

PARUL UNIVERSITY
FACULTY OF ENGINEERING & TECHNOLOGY
B.Tech. Summer 2018-19 Examination

Semester: 5
Subject Code: 03101302
Subject Name: Propulsion-I

Date: 17/05/2019
Time: 10:30am to 1:00pm
Total Marks: 60

Instructions:

1. All questions are compulsory.
2. Figures to the right indicate full marks.
3. Make suitable assumptions wherever necessary.
4. Start new question on new page.

Q.1 Objective Type Questions - (Each of one mark)**(15)**

1. Name the main Components of centrifugal compressor.
2. An axial flow compressor is suitable for _____
 - (a) high volume flow rates with a small pressure rise
 - (b) high volume flow rates with high pressure rise
 - (c) low volume flow rates with low pressure rise
 - (d) low volume flow rates with high pressure rise
3. In axial flow turbine, rotor imparts the _____ energy.
4. Define Flow co-efficient.
5. _____ turbines is also called as parallel flow turbine.
6. How many Types of turbomachines?
7. Define Degree of Reaction.
8. How many types of axial flow turbine?
9. In radial flow turbine, define Cantilever turbine.
10. Define Loading Co-efficient.
11. What is a positive displacement machine?
12. What is turbomachines?
13. In centrifugal compressor, fluid flow enters _____ and discharged radially.
14. A pair of fixed blade and rotor blade in axial flow compressor is called as _____.
(a) step, (b) pair, (c) stage, (d) state
15. In radial flow turbine, 90° IFR Turbine is similar to the _____ Compressor.

Q.2 Answer the following questions. (Attempt any three) **(15)**

- A) Explain geometry and working principles of axial flow compressor.
- B) Differentiate turbo-machines and positive displacement machines.
- C) Draw and explain h-s diagram for Centrifugal flow compressor.
- D) Explain Multi stage pressure compounded impulse for axial turbine stage.

Q.3 A) Compare the specific power output of axial and radial turbines in the following cases: **(07)**

Axial turbine: $\alpha_2 = \beta_3 = 60^\circ$ and $\alpha_3 = \beta_2 = 0^\circ$

Radial turbine: $\alpha_2 = 60^\circ$ and $\alpha_3 = \beta_2 = 0^\circ$

The rotational speed is the same in both the cases.

B) Differences between Subsonic and Transonic Compressors. **(08)**

OR

B) In axial compressor, which factors affecting the Stages Pressure ratio? **(08)**

Q.4 A) A single stage gas turbine operates at its design condition with an axial absolute flow at entry and exit from the stage. The absolute flow angle at the nozzle exit is 70° . At stage entry, the total pressure and temperature are 311 Kpa and 850°C respectively. The exhaust static pressure is 100 Kpa, the total to static efficiency is 0.87 and mean blade speed is 500 m/s. Assuming constant axial velocity through the stage, determine (a) the specific work done (b) the Mach number leaving the nozzle and (c) the axial velocity. **(07)**

OR

A) Draw and explain velocity triangle for an axial turbine stages. **(07)**

B) What is equilibrium diagram? And explain with sketches the method of finding the equilibrium points. **(08)**