Indian Maritime University

(A Central University, Govtt of India)

End Semester Examinations – June 2025

Programme Name: B Tech (Marine Engineering)

Semester: IV

Subject Code: UG11T4403

Subject Name: Marine Internal Combustion Engines and Technology 1

Date: 04.06.2025	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 (1mark each)

Choose the correct answer as applicable.

1. Which thermodynamic cycle is utilized in the operation of steam turbine plants?

A) Rankine cycle

B) Carnot cycle

C) Dual Combustion Cycle

D) Joules cycle

2. In Otto cycle, the compression and expansion processes are theoretically modelled as:

a) Isothermal processes
b) Isobaric processes
c) Isochoric processes
d) Adiabatic processes

3. What are the typical units used to express calorific value?

a) Kilograms per cubic meter
b) Joules per kilogram
c) Calories per liter
d) Kilocalories per kilogram

4. In which of the following air standard cycle, heat is added partly at constant volume and partly at constant pressure.?

a) Joule cycle
b) Otto cycle
c) Dual cycle
d) Diesel cycle

5. The distance fuel droplets travel from the injector nozzle into the combustion chamber is termed as

A) Swirl
B) Penetration
C) Turbulence
D) Mixing

6.If the normal Speed of an Engine is 600RPM it is considered as

A) Slow Speed Engine
B) Medium Speed engine
C) High Speed Engine
D) Super Long stroke engine

7. The Engine Bed Plate is secured to tank top through the use of

A) Thrust bearing
B) Holding Down Bolts
C) Tie rod bolts
D) Flange Coupling

8. The Purpose of Gudgeon pin is to
A) Connect piston and connecting rod in Cross head engines
B) Connect piston and connecting rod in Trunk Piston engines
C) Connect piston rod and cross Head in low speed engines
D) Connect Crank Shaft and big end of connecting rod

9. Scavenging Efficiency is highest in which of the following system

A) Uniflow system
B) Cross flow System
C) Loop flow system
D) Mixed System

10 Modern marine turbochargers use a ---type of compressor

a) Radial flow
b) Axial flow
c) Mixed flow
d) Turbulent flow

Section B (2 Marks each)

11. Illustrate ideal dual combustion cycle on a p-v plane
12. What are the forces that act on the bed plate?
13. why non-metallic chocking is considered superior to metallic chocking.
14. What is the function of thrust block
15. State two methods of driving cam shaft of 2stroke Cross head type marine engines

Section C

Answer any five questions

16.(a) A marine diesel engine operates at an input power of 7500 kW. During operation, 1600 kW of energy is lost as heat through the exhaust gases,2900 Kw is lost through cooling water and 500 kW is lost as heat due to friction and other inefficiencies. Calculate:

(i)The amount of useful power output generated by the engine.

(ii)The overall thermal efficiency of the engine. (5 marks)

b) Sketch, valve timing diagram for a four-stroke marine diesel engine illustrated, with all critical points clearly marked. (5 marks)

17 (a) Why is the Marine engine cylinder liner manufactured independently of the cylinder block (4 marks)

(b) Sketch and describe a cross section of a main engine structure comprising bedplate, frames and entablature, showing the tie-bolts in position (6 marks)

18 (a) Describe with the aid of sketches

(i) Pulse type turbocharger system (ii) Constant pressure turbocharger system (5 marks)

(b) Discuss any two current trends in turbocharger development? (5Marks)

19. (a) Sketch a cross section of Main Bearing assembly of Marine Diesel engine secured by jack bolts? (5 marks)

(b) What are the potential causes of main bearing failures in a two-stroke marine diesel engine? (5 marks)

20. (a) What are the different types of crankshafts used in diesel engines (6 marks)

(b) What factors contribute to crankshaft misalignment of a marine Propulsion engine? (4 marks)

21.(a) Why is it challenging to lubricate the crosshead bearing effectively? (3 marks)

(b) Sketch and label the various parts of the piston rod gland assembly? (7 marks)

22.(a) Define the scavenging process and explain its types with a neat sketch. (5 marks)

(b) Explain the methods of turbocharger washing when in operation (5 marks)

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