

7E4063

Roll No. : _____

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B. Tech. (Sem. VII) (Main/Back) Examination, December-2012
Mechanical Engg.
7ME4 Steam Turbines & Steam Power Plant

Time : 3 Hours]

[Maximum Marks : 80
[Min. Passing Marks : 24

*Attempt any five questions. Selecting one question from each unit.
All questions carry equal marks. Schematic diagrams must be
shown wherever necessary. Any data you feel missing suitably
be assumed and stated clearly. Units of quantities used /
calculated must be stated clearly.*

Use of following supporting material is permitted during examination.
(Mentioned in form No. 205)

1. Steam table

2. Mollier diagram

UNIT-I

- 1 (a) With the help of velocity diagrams at inlet and outlet, derive expression of maximum efficiency of simple impulse turbine having blade friction factor K and non symmetrical blades.
- (b) In a 50% reaction turbine, steam enters to blade with absolute velocity of 400 m/s and blade velocity is 120 m/s. Nozzle angle is 20° . Find work done, energy supplied and efficiency and thrust.

8+8

OR

- 1 (a) Derive expression of maximum efficiency for 50% reaction turbine. Draw velocity diagrams for 50% reaction turbine.
- (b) In a impulse turbine, steam enters into blade at a absolute velocity of 800 m/s, blade velocity and nozzle angle are 200 m/s and 25° respectively. If blade friction factor is 0.9, find work done, energy supplied efficiency and thrust.

8+8



UNIT-II

- 2 (a) Explain various losses in a steam turbine and discuss ways to reduce these losses.
- (b) Explain arrangements of sealing of turbine ends to avoid steam leakage at high pressure end and air ingress at condenser end.

8+8

OR

- 2 (a) Explain performance of simple impulse, 2-Row curtis and 50% reaction turbine using efficiency – blade to steam velocity ratio. Discuss use of these turbine keeping the efficiency maximum.
- (b) With the help of mollier diagram explain stage efficiency. How the stage efficiency is different from overall efficiency of turbine.

8+8

UNIT-III

- 3 (a) With the help of figures explain open and closed feed heaters. Discuss their merits and demerits.
- (b) Steam at 100 bar and 500°C enters into a steam turbine. Condenser pressure is maintained at 0.07 bar. Reheating of to the initial temperature is done at 30 bar pressure. 2 Open heaters are placed optimally, find the efficiency.

8+8

OR

- 3 (a) Derive expression of condition for optimum regeneration. Also how the pressure and temperature of extraction steam are decided ?
- (b) Steam at 150 bar and 550°C enters into steam turbine condenser pressure is 0.1 bar reheating has been done at 40 bar to the initial temperature. Find the difference in efficiency if condenser pressure is reduced to 0.06 bar.

8+8



UNIT-IV

- 4 (a) With the help of diagram, explain nozzle governing of steam turbines and discuss its merits and demerits.
- (b) Explain back pressure turbine and its areas of application. Also discuss merits and demerits.

8+8

OR

- 4 (a) With the help of figures, explain throttle governing system. Discuss its merits and demerits.
- (b) Explain mixed pressure turbine. Discuss its merits and demerits and also application areas.

8+8

UNIT-V

- 5 (a) Explain different type of air heaters used in power plants. Discuss their advantages and disadvantages.
- (b) Write the type of combustors used in power plant and discuss any one in detail.

8+8

OR

- 5 (a) Explain mechanism of water cooling in cooling towers. Also discuss types of cooling towers used in power plant.
- (b) Explain the need of water treatment and the process of water treatment in power plant.

8+8

