

Indian Maritime University
(A Central University, Govt of India)
End Semester Examinations – June 2026
Programme Name: B Tech (ME)

Semester: VI

Subject Code: UG11T4604

Subject Name: MARINE PROPULSION PLANT & AUXILIARY MACHINERY
– PERFORMANCE ASSESSMENT

Date: 08.06.2026	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.

1. Pre-purging and post-purging of the Aux. Boiler furnace is required :- **(1 Mark)**

- (a) To check the performance of FD Fan before starting
- (b) To try out alarms & trip before firing the Boiler
- (c) To remove unburnt residual fuel and gases from the furnace
- (d) None of the above

2. Which type of indicator card is used to analyze fuel injection timing and peak combustion pressure? **(1 Mark)**

- (a) Light Spring Diagram
- (b) Power Card
- (c) Draw Card (Out-of-phase diagram)
- (d) Compression Diagram

3. What is the main difference between a purifier and a clarifier? **(1 Mark)**

- (a) Purifier removes both unwanted liquids and some solids, while Clarifier removes the remaining solids
- (b) Purifier is slower, while Clarifier is faster
- (c) Purifier has no bowl, while Clarifier does have a bowl
- (d) Purifier uses filters, while Clarifier uses a centrifuge

4. Which component is responsible for detecting the flame in an oil-fired auxiliary boiler burner? **(1 Mark)**

- (a) Boiler safety valve.
- (b) Photoelectric cell
- (c) Pressure transmitter.
- (d) Thermocouple.

5. Following Number is a measure of Ignition Lag in a Diesel Engine **(1 Mark)**

- (a) Reynolds Number
- (b) Avogadro Number
- (c) Octane Number
- (d) Cetane Number

6. With reference to M/E Power calculation on board, the indicated power (IP) of a Marine Diesel Engine unit is the total power developed inside the cylinder through combustion, calculated as: $IP = P_m L A N$**(1 Mark)**

- (a) where IP is the product of Mean Effective Pressure, Length of Stroke, Area of Indicator instrument cylinder and RPM of the M/E crankshaft
- (b) where IP is the product of Peak Pressure, Length of Stroke, Area of Cylinder and RPM of the M/E crankshaft
- (c) where IP is the product of Mean Effective Pressure, Length of Cylinder, Area of Cylinder and RPM of the M/E crankshaft
- (d) where IP is the product of Mean Effective Pressure, Length of Stroke, Area of Cylinder and RPM of the M/E crankshaft

7. What is a "crash stop" test during sea trials **(1 Mark)**

- (a) Stopping the vessel from full ahead to full astern to measure stopping distance/time
- (b) A Failure of hydraulic steering gear
- (c) A Sudden loss of Electric power
- (d) Emergency shut down of main Engine

8. Which of the following would most likely cause the compressor motor to draw excessive current? **(1 Mark)**

- (a) Low ambient temperature
- (b) Worn-out piston rings
- (c) Dirty suction filter
- (d) Excessive discharge pressure or mechanical overload

9. What is indicated if a purifier takes too long time to reach full operational speed **(1 Mark)**

- (a) Sealing water pressure too high

- (b) Excessive back pressure
- (c) Inlet temperature too low
- (d) Friction pads worn off

10. During parallel operation of Generators, unequal reactive load sharing is corrected by: **(1 Mark)**

- (a) Adjusting excitation
- (b) Adjusting governor droop
- (c) Adjusting fuel rack
- (d) Adjusting engine speed

Section B

Five Questions of 02 Marks each

11. Define MCR (Maximum Continuous Rating) for a Marine propulsion Engine **(2 Marks)**

12. What is the effect of "bumping clearance" on the performance of a Main Air Compressor? How is it measured and adjusted? **(2 Marks)**

13. Define Governor Droop in Marine Generators **(2 Marks)**

14. What is a Light Spring Diagram? How is it obtained? What performance assessment of a Main Engine can be carried out using it? **(2 Marks)**

15. Describe evaporation capacity of a marine boiler and how it is commonly expressed **(2 Marks)**

Section C

Seven Questions of 10 Marks each **(ANY 5 QUESTIONS TO BE ANSWERED)**

16. (a) Describe the power evaluation calculation of Main Engine using PLAN formula **(5 Marks).**

16. (b) Explain the basic working of crank shaft angle encoder **(5 Marks)**

17. (a) In order to carry out proper Heat Exchanger Performance Assessment elaborately describe the procedure for determining the Overall Heat Transfer Coefficient, U. Sketch a simple shell & tube type heat exchanger illustrating the various media and their nomenclature. **(4 Marks)**

17. (b) For a seawater cooled Central cooler and a Main Engine F.O. Heater, explain how can one broadly assess their performance during one's regular monitoring (watch-keeping) schedule? **(3 Marks)**

17. (c) Based on the above observations, briefly describe how in each heat exchanger this drop in performance is rectified during their maintenance **(3 Marks)**

18. (a) Discuss the Emergency Generator Power Management Onboard Ships. including SOLAS requirements, **(4 Marks)**

18. (b) Emergency Switchboard power Management **(3 Marks)**

18. (c) Emergency Load supplied **(3 Marks)**

19. (a) What is Afterburning in a Main Engine? Explain it's effect on Indicator cards with a suitable sketch? **(4 Marks)**

19. (b) What is Specific Fuel Oil consumption and list the factors affecting it? **(3 Marks)**

19. (c) How is synchronisation carried out with Generators on board ships? **(3 Marks)**

20. (a) Explain the procedure for selecting the gravity disc in a heavy oil purifier when the fuel oil density changes. **(5 Marks)**

20. (b) Explain the steps involved in performing manual desludging while the purifier is in operation. **(5 Marks)**

21. (a) Discuss the three performance assessment characteristics of an Aux. Boiler and how can each of these characteristics be ascertained and kept in good order? **(5 Marks)**

21. (b) With reference to Aux. Boiler fitted on board ships, explain the following performance flaws, how are they detected and possible solutions for the same? **(5 Marks)**

22. (a) With reference to Air Compressor performance assessment onboard ships, elaborately explain the significance of the following: -

- | | |
|--------------------------------|---------------------|
| i) Air temperature | ii) Oil level |
| iii) Cooling water temperature | iv) Stage pressures |

(4 Marks)

22. (b) Discuss the probable causes for the following abnormal symptoms observed during routine watch keeping rounds on an Aux. Air Compressor: -

- (i) First Stage Suction Pressure Low
- (ii) Second Stage Discharge Pressure High
- (iii) First Stage Relief Valve lifting

(6 Marks)

" 21. (b) With reference to Aux Boiler fitted onboard ships, explain the following performance flaws, how they are detected and possible solutions for the same.

1.Low steam pressure

2.Thick Black smoke

3.Water carryover

4.High Stack/Flue Gas Temperature

5.Excessive Vibration / Burner Instability"

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