
- Q4. With reference to lubricating oil (a) Explain why oil employed in the crankcase of a trunk piston engine differs in its properties from that employed in the crankcase of a crosshead engine (6)  
(b) List FOUR effects of bacterial attack on crankcase oil (6)  
(c) Explain the action which must be taken if bacterial attack of the crankcase oil is detected (4)

**2023/SEP/Q4** **2024/FEB/Q4**

[Click Here to See the Answer](#)



www.dmarinestudy.com



Q5. (a) What is the definition of the following terms (i) Indicated power (ii) Specific fuel oil consumption (iii) Brake power (iv) Mechanical efficiency (v) Thermal efficiency (6)  
(b) What is an indicator diagram of diesel engine Draw a diagram and show different points related to diesel engine power measurement (6)

**2023/SEP/Q7** **2024/FEB/Q5**

[Click Here to See the Answer](#)

Q6. Explain how leakage of the undermentioned valves may become apparent to watchkeepers and state the effects on engine operation Describe the immediate and subsequent action which might be necessary in each case (a) Exhaust valve (b) Fuel valve (c) Air starting valve (16)

**2024/FEB/Q6**

[Click Here to See the Answer](#)

Q7. Make a report to the Chief Engineer of your vessel about malfunctioning of low lube oil pressure alarm for the auxiliary engine observed during your watch with special emphasis on the possible consequences (16)

**2023/MAY1/Q2** **2023/OCT/Q4** **2024/FEB/Q7**

[Click Here to See the Answer](#)

Q8. (a) Describe crankcase oil mist detector and the principle of its operation (8)

(b) Draw crankcase explosion relief door and name the parts State pressure setting of the door (8)

**2023/MAY1/Q4** **2023/OCT/Q7** **2024/FEB/Q8**

[Click Here to See the Answer](#)

Q9. With reference to an auxiliary diesel engine (a) Explain how a crankcase explosion may occur (4)

(b) Identify the indications of poor combustion (4)

(c) State FOUR reasons for poor combustion (4)

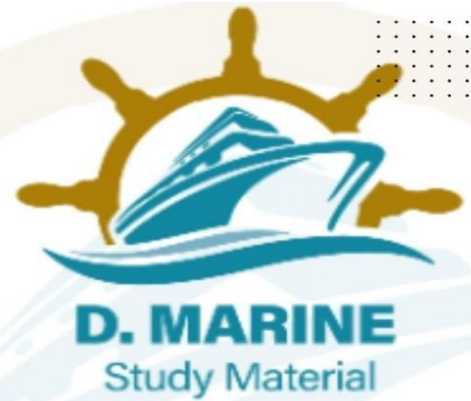
(d) Describe the effects on engine condition and maintenance by allowing poor combustion to continue (4)

**2023/MAY1/Q3** **2023/OCT/Q5** **2024/FEB/Q9**

[Click Here to See the Answer](#)



www.dmarinestudy.com



## MARCH - 2024

Q1. (a) With the help of simple diagram explain Variable Injection Timing VIT (8)

(b) Explain with suitable diagram start and end of VIT points (4)

(c) Explain with graph variation of  $P_{max}$  with VIT position (4)

**2023/MAY1/Q9** **2024/MAR/Q9**

[Click Here to See the Answer](#)

Q2. (a) Draw sectional diagram of main engine piston showing each part Show cooling passages for oil cooled piston (12)

(b) Name the different materials used for the various components of the piston as indicated to the answer above (4)

**2024/MAR/Q2**

[Click Here to See the Answer](#)

Q3. (a) Explain why it is important to measure bearing clearances in a diesel engine (4)

(b) What is bridge gauge How is the bridge gauge used Explain with a diagram (6)

(c) What are other recommended methods for checking bearing clearances

**2023/NOV/Q3** **2024/MAR/Q3**

[Click Here to See the Answer](#)

Q4. Describe following terms with respect to diesel engine with suitable diagram (a) Piston stroke (4)

(b) Swept volume (4)

(c) Clearance volume (4)

(d) Compression ratio (4)

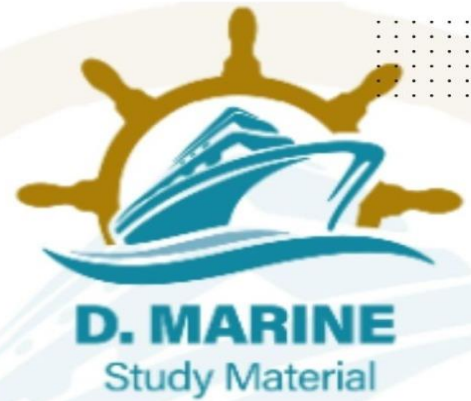
**2023/NOV/Q1** **2024/MAR/Q4**

[Click Here to See the Answer](#)

Q5. (a) What is an exhaust gas economizer Draw diagrammatic sketch of exhaust gas economizer naming each component (8)



www.dmarinestudy.com



(b) How is steam generation controlled in exhaust gas economizers (4)

(c) Briefly describe procedure to maintain efficiency of such an EGE (4)

**2023/NOV/Q4** **2024/MAR/Q5**

[Click Here to See the Answer](#)

Q6. If an auxiliary diesel generator over speeds while off load explain (a)  
How can the engine be stopped (6)

(b) What are the probable reasons for the failure (4)

(c) Give details of the checks that are required to be made after the engine has been stopped with regard to (i) Mechanical checks (ii) Electrical checks

**2024/MAY1/Q6** **2023/OCT/Q9** **2024/MAR/Q6**

[Click Here to See the Answer](#)

Q7. (a) In a 4 stroke engine describe each of the different strokes of the cycle (6)

(b) Draw 4 stroke timing diagram describing the complete cycle Explain how each stroke is completed with action of crank travel and the inlet exhaust valves (10)

**2024/MAR/Q7**

[Click Here to See the Answer](#)

Q8. (a) With a aid of a sketch briefly describe the important structural parts of 2 stroke main engine How are different structural parts held together

(b) What is the function of cross head guides (6)

**2023/MAY1/Q7** **2024/MAR/Q8**

[Click Here to See the Answer](#)

Q9. (a) Sketch and describe the starting air system of main engine (8)

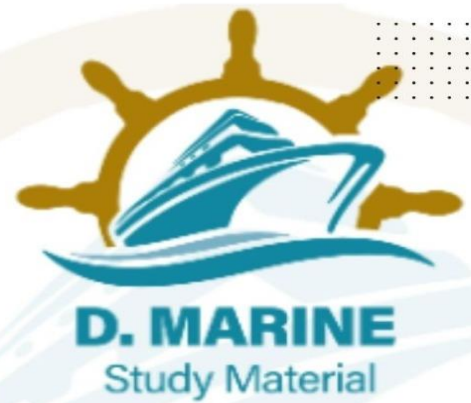
(b) What are the safety interlocks provided in compressed air starting system of main engine (8)

**2023/SEP/Q8** **2023/DEC/Q1** **2024/MAR/Q9**

[Click Here to See the Answer](#)



www.dmarinestudy.com



## APRIL - 2024

Q1. The main requirements which a fuel injection system must fulfil are (a) Accurate metering of small amount of fuel oil (b) Control of quality of fuel injection (c) Proper timing of the fuel injection (d) Selective distribution of the fuel in the combustion space State whether each of the points made above are true or false with reasons (16)

**2024/APR1/Q1**

[Click Here to See the Answer](#)

Q2. (a) Explain the advantages of fitting highly rated medium speed engines with double exhaust and air inlet valves (6)

(b) State the disadvantages of double valve arrangements (4)

(c) Explain the possible causes of persistent burning of exhaust valves if it is (i) General to most cylinders (3) (ii) Specific to a single cylinder (3)

**2024/APR1/Q2**

[Click Here to See the Answer](#)

Q3. (a) Describe means of recognizing deterioration of the lubricating oil (b) Describe how lubricating oil is conveyed to top end bottom end and main bearing in large bore 2 stroke crosshead type slow speed diesel engine (8)

**2024/APR1/Q3**

[Click Here to See the Answer](#)

Q4. (a) State the different types of turbocharger fitted in modern diesel engines (8)

(b) Describe the function of the (i) Nozzle ring (ii) Labyrinth seals (iii) Diffuser (iv) Inducer (8)

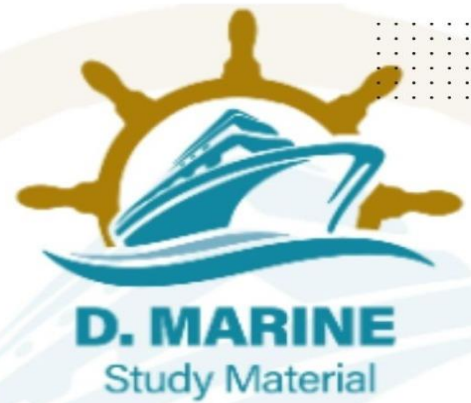
**2024/APR1/Q4**

[Click Here to See the Answer](#)

Q5. Discuss the consequences of failure to maintain correct clearances in the case of auxiliary diesel engine crankshaft and bottom end bearing



www.dmarinestudy.com



Describe the procedure of taking crankshaft deflection (16)

**2024/APR1/Q5**

[Click Here to See the Answer](#)

Q6. (a) Describe with the aid of a sketch a charge air cooler (10)

(b) State why it is necessary to maintain correct charge air temperature (6)

**2024/APR1/Q6**

[Click Here to See the Answer](#)

Q7. (a) Describe with the aid of a sketch a main engine cylinder relief valve

(b) List four conditions which may cause the valves sketched in (a) to lift

**2024/APR1/Q7**

[Click Here to See the Answer](#)

Q8. (a) What do you understand by Specific Fuel Oil Consumption Give some examples of SFOC for a two stroke engine and the auxiliary engines

(b) Explain the terms (i) Flash point (ii) Pour point (iii) Calorific value (iv) CCAI value (v) Octane number (vi) Cetane number (10)

**2024/APR1/Q8**

[Click Here to See the Answer](#)

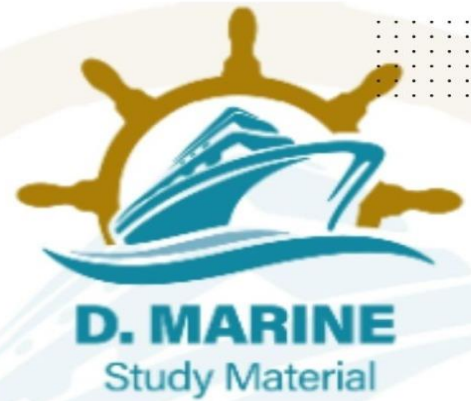
Q9. Compare the desirable qualities of the lubricating oil selected for each of the following duties (a) Auxiliary diesel engines (b) Stern tube bearings (c) Refrigeration compressors (d) Gear case of purifier Give reason for the differing properties of the oils recommended for these four purposes (16)

**2022/AUG/Q1** **2023/MAY1/Q1** **2023/OCT/Q1** **2024/APR1/Q9**

[Click Here to See the Answer](#)



www.dmarinestudy.com



## MAY - 2024(PART-1)

Q1. Efficient smooth combustion depends upon some or all of the following  
(a) A sufficiently high temperature to effect ignition (b) A large delay period or ignition lag (c) A minimum of after burning (d) A large and rapid rate of pressure rise during the second stage of combustion (e) Rapid heat losses to the walls Give the correct answer with adequate justification (16)

**2024/MAY1/Q1**

[Click Here to See the Answer](#)

Q2. (a) Write a letter to the company Technical Manager stating with reasons why the fuel bunkered in the last port is of very poor quality (10)  
(b) Briefly describe the mitigatory measures that can be taken to reduce the impact of poor bunker quality (6)

**2024/MAY1/Q2**

[Click Here to See the Answer](#)

Q3. (a) What are the different types of crankshaft used in marine diesel engines (10)  
(b) Discuss the various factors affecting the failure of crankshafts in marine diesel engine (6)

**2024/MAY1/Q3**

[Click Here to See the Answer](#)

Q4. With reference to a 2 stroke slow speed main propulsion engine air starting system (a) State with reasons three safety features incorporated in an air starting system (8)

(b) State with reason why an engine may fail to turnover on air (8)

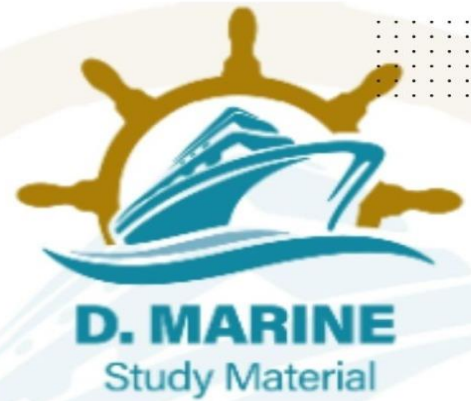
**2024/APR2/Q2 2024/MAY1/Q4**

[Click Here to See the Answer](#)

Q5. Sketch and describe an independent two stage air compressor Draw a set of typical indicator diagrams and insert the various pressures and temperatures Indicate the effect of a leaking HP suction valve and excessive



www.dmarinestudy.com



HP clearance volume (16)

**2024/MAY1/Q5**

[Click Here to See the Answer](#)

Q6. (a) How does a modern 4 stroke medium speed marine diesel engine exhaust valve spindle rotate (8)

(b) What happens if the tappet clearance between the rocker arm tappet and the exhaust valve stem is too large (8)

**2024/MAY1/Q6**

[Click Here to See the Answer](#)

Q7. Sketch and describe a device employed for continuous monitoring of the viscosity of heavy fuel oil being supplied to a main engine (16)

**2024/MAY1/Q7**

[Click Here to See the Answer](#)

Q8. (a) With the aid of a block diagram describe the operation of an electronic governor fitted to an auxiliary diesel engine (10)

(b) State the reasons for fitting a droop governor to a diesel generator (6)

**2024/MAY1/Q8**

[Click Here to See the Answer](#)

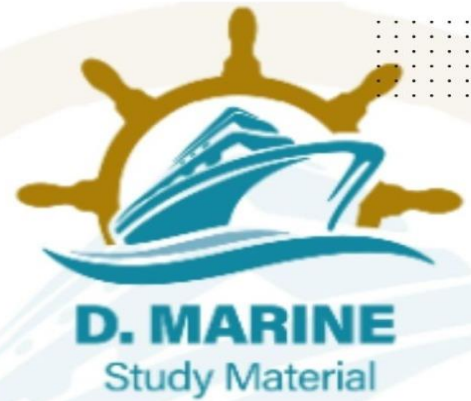
Q9. Make a diagrammatic sketch of a jacket cooling water system as applied to a group of medium speed auxiliary diesel engine. Indicate the temperatures and pressures in the system. Describe in particular the flow of water from entry to the engine to the outlet from the engine and sketch the more important joints in the system (16)

**2024/MAY1/Q9**

[Click Here to See the Answer](#)



www.dmarinestudy.com



## MAY - 2024(PART-2)

Q1. The main requirements which a fuel injection system must fulfil are  
(a) Accurate metering of small amount of fuel oil  
(b) Control of quality of fuel injection  
(c) Proper timing of the fuel injection  
(d) Selective distribution of the fuel in the combustion space Analyse each of the above statements and state whether they are true or false with a brief reasoning (16)

**2024/APR1/Q1** **2024/MAY2/Q1**

[Click Here to See the Answer](#)

Q2. The cylinder liner of one of the units is cracked inspite of the engine having logged only 300 hours since last overhaul Make a report of what you feel could be the cause of this mishap (16)

**2024/MAY2/Q2**

[Click Here to See the Answer](#)

Q3. (a) Briefly explain the construction and functions of a bedplate in a slow speed marine diesel engine (8)  
(b) How is the bedplate fastened to the hull structure (4)  
(c) What is the function of the tie rod in a slow speed 2 stroke engine (4)

**2024/MAY2/Q3**

[Click Here to See the Answer](#)

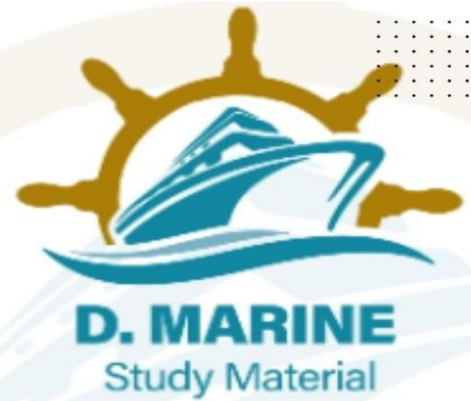
Q4. An auxiliary engine under load continuously fluctuates even with a steady load The fault you diagnose could be owing to  
(a) The quality of fuel  
(b) The quality of servicing of the governor in the last port  
(c) The supply of charge air  
(d) The overhaul of fuel injectors done in the last decarbonisation Give a brief explanation as to why each of the above mentioned points either could be true or cannot at all be the reasons for such a fluctuation (16)

**2024/APR2/Q1** **2024/MAY2/Q4**

[Click Here to See the Answer](#)



www.dmarinestudy.com



- Q5. (a) Why exhaust outlet of marine diesel engine turbocharger is lower than inlet temperature (6)  
(b) Why do we need an air cooler and why is the scavenge air temperature maintained at 40°C (10)

**2024/MAY2/Q5**

[Click Here to See the Answer](#)

- Q6. (a) (i) Describe with the aid of a sketch a main engine exhaust valve which is hydraulically operated (8)  
(ii) Explain the operation of this valve (4)  
(b) State the materials used for the seat and valve described in (a) (4)

**2024/APR2/Q8 2024/MAY2/Q6**

[Click Here to See the Answer](#)

- Q7. (a) Why do you need an over speed trip despite a governor being fitted to a marine diesel engine (8)  
(b) With respect to an auxiliary engine governor what is the significance of  
(i) The load limit knob (ii) The compensation (8)

**2024/MAY2/Q7**

[Click Here to See the Answer](#)

- Q8. Explain briefly how the different moving parts of a main engine are subjected to various stresses Name the stresses and justify by stating how they originate (16)

**2024/MAY2/Q8**

[Click Here to See the Answer](#)

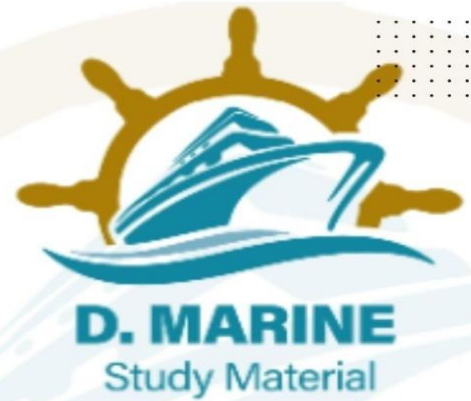
- Q9. (a) Describe the procedure for taking crankshaft deflections explaining all precautions that must be observed (8)  
(b) Explain what deflection readings actually mean and suggest the action which must be taken should readings be outside values recommended by the engine manufacturer (8)

**2024/MAY2/Q9**

[Click Here to See the Answer](#)



www.dmarinestudy.com



## JUNE - 2024

Q1. A very sudden rise in pressure during combustion accompanied by a metallic hammer like sound is called knocking of the unit or detonation and usually occurs

- (a) Near the end of the pressure rise after ignition of fuel charge
  - (b) Just before the fuel charge is about to ignite
  - (c) Immediately after the unit reaches peak pressure and before ignition of fuel
  - (d) At any stage of the combustion process
- State the correct answer and explain why the other reasons given are not justified (16)

**2024/JUN/Q1**

[Click Here to See the Answer](#)

Q2. (a) List and explain the desirable properties of lubricating oil for different application such as for main engine auxiliary engine and for cylinder lubrication (8)

- (b) Sketch an auxiliary engine lubricating oil circuit (8)

**2024/JUN/Q2**

[Click Here to See the Answer](#)

Q3. With reference to turbochargers

- (a) Explain the term surging stating how it occurs its effect on the turbocharger and how it can be avoided (8)
- (b) Describe the procedures for cleaning EACH of the following and explain the precautions which should be taken
  - (i) Suction air
  - (ii) Turbine blades and nozzle ring (8)\*\*

**2024/JUN/Q3**

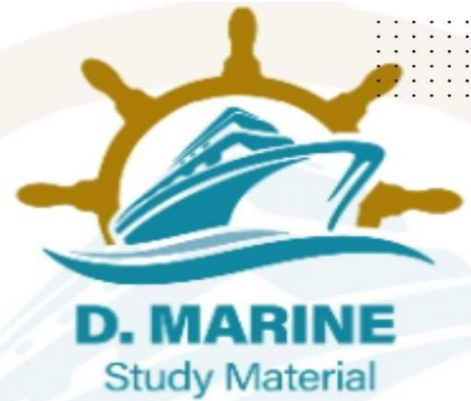
[Click Here to See the Answer](#)

Q4. Write short notes on

- (a) Control air dryer (4)
- (b) Crankcase door (4)



www.dmarinestudy.com



(c) Auxiliary engine overspeed trip (4)

(d) Fuel oil leak off alarm (4)

**2024/JUN/Q4**

[Click Here to See the Answer](#)

Q5. A large marine diesel main propulsion engine speed fluctuates all the time during the voyage. Make written statements to the chief engineer explaining the observation of various engine parameters during the voyage which could be an indication of some fault causing engine speed fluctuation.

**2024/JUN/Q5**

[Click Here to See the Answer](#)

Q6. (a) What are the advantages of a thin shell bearing (4)

(b) What are the typical bearing failures? Discuss at least four bearing failures (8)\*\*

(c) Why is periodic analysis of the lubricating oil important (4)\*\*

**2024/JUN/Q6**

[Click Here to See the Answer](#)

Q7. (a) Why are tie rods provided on a 2-stroke main engine (6)

(b) Why are tie rods placed close to the centerline of the crankshaft (5)\*\*

(c) What is a tie rod pinch screw and what is its purpose (5)\*\*

**2024/JUN/Q7**

[Click Here to See the Answer](#)

Q8. (a) Explain briefly how the different moving parts of a main engine are subjected to various stresses (8)

(b) Name the stresses and justify by stating how they originate (8)\*\*

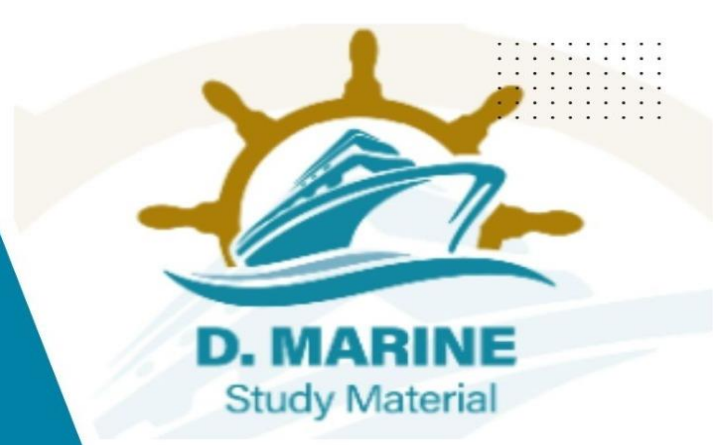
**2024/MAY2/Q8** **2024/JUN/Q8**

[Click Here to See the Answer](#)

Q9. Indicator cards have shown that one cylinder is high in power although the maximum pressure is low. State the associated effects that this might have on the various instruments of the engine and give a detailed description of the method of rectifying the defect. If this abnormality were



www.dmarinestudy.com



not remedied what might be the subsequent effects on the operation of the engine State the type of engine to which your answer refers (16)

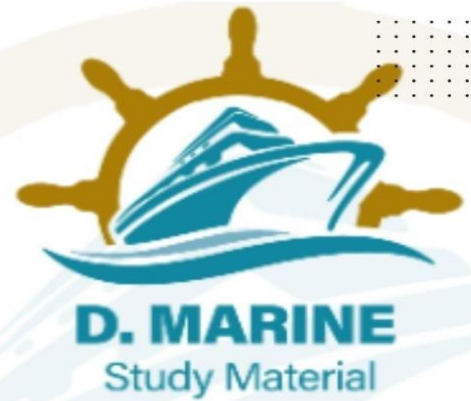
**2024/JUN/Q9**

[Click Here to See the Answer](#)





www.dmarinestudy.com



## JULY - 2024

Q1. (a) Explain the types of turbocharging in a marine diesel engine (8)  
(b) What are the reasons that may induce vibration on a main engine turbocharger (8)

**2024/JUL/Q1**

[Click Here to See the Answer](#)

Q2. Explain how sluggish action of the suction and delivery valves reduces the volumetric efficiency of an air compressor (16)

**2024/JUL/Q2**

[Click Here to See the Answer](#)

Q3. During your watch one of the main engine units was indicating high exhaust temperature reading Write a note to Chief Engineer explaining  
(a) The probable cause of the abnormal running condition and how it was diagnosed (8)

(b) List possible corrective actions (8)

**2024/JUL/Q3**

[Click Here to See the Answer](#)

Q4. (a) What is the significance of an air cooler and why is the scavenge air temperature preferred to be maintained at 40°C (8)  
(b) What are the probable indications of a leaky air cooler as fitted to a two-stroke main engine (8)

**2024/JUL/Q4**

[Click Here to See the Answer](#)

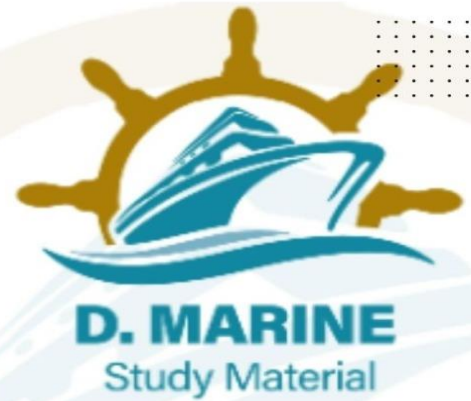
Q5. The maritime decarbonization is a priority and there are various ships that are operating on alternative fuels Discuss few potential alternate fuels by comparing their properties and list the advantages and disadvantages of at least three alternative fuel (16)

**2024/JUL/Q5**

[Click Here to See the Answer](#)



www.dmarinestudy.com



- Q6. Write short notes on (a) Main air starting valves (4)  
(b) Exhaust valve rotator (4)  
(c) Scavenge relief valve (4)  
(d) Function of labyrinth seals in turbocharger (4)

**2024/JUL/Q6**

[Click Here to See the Answer](#)

- Q7. Make a diagrammatic sketch of a jacket cooling water system as applied to a two stroke main engine. Indicate the temperatures and pressures in the system. Describe in particular the flow of water from entry to the engine to outlet from the engine and sketch the more important joints in the system.

**2024/MAY1/Q9** **2024/JUL/Q7**

[Click Here to See the Answer](#)

- Q8. Write short notes on the following (a) Indicated power (3)  
(b) Specific fuel oil consumption (3)  
(c) Brake power (3)  
(d) Mechanical efficiency (3)  
(e) Thermal efficiency (4)

**2024/JUL/Q8**

[Click Here to See the Answer](#)

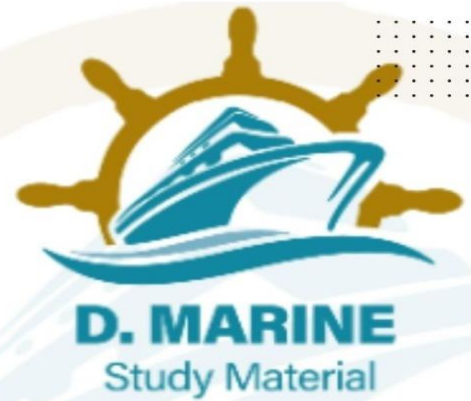
- Q9. Write short notes on the following (a) Effect of worn out rings on oil consumption and blow past (5)  
(b) Cylinder liner wears (6)  
(c) Thermal loading of piston (5)

**2024/JUL/Q9**

[Click Here to See the Answer](#)



www.dmarinestudy.com



## AUGUST - 2024

Q1. An auxiliary engine under load continuously fluctuates even with a steady load The fault you diagnose could be owing to  
(a) The quality of fuel  
(b) The quality of servicing of the governor in the last port  
(c) The supply of charge air  
(d) The overhaul of fuel injectors done in the last decarbonisation Give a brief explanation as to why each of the above-mentioned points either could be true or cannot at all be the reasons for such a fluctuation (16)

**2024/APR2/Q1** **2024/MAY2/Q4** **2024/AUG/Q1**

[Click Here to See the Answer](#)

Q2. With reference to a 2-stroke slow speed main propulsion engine air starting system

(a) State with reasons three safety features incorporated in an air starting system (8)

(b) State with reason why an engine may fail to turnover on air (8)

**2024/APR2/Q2** **2024/MAY1/Q4** **2024/AUG/Q2**

[Click Here to See the Answer](#)

Q3. Discuss the precautions which can be taken to minimize the possibility of a diesel engine crankcase explosion and the transmission of dangerous flame into the machinery space

(a) By design and equipment (8)

(b) By operating personnel (8)

**2024/APR2/Q3** **2024/AUG/Q3**

[Click Here to See the Answer](#)

Q4. (a) What are the causes of turbocharger surging How is it indicated to the watchkeeper (8)

(b) What are the possible remedial action (4)

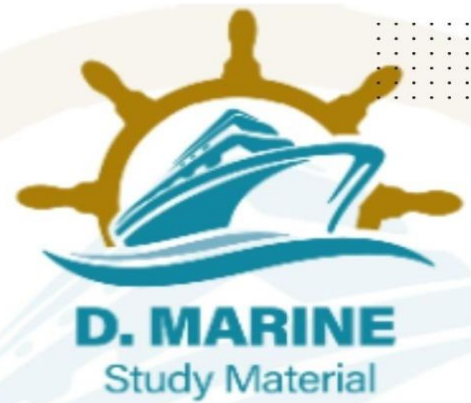
(c) What are the reasons for excessive fouling of the turbocharger (4)

**2024/APR2/Q4** **2024/AUG/Q4**

[Click Here to See the Answer](#)



www.dmarinestudy.com



Q5. With reference to the diesel prime movers for generators in unmanned machinery spaces

(a) Outline the monitoring and control equipment designed to protect the engine (8)

(b) Describe the methods employed to test the monitoring and control equipment during a routine check (8)

**2024/APR2/Q5** **2024/AUG/Q5**

[Click Here to See the Answer](#)

Q6. With reference to medium speed trunk piston engines

(a) Explain the purpose of an anti polishing ring (5)

(b) Describe how effective piston cooling is provided (5)

(c) Where is the thrust bearing fitted and why (6)

**2024/APR2/Q6** **2024/AUG/Q6**

[Click Here to See the Answer](#)

Q7. (a) Sketch a section through the bedplate and A frame of a large slow speed engine identifying parts method of construction and materials (10)

(b) Explain the function of the tie bolts and how after an alignment problem these would be tightened (6)

**2024/APR2/Q7** **2024/AUG/Q7**

[Click Here to See the Answer](#)

Q8. (a) (i) Describe with the aid of a sketch a main engine exhaust valve which is hydraulically operated (8)

(ii) Explain the operation of this valve (4)

(b) State the materials used for the seat and valve described in (a) (4)

**2024/APR2/Q8** **2024/AUG/Q8**

[Click Here to See the Answer](#)

Q9. Discuss the causes possible associated hazards and lowering of thermal efficiency consequent on poor combustion in a diesel engine cylinder

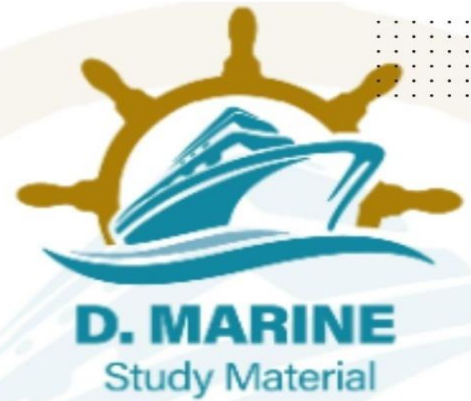
Illustrate your answer by means of indicator cards (16)

**2024/APR2/Q9** **2024/AUG/Q9**

[Click Here to See the Answer](#)



www.dmarinestudy.com



## SEPTEMBER – 2024(PART-1)

Q1. The main requirements which a fuel injection system must fulfil are (a) Accurate metering of small amount of fuel oil (b) Control of quality of fuel injection (c) Proper timing of the fuel injection (d) Selective distribution of the fuel in the combustion space State whether each one of the points made above are true or false with reasons (16)

**2024/APR1/Q1** **2024/MAY2/Q1** **2024/SEP1/Q1**

[Click Here to See the Answer](#)

Q2. (a) In a 4 stroke engine describe each of the four strokes of the engine (b) Draw timing diagram of complete cycle (5) (c) How each stroke is completed in the engine with action of crank travel and valves (6)

**2023/MAY1/Q6** **2024/MAR/Q7** **2024/SEP1/Q2**

[Click Here to See the Answer](#)

Q3. (a) Describe means of recognizing deterioration of the lubricating oil (b) Describe how lubricating oil is conveyed to top end bottom end and main bearing in large bore 2 stroke crosshead type slow speed diesel engine (8)

**2024/APR1/Q3** **2024/SEP1/Q3**

[Click Here to See the Answer](#)

Q4. (a) State the different types of turbocharger fitted in modern diesel engines (8)

(b) Describe the function of the (i) Nozzle ring (ii) Labyrinth seals (iii) Diffuser (iv) Inducer (8)

**2024/APR1/Q4** **2024/SEP1/Q4**

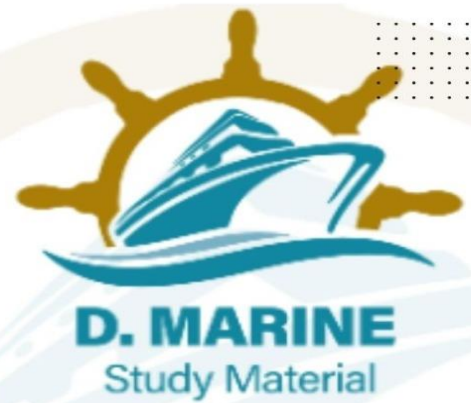
[Click Here to See the Answer](#)

Q5. Sketch and describe a device employed for continuous monitoring of the viscosity of heavy fuel oil being supplied to a main engine (16)

**2024/MAY1/Q7** **2024/SEP1/Q5**



www.dmarinestudy.com



[Click Here to See the Answer](#)

- Q6. (a) What is the importance of measuring bearing clearance in a diesel engine (4)  
(b) What is bridge gauge Describe its usage with diagram (6)  
(c) What are the other recommended methods used onboard to check bearing clearance (6)

**2023/NOV/Q3** **2024/MAR/Q3** **2024/SEP1/Q6**

[Click Here to See the Answer](#)

- Q7. (i) Describe what is nozzle burning of fuel injectors and causes of nozzle burning on marine diesel engine (6)  
(ii) What investigations are required to find causes for nozzle burning (6)  
(iii) What actions are required to reduce the risk of nozzle burning (4)

**2023/NOV/Q9** **2024/SEP1/Q7**

[Click Here to See the Answer](#)

- Q8. Explain how the following conditions affect the power developed by a diesel engine (a) Broken piston rings (4)  
(b) Worn fuel pump plungers (4)  
(c) Fouled turbochargers (4)  
(d) Worn out liner (4)

**2023/AUG/Q8** **2024/SEP1/Q8**

[Click Here to See the Answer](#)

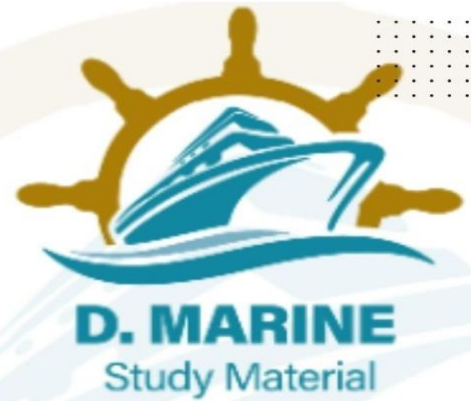
- Q9. For 2 stroke marine diesel engine (a) Describe problems in achieving good lubrication of cylinder liner (6)  
(b) What are the properties of good cylinder oil (4)  
(c) What are the consequences of under and over lubrication of liner (6)

**2023/NOV/Q7** **2024/JAN/Q9** **2024/SEP1/Q9**

[Click Here to See the Answer](#)



www.dmarinestudy.com



## SEPTEMBER - 2024(PART-2)

- Q1. Describe following terms with respect to diesel engine with suitable diagram (a) Natural aspiration (4)  
(b) Scavenging (4)  
(c) Supercharging (4)  
(d) Types of supercharging in two stroke engine (4)

**2023/MAY2/Q2** **2023/SEP/Q2** **2024/FEB/Q3** **2024/SEP2/Q1**

[Click Here to See the Answer](#)

- Q2. (a) State why double walled fuel pipes are employed for high pressure fuel lines (6)  
(b) Sketch and describe such a double walled pipe arrangement and show how high-pressure pipe failure is indicated (10)

**2023/SEP/Q6** **2023/DEC/Q5** **2024/SEP2/Q2**

[Click Here to See the Answer](#)

- Q3. (i) How power is calculated from indicator diagram (6)  
(ii) How does indicator diagram show early fuel injection What are bad effects of too early injection (5)  
(iii) What are indications of late injection on indicator diagram of the unit What are bad effects of late injection of fuel on the units (5)

**2023/DEC/Q3** **2024/SEP2/Q3**

[Click Here to See the Answer](#)

- Q4. With reference to a turbo charging system of an engine (a) State the parameters that you would check while taking over the watch (8)  
(b) Action to be taken in the event of turbo charger is observed to vibrate abnormally (8)

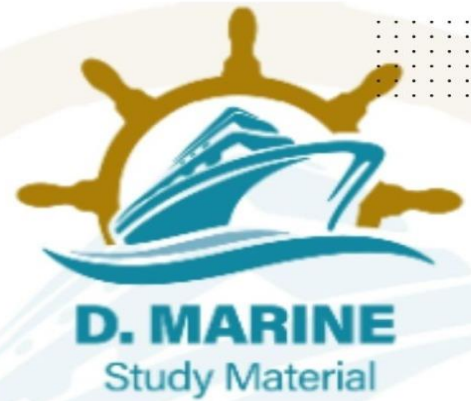
**2024/SEP2/Q4**

[Click Here to See the Answer](#)

- Q5. Discuss the consequences of failure to maintain correct clearances in the case of auxiliary diesel engine crankshaft and bottom end bearing



www.dmarinestudy.com



Describe the procedure of taking crankshaft deflection (16)

**2024/APR1/Q5** **2024/SEP2/Q5**

[Click Here to See the Answer](#)

Q6. (a) Describe how fuel injector components deteriorate with time (6)

(b) What are effects of deterioration of fuel injector components (6)

(c) What are the signs of a bad injector (4)

**2023/SEP/Q9** **2024/SEP/Q6**

[Click Here to See the Answer](#)

Q7. With respect to a marine diesel engine (a) What are the different types of lubrication system that you would see on the main and auxiliary machineries (8)

(b) What are the desirable qualities for the lubricating oil selected for each of the following duties

(i) Auxiliary diesel engine

(ii) Stern tube bearings

(iii) Refrigeration system

(iv) Turbocharger (8)\*\*

**2024/SEP/Q7**

[Click Here to See the Answer](#)

Q8. With reference to cylinder liner wear in large slow speed engine

(a) State THREE major factors associated with wear (4)

(b) Explain the procedure for correct running in of piston rings and cylinder liners (4)

(c) Explain what is achieved by running in process (4)

(d) Describe how cylinder lubrication limits wear (4)

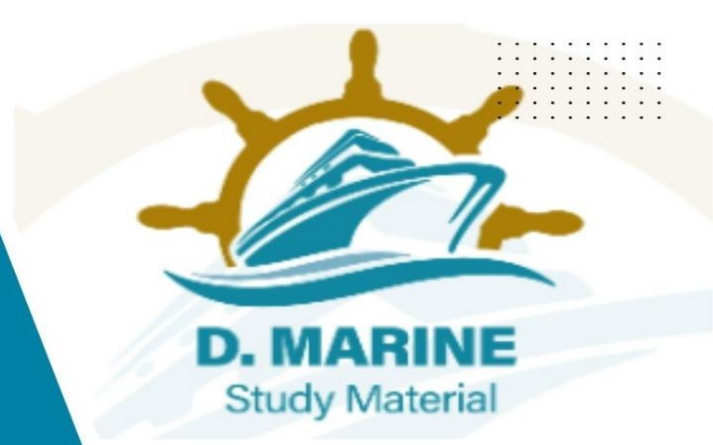
**2024/SEP/Q8**

[Click Here to See the Answer](#)

Q9. Describe the action you as watch keeper would take and outline possible reasons for failure in both the following cases



www.dmarinestudy.com



(a) The auxiliary diesel engine fails to turn on starting air (8)

(b) The engine turn on starting air but fails to fire (8)

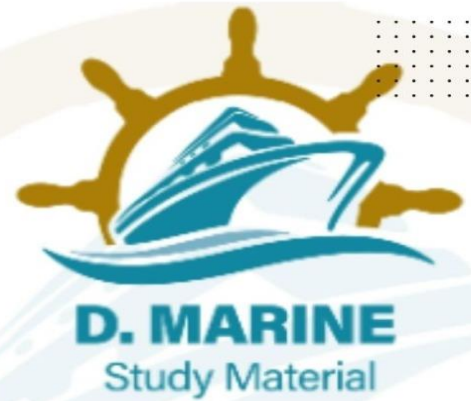
2023/OCT/Q2 2024/SEP2/Q9

[Click Here to See the Answer](#)





www.dmarinestudy.com



## OCTOBER - 2024

Q1. A very sudden rise in pressure during combustion accompanied by a metallic hammer like sound is called knocking of the unit or detonation and usually occurs

- (a) Near the end of the pressure rise after ignition of fuel charge
  - (b) Just before the fuel charge is about to ignite
  - (c) Immediately after the unit reaches peak pressure and before ignition of fuel
  - (d) At any stage of the combustion process
- State the correct answer and explain why the other reasons given are not justified (16)

**2024/JUN/Q1** **2024/OCT/Q1**

[Click Here to See the Answer](#)

Q2. (a) List and explain the desirable properties of lubricating oil for different application such as for main engine auxiliary engine and for cylinder lubrication (8)

(b) Sketch an auxiliary engine lubricating oil circuit (8)

**2024/JUN/Q2** **2024/OCT/Q2**

[Click Here to See the Answer](#)

Q3. With reference to turbochargers

(a) Explain the term surging stating how it occurs its effect on the turbocharger and how it can be avoided (8)

(b) Describe the procedures for cleaning EACH of the following and explain the precautions which should be taken

(i) Suction air

(ii) Turbine blades and nozzle ring (8)\*\*

**2024/JUN/Q3** **2024/OCT/Q3**

[Click Here to See the Answer](#)

Q4. Write short notes on

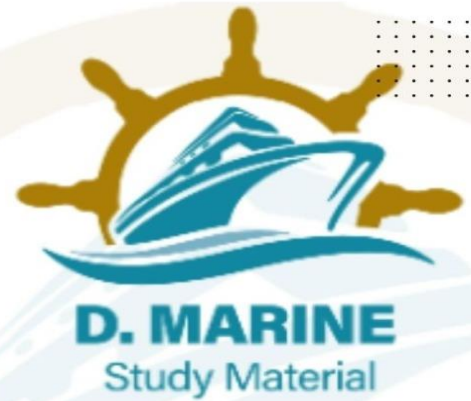
(a) Control air dryer (4)

(b) Crankcase door (4)

(c) Auxiliary engine overspeed trip (4)



www.dmarinestudy.com



(d) Fuel oil leak off alarm (4)

**2024/JUN/Q4** **2024/OCT/Q4**

[Click Here to See the Answer](#)

Q5. A large marine diesel main propulsion engine speed fluctuates all the time during the voyage Make written statements to the chief engineer explaining the observation of various engine parameters during the voyage which could be indication of some fault causing engine speed fluctuation

**2024/JUN/Q5** **2024/OCT/Q5**

[Click Here to See the Answer](#)

Q6. (a) What are the advantages of a thin shell bearing (4)

(b) What are the typical bearing failures Discuss at least four bearing failures (8)\*\*

(c) Why is periodic analysis of the lubricating oil important (4)\*\*

**2024/JUN/Q6** **2024/OCT/Q6**

[Click Here to See the Answer](#)

Q7. (a) Why tie rods are provided on a 2 stroke main engine (6)

(b) Why tie rods are placed close to the centerline of the crankshaft (5)\*\*

(c) What is a tie rod pinch screw and what is its purpose (5)\*\*

**2024/JUN/Q7** **2024/OCT/Q7**

[Click Here to See the Answer](#)

Q8. (a) Explain briefly how the different moving parts of a main engine are subjected to various stresses (8)

(b) Name the stresses and justify by stating how they originate (8)\*\*

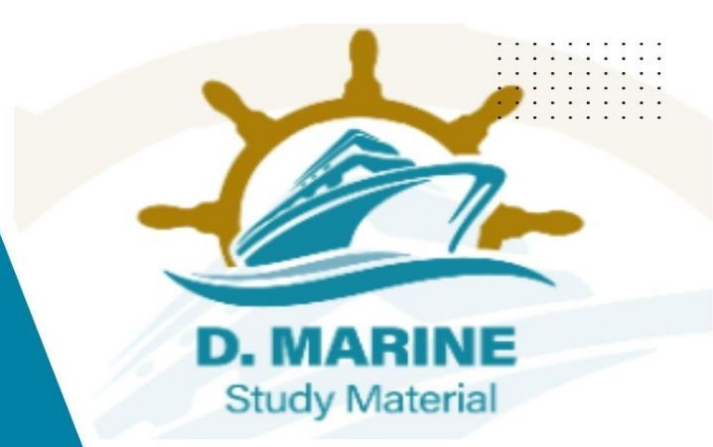
**2024/MAY2/Q8** **2024/JUN/Q8** **2024/OCT/Q8**

[Click Here to See the Answer](#)

Q9. Indicator cards have shown that one cylinder is high in power although the maximum pressure is low State the associated effects that this might have on the various instruments of the engine and give a detailed description of the method of rectifying the defect If this abnormality were not remedied what might be the subsequent effects on the operation of the



[www.dmarinestudy.com](http://www.dmarinestudy.com)



engine State the type of engine to which your answer refers (16)

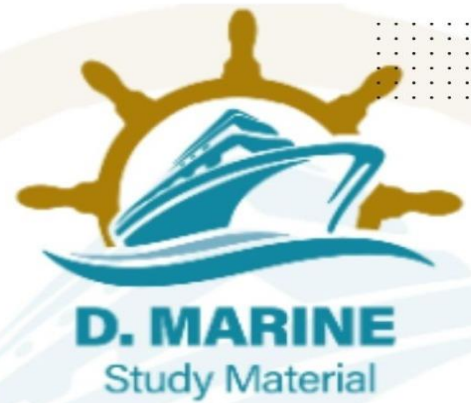
**2024/JUN/Q9** **2024/OCT/Q9**

[Click Here to See the Answer](#)





www.dmarinestudy.com



## NOVEMBER – 2024

Q1. The main requirements which a fuel injection system must fulfil are  
(a) Accurate metering of small amount of fuel oil  
(b) Control of quality of fuel injection  
(c) Proper timing of the fuel injection  
(d) Selective distribution of the fuel in the combustion space Analyse each of the above statements and state whether they are true or false with a brief reasoning (16)

**2024/APR1/Q1** **2024/MAY2/Q1** **2024/NOV/Q1**

[Click Here to See the Answer](#)

Q2. The cylinder liner of one of the unit is cracked inspite of the engine having logged only 300 hours since last overhaul Make a report of what you feel could be the cause of this mishap (16)

**2024/MAY2/Q2** **2024/NOV/Q2**

[Click Here to See the Answer](#)

Q3. (a) Briefly explain the construction and functions of a bedplate in a slow speed marine diesel engine (8)  
(b) How is the bedplate fastened to the hull structure (4)  
(c) What is the function of the tie rod in a slow speed 2 stroke engine (4)

**2024/MAY2/Q3** **2024/NOV/Q3**

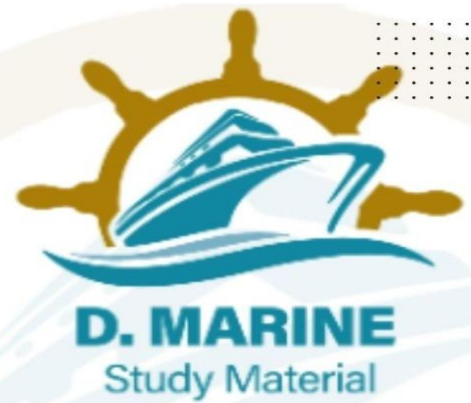
[Click Here to See the Answer](#)

Q4. An auxiliary engine under load continuously fluctuates even with a steady load The fault you diagnose could be owing to  
(a) The quality of fuel  
(b) The quality of servicing of the governor in the last port  
(c) The supply of charge air  
(d) The overhaul of fuel injectors done in the last decarbonisation Give a brief explanation as to why each of the above-mentioned points either could be true or cannot at all be the reasons for such a fluctuation (16)

**2024/APR2/Q1** **2024/MAY2/Q4** **2024/NOV/Q4**



www.dmarinestudy.com



[Click Here to See the Answer](#)

Q5. (a) Why exhaust outlet of marine diesel engine turbocharger is lower than inlet temperature (6)

(b) Why do we need an air cooler and why is the scavenge air temperature maintained at 40°C (10)

**2024/MAY2/Q5** **2024/NOV/Q5**

[Click Here to See the Answer](#)

Q6. (a) (i) Describe with the aid of a sketch a main engine exhaust valve which is hydraulically operated (8)

(ii) Explain the operation of this valve (4)

(b) State the materials used for the seat and valve described in (a) (4)

**2024/APR2/Q8** **2024/MAY2/Q6** **2024/NOV/Q6**

[Click Here to See the Answer](#)

Q7. (a) Why do you need an over speed trip despite a governor being fitted to a marine diesel engine (8)

(b) With respect to an auxiliary engine governor what is the significance of

(i) The load limit knob

(ii) The compensation (8)\*\*

**2024/MAY2/Q7** **2024/NOV/Q7**

[Click Here to See the Answer](#)

Q8. Explain briefly how the different moving parts of a main engine are subjected to various stresses Name the stresses and justify by stating how they originate (16)

**2024/MAY2/Q8** **2024/NOV/Q8**

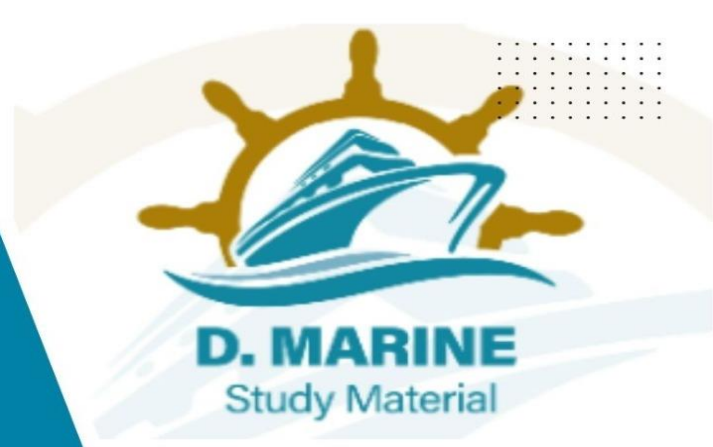
[Click Here to See the Answer](#)

Q9. (a) Describe the procedure for taking crankshaft deflection explaining all precautions that must be observed (8)

(b) Explain what deflection readings actually mean and suggest the action which must be taken should readings be outside values recommended by



www.dmarinestudy.com



the engine manufacturer (8)\*\*

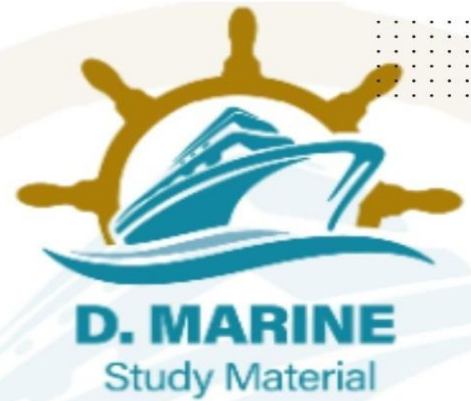
**2024/MAY2/Q9** **2024/NOV/Q9**

[Click Here to See the Answer](#)





www.dmarinestudy.com



## DECEMBER – 2024

Q1. (a) Sketch and describe the starting air system of main engine (8)  
(b) What are the safety interlocks provided in compressed air starting system of main engine (8)

**2023/MAR/Q8** **2023/SEP/Q8** **2023/DEC/Q1** **2024/MAR/Q9**  
**2024/DEC1/Q1**

[Click Here to See the Answer](#)

Q2. (a) Draw sectional diagram of main engine piston showing each part Show cooling passages for oil cooled piston (12)

(b) Name the different materials used for the various components of the piston as indicated to the answer above (4)

**2023/JULY/Q2** **2023/NOV/Q2** **2024/MAR/Q2** **2024/DEC1/Q2**

[Click Here to See the Answer](#)

Q3. (a) Explain why it is important to measure bearing clearances in a diesel engine (4)

(b) What is bridge gauge How is the bridge gauge used Explain with a diagram (6)

(c) What are other recommended methods for checking bearing clearances

**2023/MAR/Q5** **2023/NOV/Q3** **2024/MAR/Q3** **2024/SEP1/Q6**  
**2024/DEC1/Q3**

[Click Here to See the Answer](#)

Q4. Describe following terms with respect to diesel engine with suitable diagram (a) Piston stroke (4)

(b) Swept volume (4)

(c) Clearance volume (4)

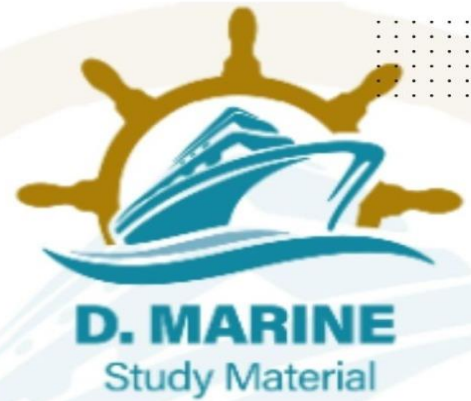
(d) Compression ratio (4)

**2023/MAR/Q2** **2023/NOV/Q1** **2024/DEC1/Q4**

[Click Here to See the Answer](#)



www.dmarinestudy.com



Q5. (a) What is an exhaust gas economizer Draw diagrammatic sketch of exhaust gas economizer naming each component (8)

(b) How is steam generation controlled in exhaust gas economizers (4)

(c) Briefly describe procedure to maintain efficiency of such an EGE (4)

**2023/NOV/Q4** **2024/MAR/Q5** **2024/DEC1/Q5**

[Click Here to See the Answer](#)

Q6. If an auxiliary diesel generator over speeds while off load explain

(a) How can the engine be stopped (6)

(b) What are the probable reasons for the failure (4)

(c) Give details of the checks that are required to be made after the engine has been stopped with regard to

(i) Mechanical checks

(ii) Electrical checks

**2022/AUG/Q9** **2023/MAY1/Q5** **2023/OCT/Q9** **2024/MAR/Q6**

**2024/DEC1/Q6**

[Click Here to See the Answer](#)

Q7. (a) In a 4-stroke engine describe each of the different strokes of the cycle (6)

(b) Draw 4 stroke timing diagram describing the complete cycle Explain how each stroke is completed with action of crank travel and the inlet exhaust valves (10)

**2023/MAY1/Q6** **2024/MAR/Q7** **2024/SEP1/Q2** **2024/DEC1/Q7**

[Click Here to See the Answer](#)

Q8. (a) With a aid of a sketch briefly describes the important structural parts of 2 stroke main engine How are different structural parts held together

(b) What is the function of cross head guides (6)

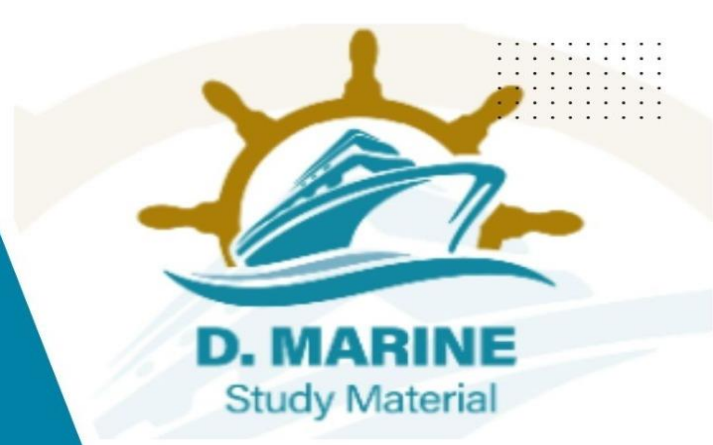
**2023/MAY1/Q7** **2024/MAR/Q8** **2024/DEC1/Q8**

[Click Here to See the Answer](#)

Q9. For 2 stroke marine diesel engine



www.dmarinestudy.com



- (a) Describe problems in achieving good lubrication of cylinder liner (6)
- (b) What are the properties of good cylinder oil (4)
- (c) What are the consequences of under and over lubrication of liner (6)

**2023/NOV/Q7** **2024/JAN/Q9** **2024/SEP1/Q9** **2024/DEC1/Q9**

[Click Here to See the Answer](#)

