Indian Maritime University

(A Central Univeqrsity, Govt of India)

Supplementary Examinations – March/April 2025

Programme Name: B Tech (ME)

Semester: Sixth

Subject Code: UG11T4603

Subject Name: Marine Propulsion Plant: Configuration And Characteristics

Date: 25.04.2025	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

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

1. What is the primary purpose of quill shafts in marine gearing?

a) Increase weight

b) Absorb misalignment

c) Reduce gear defects

d) Improve lubrication

2. How is misalignment checked in gear teeth?

a) Checking for flaking

b) Use of a flexible coupling

c) Blueing one tooth and viewing the mating teeth

d) Checking for interference wear

3. How does a "fouled hull" affect a ship's propeller curve?

a) Shifts the curve downward

b) Shifts the curve to the left

c) Shifts the curve to the right and upward

d) Has no effect on the curve

4. What is a key advantage of Diesel Engine (without Gear) - Direct Drive propulsion?

a) Improved fuel efficiency

b) Simplicity and potentially higher efficiency due to no gear losses

c) Enhanced manoeuvrability

d) Lower installation costs

5. What is the primary purpose of the bollard pull curve in an engine load diagram?

a) To represent the maximum engine power

b) To illustrate the engine's fuel consumption

c) To measure the vessel's pulling power

d) To indicate the engine's torque output

6. What is the primary advantage of Gas Turbine-Electric (GTE) propulsion in ships?

a) High fuel efficiency at low loads

b) Quick start-up and response to power changes

c) Low emissions at all power levels

d) Minimal vibrations during operation

7. What is a critical factor in determining the efficiency of electric propulsion systems for ships?

a) Manoeuvrability

b) Power distribution

c) Fuel type

d) Regulatory approvals

8. While running, a synchronous motor is compelled to run at synchronous speed because of

(a) Damper winding in its pole faces

(b) Magnetic locking between stator and rotor poles

(c) Induced e.m.f. in rotor field winding by stator flux

(d) Compulsion due to Lenz's law

9. Which propulsion configuration is known for its high overall efficiency by utilizing waste heat for power generation?

a) Combined Diesel and Gas (CODAG)

b) Combined Gas and Gas (COGAG)

c) Combined Gas turbine And Steam turbine (COGAS)

d) Gas Turbine Mechanical Drive

10. In the engine load diagram what is the slope (value of i) of the torque limit line

A)0

B)2

C) 3

D)1

Section B

Five Questions of 02 Marks each

11. How does the load diagram of an engine help engineers in understanding the relationship between power output and load handling?

12. Explain the concept of "Redundancy" in the context of ship propulsion systems and its significance.

13. Explain the advantage of the dual tandem arrangement in reduction gearing?

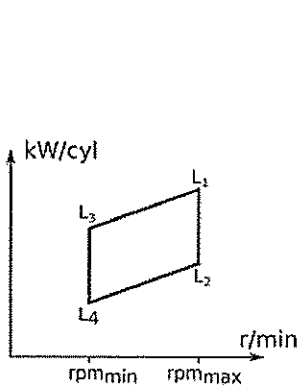
14. Explain the operational flexibility provided by Combined Diesel-Electric and Gas (CODLAG) propulsion systems?

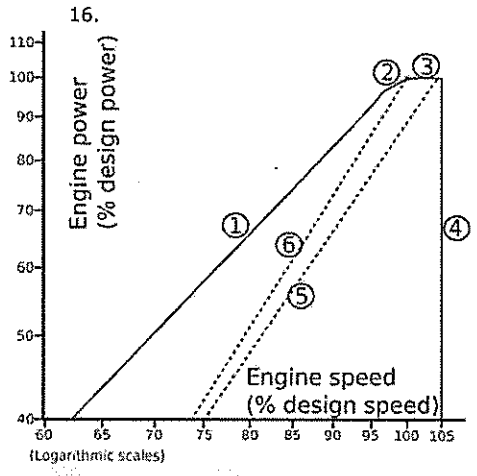
15. How does a "heavy propeller" affect a ship's performance?

Section C

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

16.





16a) Explain the significance of the area bounded by L1-L2-L3-L4 [3]
16b) Explain the significance of the lines 1, 2, 3, 4, 5, 6 [3]
16c) Explain the consequence of running an engine for extended periods to the left of line 1 and right of line 4 [2+2]

17. a) Write a short note to bring out various parameters affecting performance of a Gas turbine?
b) Explain the importance of "enthalpy drop test" and the parameter affecting steam rate for steam turbine? (6+4)

18. (a) Draw typical Rate of revolution versus power diagram showing the interaction of ship- engine- propeller (4)
18. (b) Explain the influence of the following on the power curve for ship and propeller.

(i) Number of Propeller blades (3)
(ii) Diameter of the propeller (3)

19. a) State the advantages of installing Electric drive propulsion systems?

19 b) Sketch and explain the layout of a Diesel Electric propulsion system?

(4 + 6)

20. With reference of ships Load Diagram:
a) Derive and explain the values of i with power formula and with the help of propeller law (log PB = log C + i log n) and state how the i values correspond to significant numbering on engine load diagram. With the help of a Brake power vs RPM graph and plot the i values and hence find and obtain the load diagram

b) Explain the various types over-loading that may be experienced by a diesel engine propulsion? (7 + 3)

21. With reference to the use of Reduction Gears in ships propulsion:

a) Compare and contrast the gear layouts of tandem and epicyclic gearing in terms of efficiency and maintenance?
b) Discuss the significance of flexible couplings in reduction gearing systems and elaborate on the different types of flexible couplings used? (5+5)

22. With reference to selection of propulsion plant for ships:

a) What are the key factors to consider when selecting the main propulsion system for a ship?
b) How do different propulsion options for ships, such as diesel engines, gas turbines, nuclear propulsion, and electric propulsion, compare in terms of fuel efficiency, environmental impact, operational flexibility, and cost?
(3 + 7)