

Indian Maritime University
(A Central University, Govt of India)
End Semester Examinations – June 2024
Programme Name: B Tech (ME)
Semester: IV
Subject Code: UG11T4403

Subject Name: Marine Internal Combustion Engines and Technology 1

Date: 04.06.2024

Max Marks: 70

Duration: 03 Hrs

Pass Marks: 35

General Instructions

- (i) All Sections (A, B & C) are to be attempted.
- (ii) Options, if any, are specified in respective section.

Section A

1. In a heat engine cycle, which of the following process occurs?
(a) heat is transferred from furnace to boiler
(b) work is produced in turbine rotor
(c) steam is condensed in condenser
(d) all the mentioned

2. In a diesel engine 500 joule of heat is supplied in a cycle. 250 Joule is lost to the surrounding. What is the thermal efficiency of the cycle.
(a)30% (b)40% (c)50% (d)60%

3. Which statement about diesel engine combustion is true?
(a) Combustion does not begin until the piston starts down on the power stroke.
(b) Maximum combustion pressure is reached before TDC
(c) Turbulence in the cylinder causes a delay in ignition
(d) Maximum cylinder firing pressure is not developed until the piston passes TDC.

4. When using medium-speed engines or high-speed engines for main propulsion, what is typically required?
(a)Some form of speed increment.
(b)Direct drive to the propeller.
(c)Variable-speed operation.
(d)Some form of speed reduction.

5. Precision engine bearing inserts are manufactured with a small portion of the bearing ends extending beyond the bearing housing or caps. The installation process of these bearings requires sufficient _____.

- (a) overlap (b) crush or snip (c) lap or lead (d) protrusion

6. The piston rod scraper box incorporated in a two-stroke/cycle, crosshead diesel engine serves to _____.

- (a) eliminate the necessity for an oil scraper ring
- (b) prevent side thrust and cylinder scoring
- (c) prevent sludge and dirty oil from entering the crankcase
- (d) scrape oil and carbon deposits off the cylinder walls

7. The closing of the exhaust valves used on a modern, large, low-speed, main propulsion diesel engine may be directly provided by _____.

- (a) large conical springs
- (b) compressed air pressure
- (c) hydraulic pressure
- (d) exhaust gas pressure

8. What components are typically used in place of piston rods and crossheads in smaller 4-stroke diesel engines?

- (a) Piston rods and connecting rod.
- (b) Connecting rods and wrist pins
- (c) Gudgeon pins and crankshaft
- (d) Trunk pistons and gudgeon pins

9. What is the purpose of a camshaft in an engine?

- (a) To control the timing of exhaust valve, inlet valve, and fuel injection.
- (b) To provide rotational power to the engine.
- (c) To regulate the engine's oil flow.
- (d) To control the engine's cooling system.

10. Supercharging is the process of

- (a) supplying the engine with air at a density greater than the density of the surrounding atmosphere
- (b) providing forced cooling air
- (c) injecting excess fuel
- (d) raising the exhaust pressure

Section B

Five Questions of 02 Marks each

11. Define the Lower and higher heating values of fuel and why the fuel has 2 heating values?

12. Sketch the P-V diagram for Dual Cycle and briefly explain the gas exchange process.

13. Name any four ways that Internal Combustion engines can be classified.

14. What is the purpose of (i) End chocks and (ii) Side chocks

15. Explain the function of charge air cooler in marine diesel engine

Section C

Seven Questions of 10 Marks each of which any 05 questions to be answered.

16.(a) An engine of 250 mm bore and 375 mm stroke works on Otto cycle. The clearance volume is 0.00263 m^3 . The initial pressure and temperature are 1 bar and 50°C . If the maximum pressure is limited to 25 bar, find the air standard efficiency of the cycle. (4 marks)

(b) Draw the valve timing diagram of a 4-stroke diesel engine. (6 marks)

17. a) Sketch and illustrate a fuel injector for a diesel engine in respect to its working principle, needle valve lift and adjustment. (7 marks)

b) What is sac in a fuel injector and why do engine manufacturers aim to achieve zero sac. (3 marks)

18. a) State and explain the various types of crankshafts that can be found in marine diesel engines. Explain the advantages of each kind. (6 marks)

b) Explain the purpose of crankshaft deflection and under what circumstances would they might need to be taken. (4 marks)

19 a) Describe with a neat sketch about the working principle of Thrust block (5marks)

b) Sketch and label various parts of a piston rod gland assembly what is the functional purpose of it. (5 marks)

20.(a) Sketch the main bearing for a large marine diesel engine and discuss about the forces acting on it.(5 marks)

(b) Sketch and describe a Tie bolt in position in a large engine. Define the purpose of tie bolts. (5 marks)

21. a) Explain the working of a hybrid turbocharger used in marine diesel engines with a simple diagram. (7 marks)

(b) What is the purpose of the Labyrinth Seal in a T/C. (3 marks)

22.

(a) State the importance of the auxiliary blower in the operation of a main engine (4 marks)

(b) What is the camshaft speed with respect to the crankshaft in both 2 stroke and 4 stroke engines and How is this typically achieved in both the cases? (3 marks)

(C) List out the functions of guide and guide shoes (3 marks)

