

Indian Maritime University
(A Central University, Govt of India)
End Semester Examinations – June 2025
Programme Name: B Tech (Marine Engineering)
Semester: IV
Subject Code: UG11T4402
Subject Name: Marine Turbo Machinery

Date: 02.06.2025

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.
- (iii) Steam tables & Mollier chart can be used.

Section A

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

1. In gas turbine, intercooler is placed _____
 - a) before low pressure compressor
 - b) in between low pressure compressor and high pressure compressor
 - c) in between high pressure compressor and turbine
 - d) none of the mentioned
2. For an impulse steam turbine with perfectly smooth and symmetrical blades, the maximum diagram efficiency is:
 - (a) $\cos^2 \alpha_1$
 - (b) $\cos^2 (\alpha_1 + \beta_2)$
 - (c) $\cos \alpha_1$
 - (d) $(2 \cos^2 \alpha_1) / (1 + \cos^2 \alpha_1)$
3. In a gas turbine, _____ design of combustion chamber (combustor) is the most efficient design.
 - (a) Can combustor
 - (b) Can-annular combustor
 - (c) Multi-can combustor
 - (d) Annular combustor

4. De-Laval turbine is a
- Single rotor impulse turbine
 - Reaction turbine
 - Axial Flow turbine
 - Multi rotor impulse turbine
5. In centrifugal compressor, the diffuser converts _____
- Kinetic energy into pressure energy
 - Pressure energy into Kinetic energy
 - Kinetic energy into Mechanical energy
 - Mechanical energy into Kinetic energy
6. For a Parson's reaction turbine, if α_1 and α_2 are fixed blade angles at inlet and exit respectively and β_1 and β_2 are the moving blade angles at the entrance and exit respectively, then
- $\alpha_1 = \alpha_2$ and $\beta_1 = \beta_2$
 - $\alpha_1 = \beta_1$ and $\alpha_2 = \beta_2$
 - $\alpha_1 < \beta_1$ and $\alpha_2 > \beta_2$
 - $\alpha_1 = \beta_2$ and $\beta_1 = \alpha_2$
7. The degree of reaction is given by
- Heat drop in moving blades / total heat drop in the stage
 - Heat drop in fixed blades / total heat drop in the stage
 - Heat drop in moving blades / Heat drop in fixed blades
 - total heat drops in the stage / Heat drop in fixed blades
8. In gas turbine, what is the function of Re-heater?
- Heat inlet air
 - Heat exhaust gases
 - Heat air coming out of compressor
 - Heat gases coming out of high pressure turbine
9. The mass flow rate of air compressed in axial flow compressor is _____ centrifugal compressor.
- lower than
 - higher than
 - same as
 - unpredictable
10. Choose the correct statement.
- Gas turbine requires a lot of cooling water
 - Gas turbine is capable of rapid start-up and loading
 - Gas turbines has flat efficiency at part loads
 - Gas turbines have high standby losses and require a lot of maintenance

Section B

Five Questions of 02 Marks each

11. Explain model and prototype?
12. State & explain in brief on any 2 types of blade fastening?
13. State, the different types of combustion chambers used in Gas turbines?
14. What is the use of Cordier diagram?
15. What is the purpose of using shrouding in steam turbine blades?

Section C

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

16. (a) Bring out at least six differences between an Impulse turbine and Reaction turbine. (3 Marks)
- (b) Draw and explain the schematic diagram of pressure-velocity variation in different types of compounding in Impulse Turbine. (7 Marks)
17. In a stage of an impulse turbine provided with a single row wheel, the mean diameter of the blade ring is 800 mm and the speed of rotation is 3000 rpm. The steam issues from the nozzle with a velocity of 300 m/s and the nozzle angle is 20° . The rotor blades are equiangular and the blade friction factor is 0.86. What is the power developed in the blading when the axial thrust on the blades is 140 N? (10 Marks)
18. (a) Write a short note on Gas turbine propulsion option for ship propulsion. Write advantages and Disadvantages of Gas Turbine Propulsion? (6 Marks)
- (b) Draw the reheat cycle and T-s diagram for gas turbine? (4 Marks)
19. (a) Derive Euler's Turbomachinery equation? (6 Marks)
- (b) Draw and explain characteristics curve for Compressor? (4 Marks)
20. (a) List the methods to improve thermal efficiency of gas turbine and explain any one of them in detail? (4 Marks)
- (b) Write a short note on turbine thrust bearing? (3 Marks)
- (c) List out the various advantages and disadvantages of gas turbine over diesel and steam as propulsion plant options? (3 Marks)
21. (a) Explain Pulse Turbocharging system? (7 Marks)
- (b) List out various advantages and disadvantages of constant pressure turbocharging system? (3 Marks)
22. (a) Explain the concept of blade cooling in gas turbines? (5 Marks)
- (b) Explain starting and ignition system in gas turbine? (5 Marks)

