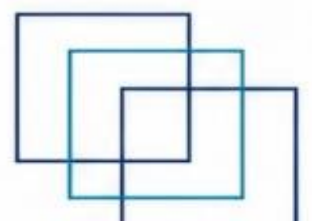


MEO CLASS 4

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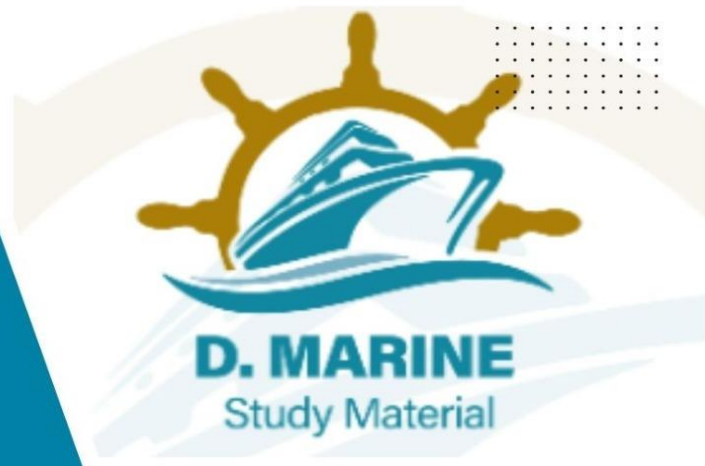
(ENGINEERING KNOWLEDGE MOTOR)

FOR INDIAN COMPETENCY EXAM





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JANUARY - 2025 (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** **2024/NOV/Q1**
2025/JAN1/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 **2025/JAN1/Q2**

[Click Here to See the Answer](#)

Q3. 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)

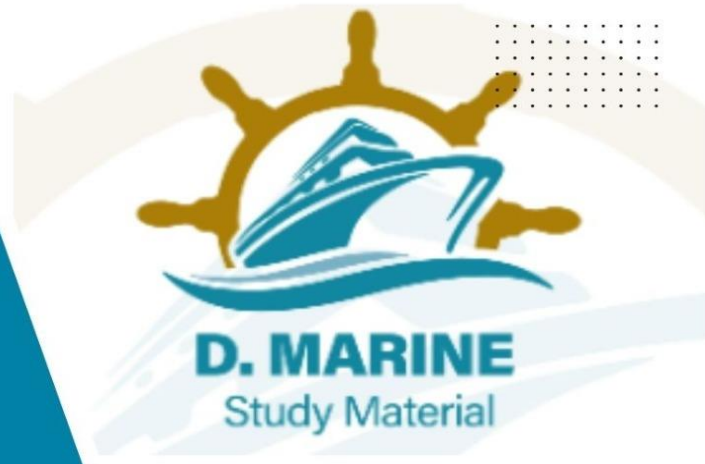
2023/MAY1/Q2 **2023/OCT/Q4** **2024/FEB/Q7** **2025/JAN1/Q3**

[Click Here to See the Answer](#)

Q4. (a) State the different types of turbochargers fitted in modern diesel engines (8)
(b) Describe the function of the
(i) Nozzle ring
(ii) Labyrinth seals
(iii) Diffuser



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(iv) Inducer (8)

2024/APR1/Q4 **2024/SEP1/Q4** **2025/JAN1/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 Describe the procedure of taking crankshaft deflection (16)

2024/APR1/Q5 **2024/SEP2/Q5** **2025/JAN1/Q5**

[Click Here to See the Answer](#)

Q6. Sketch and describe the operation of a crankcase oil mist detector What operational maintenance does this instrument require for efficient performance (16)

2023/JAN/Q9 **2023/MAY2/Q9** **2025/JAN1/Q6**

[Click Here to See the Answer](#)

Q7. (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 sketch variation of P_{max} with VIT position (4)

2023/MAY1/Q9 **2024/MAR/Q1** **2025/JAN1/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

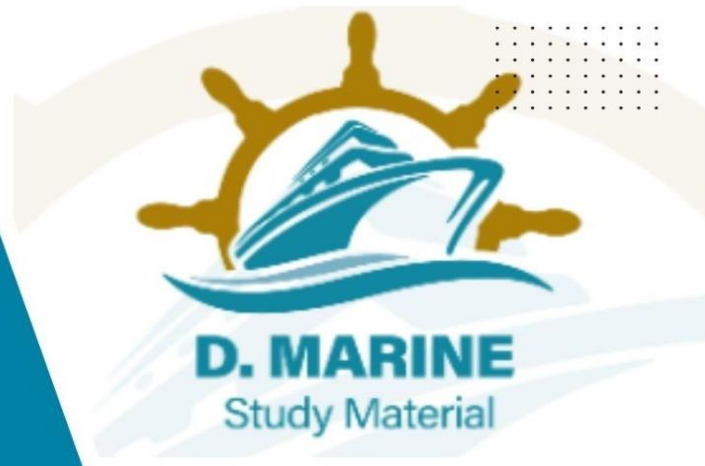
(vi) Cetane number (10)

2024/APR1/Q8 **2025/JAN1/Q8**

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Q9. Compare the desirable qualities of the lubricating oil selected for each of the following duties

(a) Auxiliary diesel engines

(b) Stern tube bearings

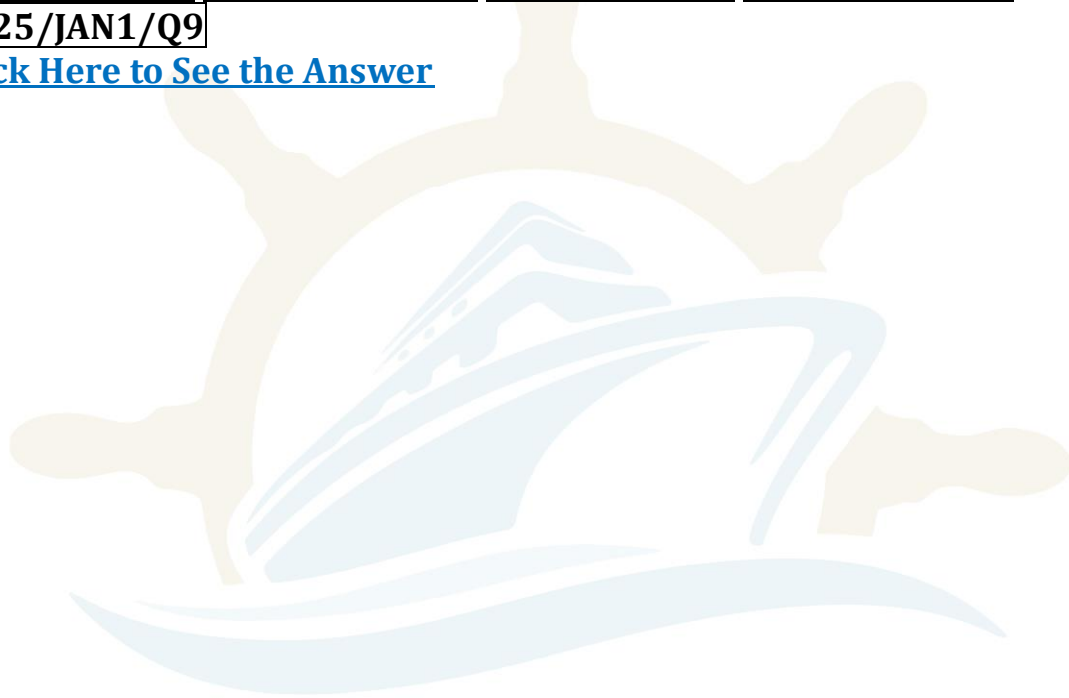
(c) Refrigeration compressors

(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**

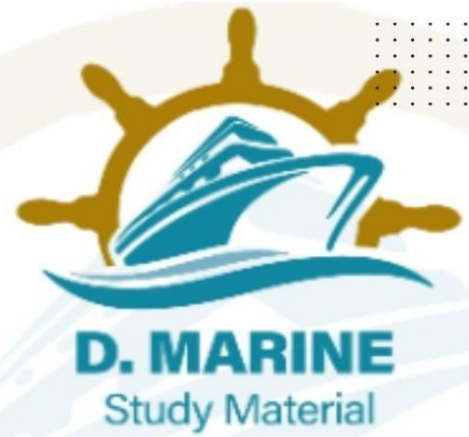
2025/JAN1/Q9

[Click Here to See the Answer](#)





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JANUARY - 2025(PART-2)

Q1. Explain the method of obtaining the following diagrams on a 2-stroke main propulsion engine

- (a) Power card showing vital point of diagram (4)
- (b) Out of phase diagram indicating vital points (4)
- (c) Light spring diagram indicating vital points (4)
- (d) Compression diagram and its importance (4)

2023/JULY/Q6 **2025/JAN2/Q1**

[Click Here to See the Answer](#)

Q2. (a) With reference to crankshafts and piston crowns outline the main stresses to which these parts are subjected (4)
(b) In each case explain how the stresses are generated and how they vary in magnitude and direction during one cycle (6)
(c) With respect to the whole engine describe how stresses may be accommodated by good design and influenced by poor maintenance (6)

2022/NOV/Q7 **2022/DEC/Q2** **2023/APR/Q3** **2023/DEC/Q2**
2025/JAN2/Q2

[Click Here to See the Answer](#)

Q3. (a) What is crankshaft misalignment (4)
(b) What are the reasons for crankshaft misalignment (8)
(c) What is the effect on main engine of such misalignment (4)

2023/JUN/Q3 **2025/JAN2/Q3**

[Click Here to See the Answer](#)

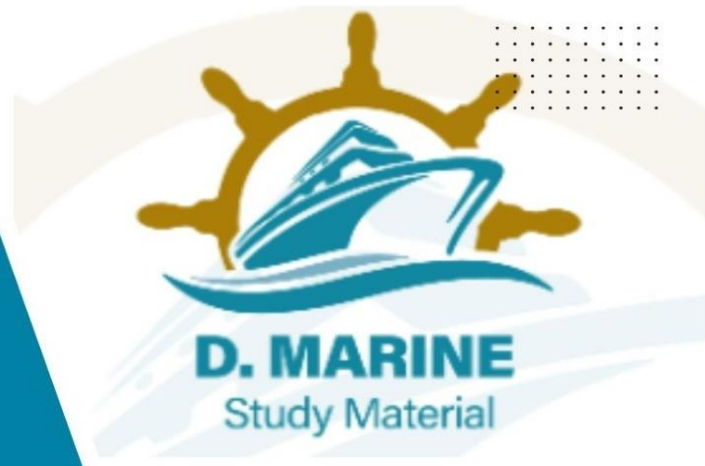
Q4. During your watch one of the main engine units was indicating high exhaust temperature reading Write a note to Chief Engineer explaining (a) How the cause leading to abnormal running condition was diagnosed (8)
(b) Subsequent action taken to control the situation (8)

2024/JUL/Q3 **2025/JAN2/Q4**

[Click Here to See the Answer](#)



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- Q5. (a) Sketch and describe a fuel oil system of a large diesel engine from settling tanks to main engine fuel injectors (10)
(b) Also comment on the importance of
(i) Heating arrangement with temperature control (3)
(ii) Prevention of air lock in the system (3)

2023/MAY2/Q6 **2025/JAN2/Q5**

[Click Here to See the Answer](#)

- Q6. (a) How is a 2-stroke engine started Describe the sequence of engine starting (6)
(b) Draw the timing diagram of engine starting showing crank position of each step (6)
(c) What is overlap in engine starting (4)

2023/MAR/Q1 **2023/JULY/Q1** **2023/DEC/Q6** **2025/JAN2/Q6**

[Click Here to See the Answer](#)

- Q7. With reference to the construction of a turbocharger sketch and describe

- (a) The rotor bearing and its method of lubrication (6)
(b) Labyrinth seal and explain how such a seal works (6)
(c) Impeller and diffuser (4)

2023/JAN/Q8 **2023/MAY2/Q8** **2025/JAN2/Q7**

[Click Here to See the Answer](#)

- Q8. (a) Draw sectional diagram of exhaust valve of 2 stroke diesel engine Name the different components of the valve (8)
(b) Describe working of the valve in operation How valve rotation occurs during operation and its purpose (6)
(c) What is the special material used on valve lid (2)

2023/DEC/Q8 **2025/JAN2/Q8**

[Click Here to See the Answer](#)

- Q9. (a) What are the difficulties observed in lubrication of gear teeth in gear trains (4)



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(b) Describe with diagram how good lubrication to gear teeth is achieved

(c) What are the qualities of lubricating oil suitable for main reduction gearing of main engine (6)

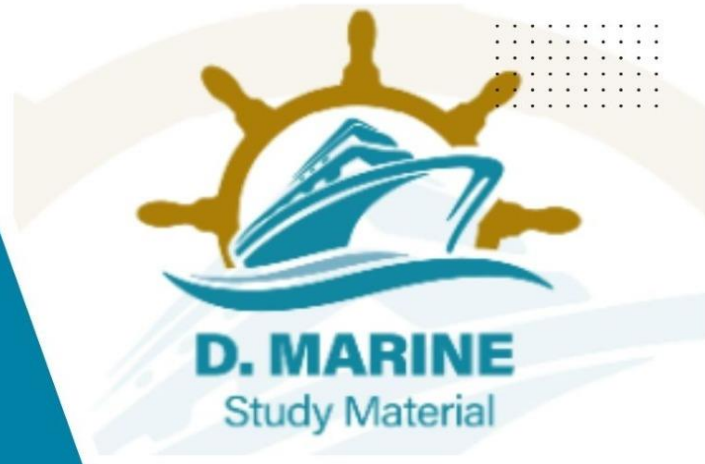
2023/DEC/Q9 2025/JAN2/Q9

[Click Here to See the Answer](#)





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FEBRUARY - 2025

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** **2024/NOV/Q4**
2025/FEB/Q1

[Click Here to See the Answer](#)

Q2. With reference to a 2-stroke slow speed main propulsion engine sketch a line diagram showing the 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** **2025/FEB/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** **2025/FEB/Q3**

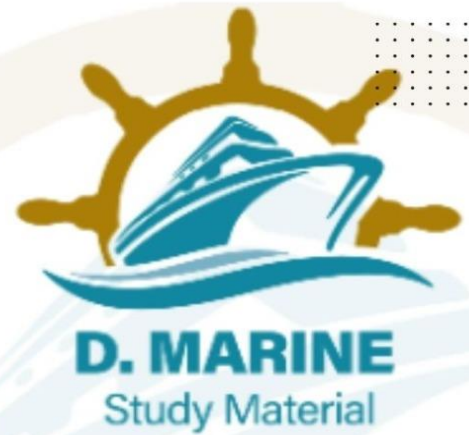
[Click Here to See the Answer](#)

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)



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

2024/APR2/Q4 **2024/AUG/Q4** **2025/FEB/Q4**

[Click Here to See the Answer](#)

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** **2025/FEB/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** **2025/FEB/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** **2025/FEB/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/MAY2/Q6** **2024/AUG/Q8** **2024/NOV/Q6**

2025/FEB/Q8

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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)

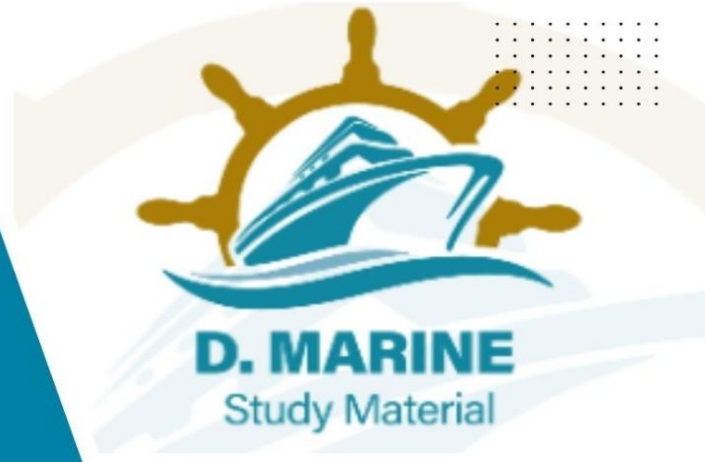
2024/APR2/Q9 **2024/AUG/Q9** **2025/FEB/Q9**

[Click Here to See the Answer](#)





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MARCH - 2025

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 **2025/MAR/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 (6)
(b) Briefly describe the mitigatory measures that can be taken to reduce the impact of poor bunker quality (4)

2024/MAY1/Q2 **2025/MAR/Q2**

[Click Here to See the Answer](#)

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

2024/MAY1/Q3 **2025/MAR/Q3**

[Click Here to See the Answer](#)

Q4. With reference to a 2-stroke slow speed main propulsion engine sketch a line diagram showing the air starting system

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

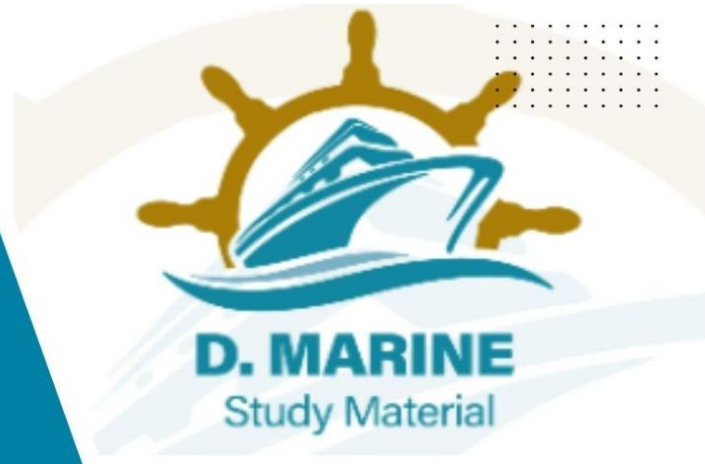
(b) State with reason why an engine may fail to turnover on air (8)

2024/APR2/Q2 **2024/MAY1/Q4** **2024/AUG/Q2** **2025/FEB/Q2**

2025/MAR/Q4



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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 HP clearance volume (16)

2024/MAY1/Q5 **2025/MAR/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 **2025/MAR/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)

2022/NOV/Q9 **2023/APR/Q5** **2024/MAY1/Q7** **2024/SEP1/Q5**

2025/MAR/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 **2025/MAR/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 **2025/MAR/Q9**

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Study Material

APRIL - 2025

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** **2025/APR1/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** **2025/APR1/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** **2025/APR1/Q3**

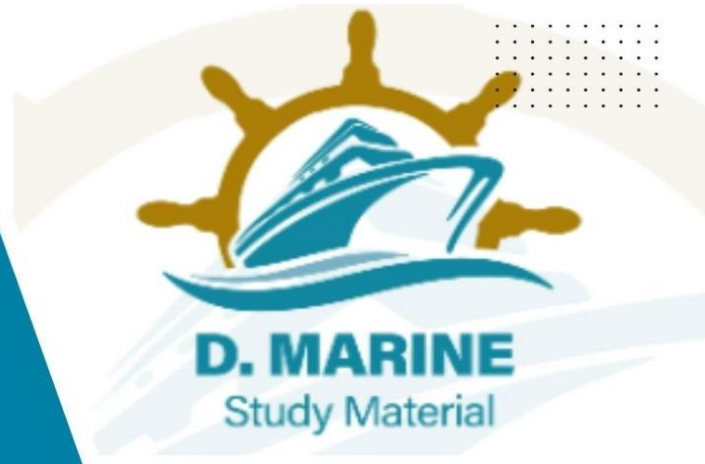
[Click Here to See the Answer](#)

Q4. Write short notes on

- (a) Control air dryer (4)



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- (b) Crankcase door (4)
- (c) Auxiliary engine overspeed trip (4)
- (d) Fuel oil leak off alarm (4)

2024/JUN/Q4 **2024/OCT/Q4** **2025/APR1/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** **2025/APR1/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** **2025/APR1/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 centreline of the crankshaft (5)
(c) What is a tie rod pinch screw and what is its purpose (5)

2024/JUN/Q7 **2024/OCT/Q7** **2025/APR1/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)

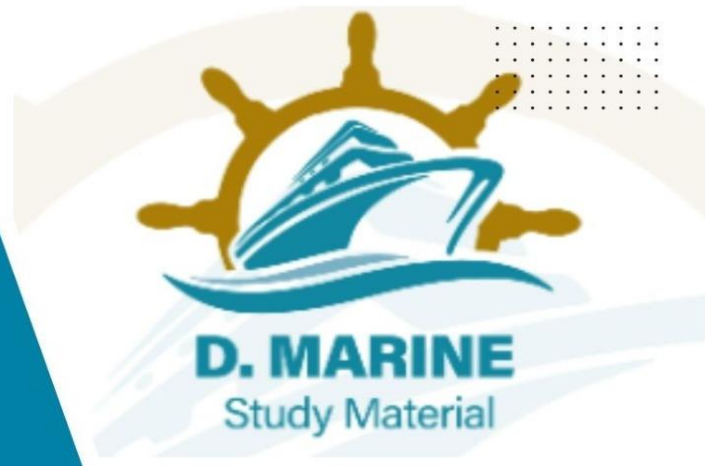
2024/MAY2/Q8 **2024/JUN/Q8** **2024/OCT/Q8** **2024/NOV/Q8**

2025/APR1/Q8

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

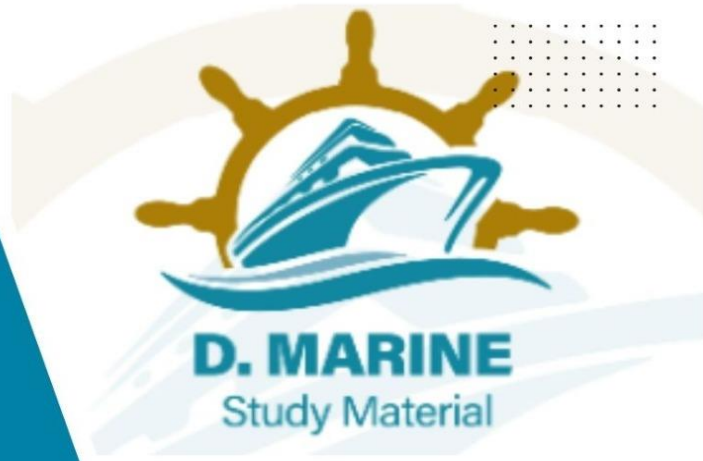
2024/JUN/Q9 **2024/OCT/Q9** **2025/APR1/Q9**

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JUNE - 2025

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**

2025/JUN/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)

2022/DEC/Q9 **2023/APR/Q9** **2023/SEP/Q6** **2023/DEC/Q5**

2024/SEP2/Q2 **2025/JUN/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** **2025/JUN/Q3**

[Click Here to See the Answer](#)

Q4. With reference to a turbo charging system of an engine

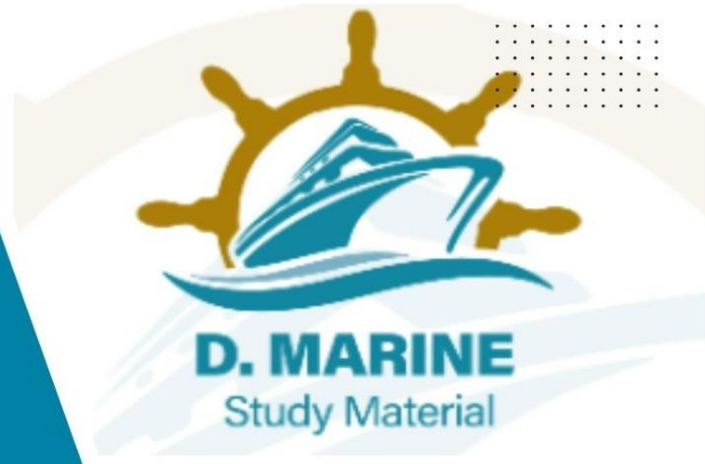
(a) State the parameters that you would check while taking over the watch (8)

(b) Action to be taken in the event of turbo charger is observed to vibrate abnormally (8)

2024/SEP2/Q4 **2025/JUN/Q4**



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Q5. Discuss the consequences of failure to maintain correct clearances in the case of auxiliary diesel engine crankshaft and bottom end bearing
Describe the procedure of taking crankshaft deflection (16)

2024/APR1/Q5 **2024/SEP2/Q5** **2025/JAN1/Q5** **2025/JUN/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/MAR/Q9 **2023/SEP/Q9** **2024/SEP2/Q6** **2025/JUN/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/SEP2/Q7 **2025/JUN/Q7**

[Click Here to See the Answer](#)

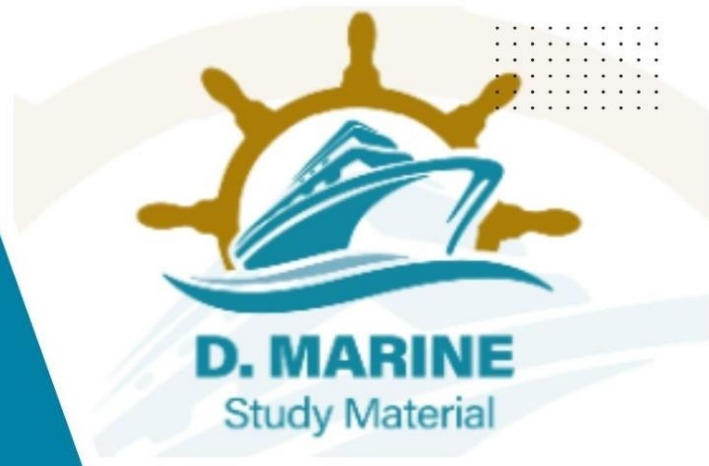
Q8. With reference to cylinder liner wear in large slow speed engine (a)
State THREE major factors associated with wear (4)
(b) Explain the procedure for correct running in of piston rings and cylinder liners (4)
(c) Explain what is achieved by running in process (4)
(d) Describe how cylinder lubrication limits wear (4)

2024/SEP2/Q8 **2025/JUN/Q8**

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

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

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

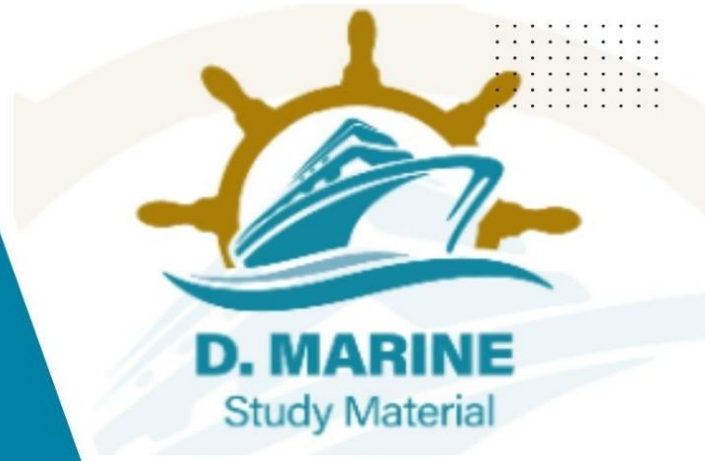
2022/AUG/Q2 **2023/OCT/Q2** **2024/SEP2/Q9** **2025/JUN/Q9**

[Click Here to See the Answer](#)





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JULY - 2025

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** **2024/NOV/Q1**
2025/JAN1/Q1 **2025/APR2/Q1** **2025/JUL/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 **2024/NOV/Q2** **2025/JUL/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** **2025/JUL/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

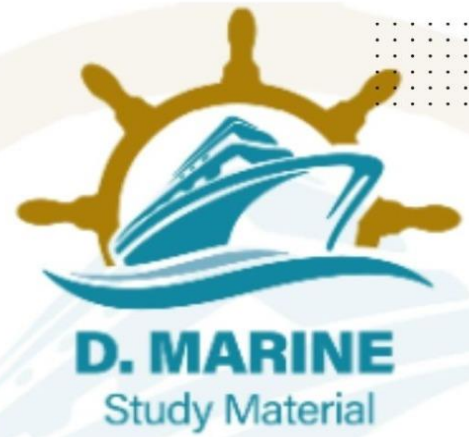
(b) The quality of servicing of the governor in the last port

(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



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could be true or cannot at all be the reasons for such a fluctuation (16)

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

2025/FEB/Q1 **2025/JUL/Q4**

[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** **2025/JUL/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/AUG/Q8** **2024/NOV/Q6**

2025/FEB/Q8 **2025/JUL/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** **2025/JUL/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)

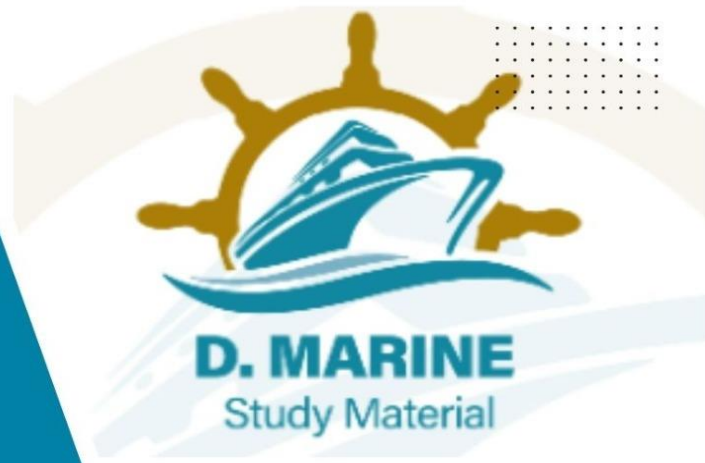
2024/MAY2/Q8 **2024/JUN/Q8** **2024/OCT/Q8** **2024/NOV/Q8**

2025/APR1/Q8 **2025/JUL/Q8**

[Click Here to See the Answer](#)



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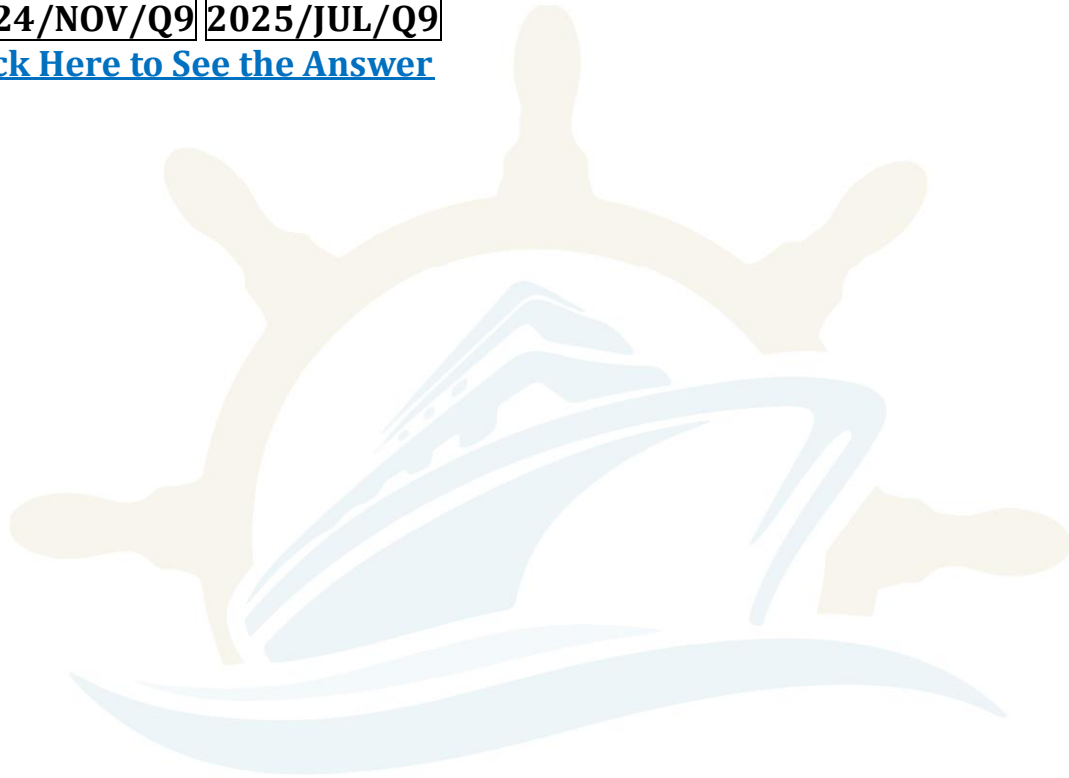


Q9. (a) Describe the procedure for taking crankshaft deflection of Auxiliary Engine explaining all precautions that must be observed (8)
(b) Explain what deflection readings actually mean and suggest the action which must be taken should readings be outside values recommended by the engine manufacturer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

2023/APR/Q8 | **2023/SEP/Q5** | **2024/FEB/Q1** | **2024/MAY2/Q9**

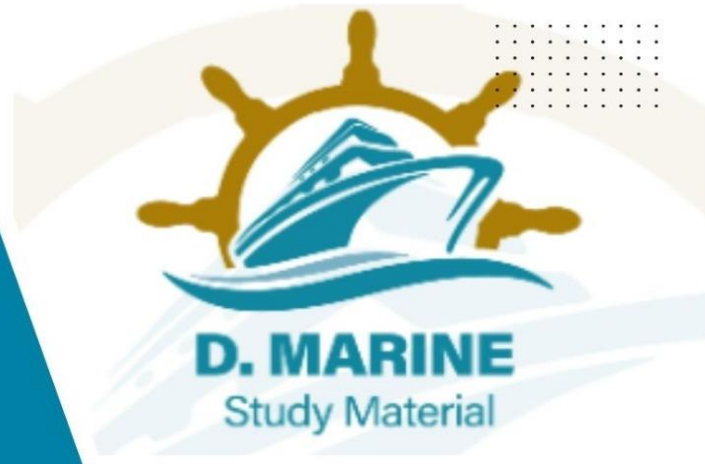
2024/NOV/Q9 | **2025/JUL/Q9**

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AUGUST - 2025

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 | 2025/AUG/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
2025/AUG/Q2

[Click Here to See the Answer](#)

Q3. (a) Explain why it is important to measure bearing clearance 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 | 2025/APR2/Q6 | 2025/AUG/Q3

[Click Here to See the Answer](#)

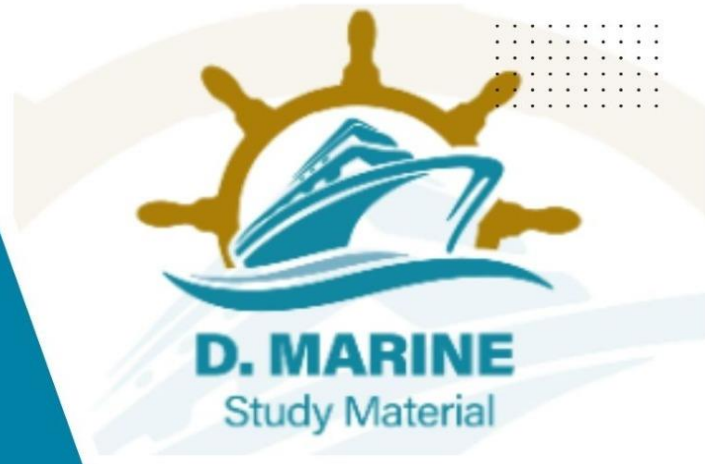
Q4. Describe following terms with respect to diesel engine with suitable diagram (a) Piston stroke (4)
(b) Swept volume (4)
(c) Clearance volume (4)
(d) Compression ratio (4)

2023/MAR/Q2 | 2023/NOV/Q1 | 2024/MAR/Q4 | 2024/DEC1/Q4
2025/AUG/Q4

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- 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** **2025/AUG/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 **2025/AUG/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/DEC1/Q7 **2025/APR2/Q7** **2025/AUG/Q7**

[Click Here to See the Answer](#)

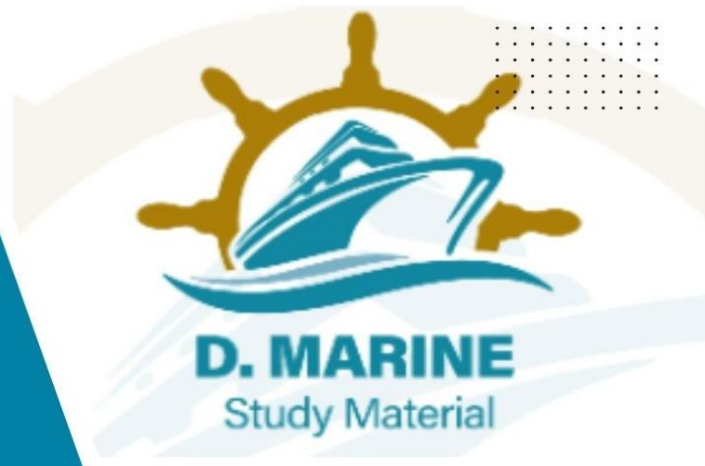
- Q8. (a) With an aid of a sketch briefly describe the important structural parts of 2 stroke main engine How are different structural parts held together (10)
(b) What is the function of cross head guides (6)

2023/MAY1/Q7 **2024/MAR/Q8** **2024/DEC1/Q8** **2025/AUG/Q8**

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- 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** **2024/DEC1/Q9**

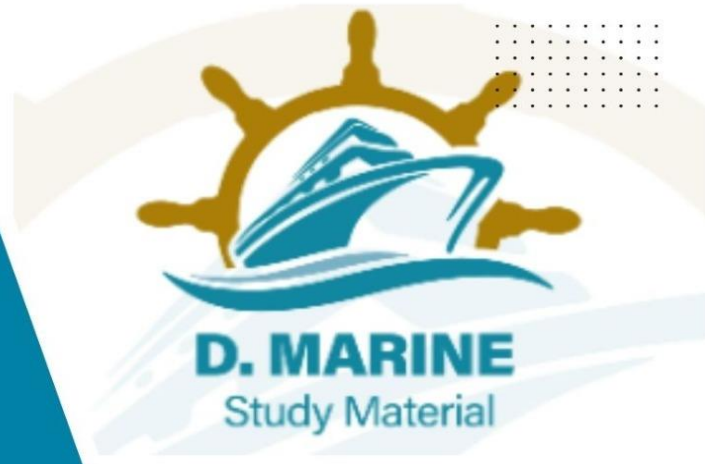
2025/APR2/Q9 **2025/AUG/Q9**

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SEPTEMBER - 2025

- Q1. (a) Sketch a main engine jacket water cooling system (8)
(b) State why chemical treatment of such systems 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** **2024/DEC2/Q1** **2025/SEP/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** **2024/DEC2/Q2** **2025/SEP/Q2**

[Click Here to See the Answer](#)

- Q3. (a) What is the function of charge air cooler on 2 stroke diesel engines
(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** **2024/DEC2/Q3** **2025/SEP/Q3**

[Click Here to See the Answer](#)

- Q4. (a) Describe a pressure relief device fitted on a diesel engine crankcase Are these devices fitted on all sizes of the engine (8)
(b) What attention do crankcase pressure relief devices require (4)
(c) Name the factors which must be present for an explosion to occur in the crankcase of a diesel engine (4)

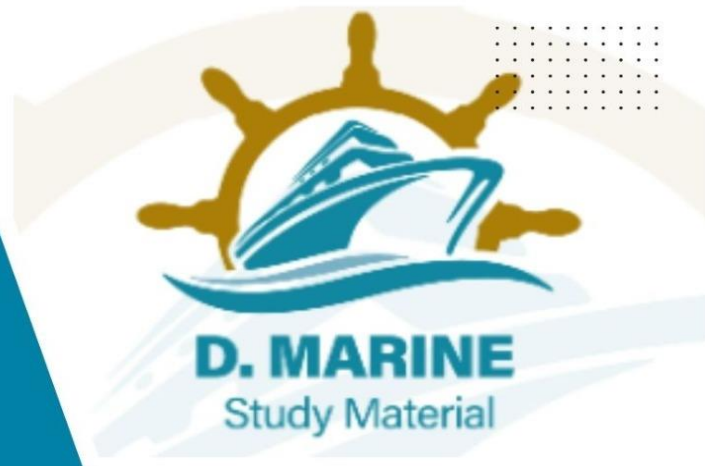
2024/DEC2/Q4 **2025/SEP/Q4**

[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)



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

2024/JAN/Q5 **2024/DEC2/Q5** **2025/SEP/Q5**

[Click Here to See the Answer](#)

Q6. (a) Sketch and describe the significance of chocks Give the three different types of chocks fitted in marine diesel engines Briefly describe the purpose of each (8)

(b) What are the different classification of chocks based on its material (4)

(c) What are resilient chocks Where are these fitted and why (4)

2024/DEC2/Q6 **2025/SEP/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 **2024/DEC2/Q7** **2025/SEP/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 **2024/DEC2/Q8** **2025/SEP/Q8**

[Click Here to See the Answer](#)

Q9. With reference to engine inlet and exhaust valves

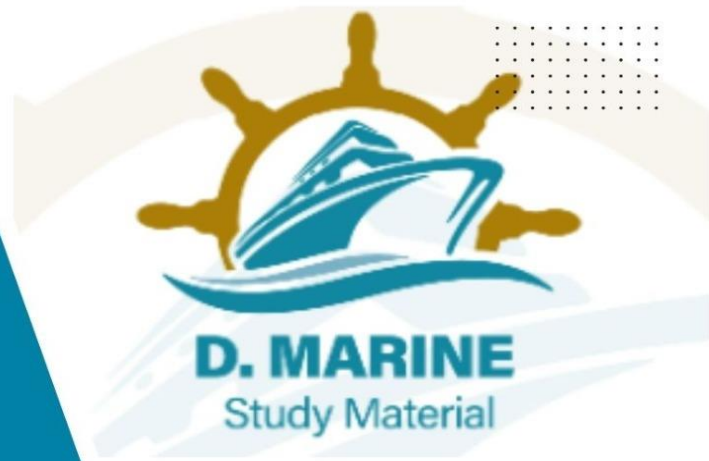
(a) State why tappet clearance is essential and why it must be periodically checked (6)

(b) List with reasons the likely consequences of excessive and insufficient tappet clearance (4)

(c) State how carbon build up can occur during engine running and indicate



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the possible effects on cylinder performance (6)

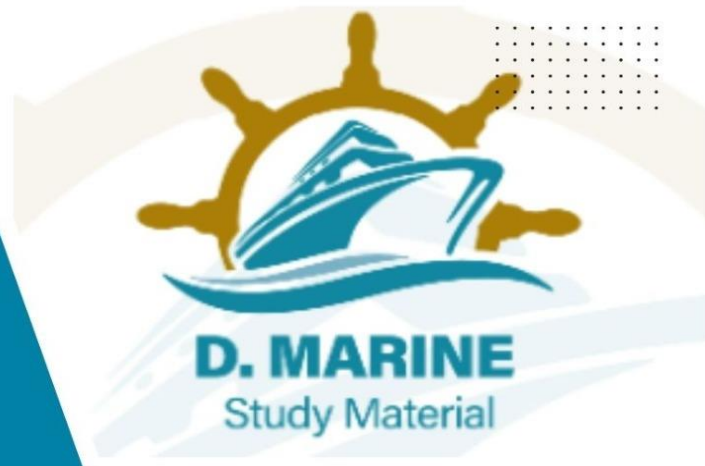
2024/DEC2/Q9 **2025/SEP/Q9**

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OCTOBER - 2025

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 **2025/OCT/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 **2025/OCT/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 **2025/JAN2/Q4** **2025/OCT/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 **2025/OCT/Q4**

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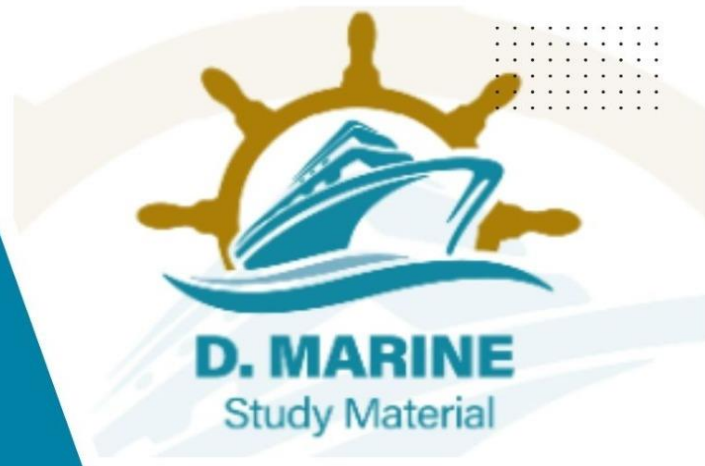
Q5. The maritime decarbonization is a priority and there are various ships that are operating on alternative fuels Discuss few potential alternate fuels by comparing their properties and list the advantages and disadvantages of at least three alternative fuel (16)

2024/JUL/Q5 **2025/OCT/Q5**

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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 **2025/OCT/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/JUL/Q7 **2025/OCT/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 **2025/OCT/Q8**

[Click Here to See the Answer](#)

Q9. Write short notes on the following

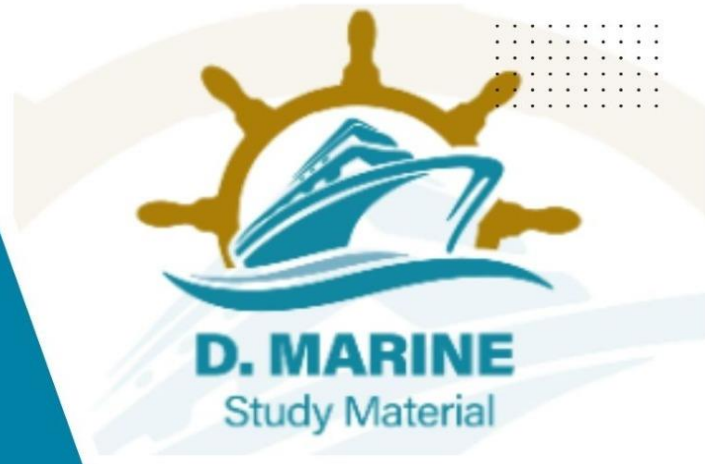
- (a) Effect of worn-out rings on oil consumption and blow past (5)
- (b) Cylinder liner wears (6)
- (c) Thermal loading of piston (5)

2024/JUL/Q9 **2025/OCT/Q9**

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NOVEMBER - 2025

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** **2024/NOV/Q1**

2025/JAN1/Q1 **2025/APR2/Q1** **2025/JUL/Q1** **2025/NOV/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 **2025/JAN1/Q2** **2025/NOV/Q2**

[Click Here to See the Answer](#)

Q3. 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)

2022/AUG/Q4 **2023/MAY1/Q2** **2023/OCT/Q4** **2024/FEB/Q7**

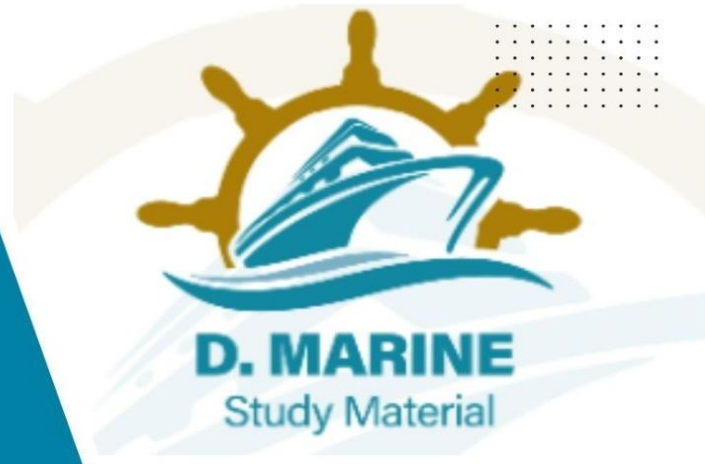
2025/JAN1/Q3 **2025/NOV/Q3**

[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



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(iv) Inducer (8)

2024/APR1/Q4 **2024/SEP1/Q4** **2025/JAN1/Q4** **2025/APR2/Q4**
2025/NOV/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 bearings Describe the procedure of taking crankshaft deflection (16)

2024/APR1/Q5 **2024/SEP2/Q5** **2025/JAN1/Q5** **2025/JUN/Q5**
2025/NOV/Q5

[Click Here to See the Answer](#)

Q6. Sketch and describe the operation of a crankcase oil mist detector What operational maintenance does this instrument require for efficient performance (16)

2023/JAN/Q9 **2023/MAY2/Q9** **2025/JAN1/Q6** **2025/NOV/Q6**

[Click Here to See the Answer](#)

Q7. (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 sketch variation of Pmax with VIT position (4)

2023/MAY1/Q9 **2024/MAR/Q1** **2025/JAN1/Q7** **2025/NOV/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

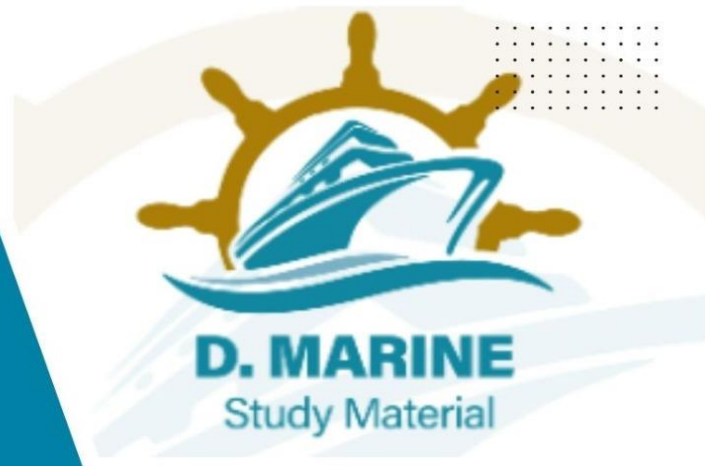
(iii) Calorific value

(iv) CCAI value

(v) Octane number



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(vi) Cetane number (10)

2024/APR1/Q8 **2025/JAN1/Q8** **2025/NOV/Q8**

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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)

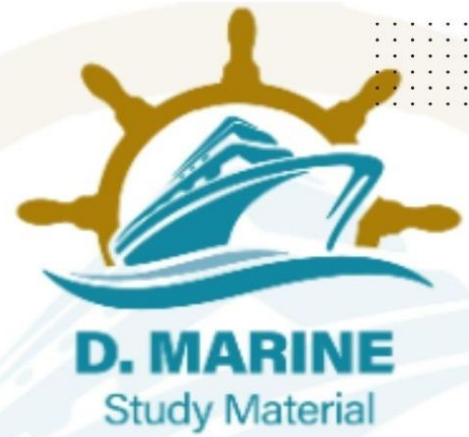
2022/AUG/Q1 **2023/MAY1/Q1** **2023/OCT/Q1** **2024/APR1/Q9**

2025/JAN1/Q9 **2025/NOV/Q9**

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DECEMBER - 2025

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** **2024/NOV/Q4**
2025/FEB/Q1 **2025/JUL/Q4** **2025/DEC/Q1**

[Click Here to See the Answer](#)

Q2. With reference to a 2-stroke slow speed main propulsion engine sketch a line diagram showing the 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** **2025/FEB/Q2**
2025/MAR/Q4 **2025/DEC/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** **2025/FEB/Q3** **2025/DEC/Q3**

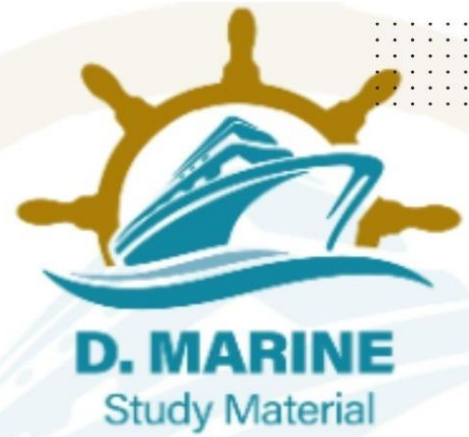
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Q4. (a) What are the causes of turbocharger surging How is it indicated to the watchkeeper (8)

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



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

2024/APR2/Q4 **2024/AUG/Q4** **2025/FEB/Q4** **2025/DEC/Q4**

[Click Here to See the Answer](#)

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** **2025/FEB/Q5** **2025/DEC/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** **2025/FEB/Q6** **2025/DEC/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** **2025/FEB/Q7** **2025/DEC/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)

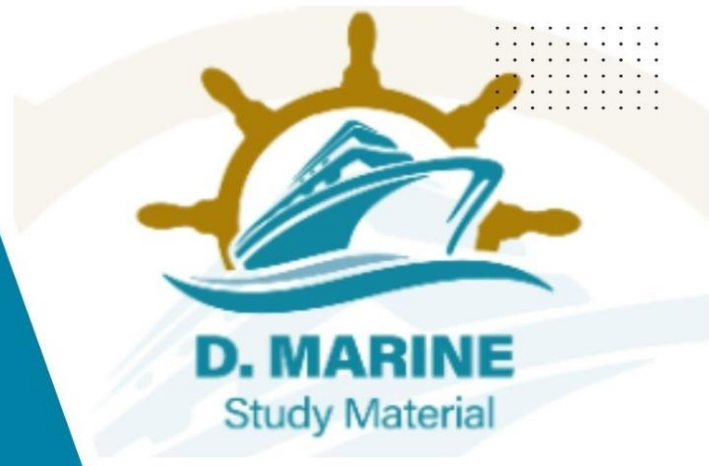
2024/APR2/Q8 **2024/MAY2/Q6** **2024/AUG/Q8** **2024/NOV/Q6**

2025/FEB/Q8 **2025/JUL/Q6** **2025/DEC/Q8**

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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** **2025/FEB/Q9** **2025/DEC/Q9**

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