Indian Maritime University

(A Central University, Govt of India)

End Semester Examinations – June 2024

Programme Name: B Tech (ME)

Semester: VI

Subject Code: UG11T4603

Subject Name: Marine Propulsion Plant: Configuration And Characteristics

Date: 03.06.2024	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

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. In order to ensure the reduction of greenhouse gasses (GHG) from shipping, the IMO have introduced the energy efficiency design index (EEDI) as an amendment to annex VI of MARPOL, EEDI reduction measures includes
a) speed reduction
b) reducing required power
c) changing fuel type

d) all the above

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. The ship-owners are moving towards hybrid propulsion system with use of Battery energy storage system (BESS) in combination with conventional system, the main advantage of BESS is/are_____.
a). Lower emission
b). Compensating peak load requirements
c). maintain spinning reserve
d). All the above

8 A trailing edge adjustment is adopted to eliminate heavy running of propeller, this process involves
a). Addition of pre-swirl fins
b). Decreasing mean pitch of propeller
c). Decreasing engine rpm
d). All the above

9. The benefits of using diesel electric propulsion system includes
a). Lower emission
b). Higher sfoc
c). Higher Vibration
d). all the above

10. Selection of number of blades in propeller is related to a large number of factors including number of blades, the increase in number of blades results in _____ .
a). Increase in propeller efficiency
b). Decrease in propeller efficiency
c). No change in propeller efficiency
d). none of above

Section B

Five Questions of 02 Marks each

11. Define propeller law, how resistance of a vessel is related to speed of vessel at lower Froude number.

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. What do you mean by heavy running of fixed pitch propeller, state factors that lead to heavy running of propellers.

Section C

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

16. (a). Sketch and describe Diesel –Electric propulsion system of a vessel, how RPM of propeller is varied in case of fixed pitch propeller. (5)
(b). Sketch and describe Hybrid propulsion system of a vessel. (5)

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

18. (a) Draw typical Rate of revolution versus power diagram showing the interaction of ship- engine- propeller (4)

(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). Describe the process of engine-propeller matching in ship propulsion systems. (5)

(b). Discuss the importance of optimizing the engine-propeller matching for fuel efficiency and performance. (5)

20. What is an engine load diagram? Sketch and explain a load diagram indicating for an engine? Which are the zone boundaries for overload operation and any limits in such operations? (10)

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? (5)

b) Discuss the significance of flexible couplings in reduction gearing systems and elaborate on the different types of flexible couplings used? (5)

22. (a). Explain in details about sea trials of a vessel and its purpose. (5)

(b). For sustainability, a vessel has to satisfy EEDI requirements stipulated by IMO , what measures can be taken to full fill EEDI requirements if vessel found not meeting IMO requirements while carrying out sea trails. (5)