

**Indian Maritime University**  
**(A Central University, Govt of India)**  
**End Semester Examinations – June 2023**

**Programme Name: B Tech (ME)**

**Semester: IV**

**Subject Code: UG11T4403**

**Subject Name: Marine Internal Combustion Engines and Technology 1**

---

Date: 31.05.2023

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**

Ten MCQs/Fill in the Blanks of **01 Mark** each – Choose the correct answer as applicable.

Q1. For same compression ratio, the efficiency of dual combustion cycle is:

- a) Greater than otto cycle
- b) Less than diesel cycle
- c) Less than otto cycle and greater than diesel cycle
- d) Greater than both otto and diesel cycle

Q2. In a 4-stroke engine the camshaft runs at \_\_\_\_\_ rotational speed of the crankshaft.

- a. Twice
- b. Half
- c. Same
- d. None of the above

Q3. Sulphur in fuel oil results in the following type of wear in a cylinder liner

- a. Corrosive
- b. Abrasive
- c. Friction wear
- d. Scuffing

Q4. Transverse Girder in the bedplate of a 2-stroke marine engine encloses the

- a. Holding down bolts
- b. Main bearing saddle
- c. Cross head guides
- d. Scavenge ports

Q5. Catalytic Fines found in residual fuel mainly consist of

- a. Sodium + Vanadium
- b. Aluminium+ Silica
- c. Copper+ Silver
- d. Steel+ Cast iron

Q6. Charge air for combustion can be provided by the following means for a marine combustion engine:

- a. Turbocharger
- b. Auxiliary Blowers
- c. Both **a** and **b**
- d. Neither **a** or **b**

Q7. Medium speed trunk engines **do not** have the following:

- a. Connecting rod
- b. Piston Skirt
- c. Exhaust Valves
- d. Stuffing Box

Q8. Exhaust Valves on modern 2 stroke diesel engines are

- a. Hydraulically open and Air Spring close
- b. Air Spring open and hydraulically close
- c. Air Spring open and Air Spring close
- d. Hydraulically open and hydraulically close

Q9. **RMG-380** is a residual fuel used in marine combustion engines, where the **380** defines the:

- a. Density at 15°C
- b. Flash point in °C
- c. Acid number in mg/koh
- d. Viscosity at 50° C

Q10. A chain serves the following purpose in a marine internal combustion engine:

- a. Used to provide charge air for combustion
- b. Used to transmit motion from the crankshaft of the engine to the camshaft.
- c. Used to pressurise fuel for atomisation
- d. Used to absorb the thrust from the propeller and transmit to the hull.

### **Section B**

Five Questions of 02 Marks each

Q11. What are the constraints to increase the engine mean piston speed?

Q12. Distinguish clearly between: Flash point, Ignition point, and Fire point temperatures of a fuel oil.

Q13. Why tie rods are used for Marine Diesel Engines?

Q14. What is surging of a turbocharger in a marine diesel engine. State any two reasons as to why it may occur.

Q15. Explain the reasons for crankshaft misalignment.

### **Section C**

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

Q16. a. What is compression ratio and fuel cut-off ratio in diesel cycle? What is the effect of fuel cut off ratio in cycle thermal efficiency? (4 marks)

b State the classification of engines based on the following parameters: Ignition System, Strokes/Cycle, method of Charging and Cylinder Arrangement (4 Marks)

c. in a diesel engine 600 Joule heat is added by burning fuel, 360 joule heat rejected in surrounding in a cycle. Calculate thermal efficiency of the engine. (2 Marks)

Q17. a. Explain the purpose of holding down bolts. (2 Marks)

- b. Explain the consequences of running an engine with slack holding down bolts. (4 Marks) c. Describe the procedure for tightening the tie bolts. (4marks)

Q18. a. Draw a simple sketch of a cross head in a 2-stroke engine and label it. (4Marks) b. Why is it difficult to lubricate X-head bearing of a diesel engine. (3 Marks) c. Explain two methods which are in use to overcome this problem. (3 Marks)

Q19. a. What materials are used in the coatings of Piston Rings for large slow running Diesel Engines?(3 Marks) b. State the clearances that are necessary in piston rings and how they are measured.(4 Marks) c. Give possible causes for failure of piston rings in service. (3 Marks)

Q20. In reference to the combustion process in an engine cylinder, describe:

- a) The need for atomisation. (2 Marks)
- b) The degree of penetration dependent on atomisation.( 2 Marks)
- c) How better turbulence is obtained inside the combustion chamber.( 2 Marks)
- d) Why ignition delay happens during the combustion process.( 2 Marks)
- e) Why the sulphur, although combustible, is an undesirable element in a fuel.( 2 Marks)

Q21. Sketch valve timing diagram for a 2-stroke engine and a 4 stroke engine clearly marking the operation of exhaust valves, Inlet valves/ports and fuel injectors with respect to TDC or BDC. (5+5)Marks

Q22. Sketch and explain the Exhaust valve fitted on a typical 2-stroke propulsion engine (10 Marks)