Indian Maritime University

(A Central University, Govt of India)

End Semester Examinations – December 2023

Programme Name: B. Tech(Marine Engineering)

Semester: VI

Subject Code: UG11T3607

Subject Name: Marine Steam Engineering

Date: 28.11.2023 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.

1. A bridge gauge is normally used to determine turbine

a) bearing oil clearance
b) diaphragm tip clearance
c) blade axial clearance
d) bearing wear

2. In a cross-compound main propulsion unit, the astern turbine is usually installed at the _____.

a) low pressure end of the low pressure turbine
b) high pressure end of the low pressure turbine
c) low pressure end of the high pressure turbine
d) high pressure end of the high pressure turbine

3. Which of the following types of main propulsion Turbines is most likely to require a dummy piston or cylinder arrangement to counter balance axial thrust?

a) Double flow impulse turbine
b) Multistage impulse turbine
c) Double flow reaction turbine
d) Single flow reaction turbine

4. A steam nozzle converts
   a) Heat energy of steam into kinetic energy
   b) Kinetic energy into heat energy of steam
   c) Heat energy of steam into potential energy
   d) Potential energy into heat energy of steam

5. A condenser in a marine steam propulsion plant
   a) Increases expansion ratio of steam
   b) Reduces back pressure of steam
   c) Reduces temperature of exhaust steam
   d) All of these

6. In a throttling process
   a) Steam temperature remains constant
   b) Steam pressure remains constant
   c) Steam enthalpy remains constant
   d) Steam entropy remains constant

7. What is the usual pressure of gland sealing steam?

   a. 0.5 to 1.5 bar
   b. 2 to 4.5 bar
   c. 5 to 9.5 bar
   d. 10 to 15 bar

8. Which of the listed conditions is responsible for causing the gland leak off steam from a propulsion turbine to pass through the gland exhaust condenser?
   a) Steam pressure from the low pressure turbine.
   b) Steam pressure from the high pressure turbine.
   c) Compressed air in the air pilot.
   d) The use of a gland exhauster fan.

9. Metallic packing rings are installed in turbine diaphragms to prevent _____.
   a) inter stage steam leakage along the shaft
   b) air from entering the turbine casing
   c) pressure build up on both sides of the diaphragm
   d) steam from escaping to the atmosphere

10. Where are moisture shields located in a main propulsion steam turbine?
   a) Around throttle valve stems
   b) At the steam strainer inlet
   c) At the inner stage diaphragms
   d) On the last stages of the rotor blading

Section B

Five Questions of 02 Marks each

11. Where is the de- aerator located on ship steam turbine Plant & why?

12. Why reduction gear is used on ship steam turbine propulsion plant?

13. What are Shroud Rings and Lacing Wires? Why they are fitted?

14. What are the desired properties of turbine oil?

15. How is velocity compounding accomplished in a steam turbine?

Section C

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

16. (a).
Draw neatly and label the general arrangement of a marine steam turbine propulsion system showing the following
a) The flow of steam from boiler to steam turbine
b) The return of condensate from condenser to boiler
c) Lubricating oil flow from sump to gravity tank and back to sump through bearings
The question carries marks for neatness and proper labelling of the various parts of the system.
(7 Marks)
16.(b).What is the use of an ejector in the steam turbine system? (3 Marks)

17.(a). With respect to the reduction gear used for Turbine explain the following terms with its significance
i) Backlash
ii) Hunting Gear
iii) Herringbone gear
iv) Pinion Gear
v) Quill Shaft. (5 Marks)
17.(b). Explain with a simple sketch of turbine lubrication system? (5 Marks)

18.(a). With respect to gland sealing arrangement. With a simple sketch explain a typical HP OR LP gland seal arrangement. (5 Marks)
18(b). Explain, with sketch a gland sealing steam arrangement provided for steam turbine? (5 Marks)

19. Write short notes on:
i) Double Flow Turbine
ii) Back Pressure Turbine
iii) Reheat Turbine
iv) Extraction Turbine (4 x 2.5 Marks)

20. (a) What is the role of a condenser in steam plant? (3 Marks)
(b) How does the effect of a) Change of sea water temperature b) Circulating water quantity c) Change of main engine power effects the performance of the condenser? (7 Marks)

21. Using suitable sketches describe how turbine casing expansion arrangements are provided. Explain how connecting steam pipe expansions are taken up? (10 Marks)

22.(a). Describe with a simple sketch about the typical location of drains for a cross compounded turbine? (5 Marks)
22.(b). Explain with a suitable sketch of the scoop system used for condense cooling? (5 Marks)