Code: R7320306

R07

B.Tech III Year II Semester (R07) Supplementary Examinations December/January 2015/2016

THERMAL ENGINEERING – II

(Mechanical Engineering)

(For 2008 regular admitted batch only)

Time: 3 hours Max Marks: 80

Answer any FIVE questions

All questions carry equal marks

(Use of steam tables is permitted in the examination hall)

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1 (a) What are secondary fuels? List some important secondary fuels.

(b) In a regenerative cycle the inlet conditions are 40 bar and 400^{0}C. Steam is bled at 10 bar in regenerative heating. The exit pressure is 0.8 bar. Neglecting pump work, determine the efficiency of the cycle.

2 (a) State briefly what do you understand by natural and artificial draughts. What are the advantages of artificial draught over natural draught?

(b) A chimney has a height of 24 m. The ambient temperature is 25^{0}C. Temperature of flue gasses passing through the chimney is 300^{0}C. If the air flow through the combustion space is 20 kg/kg of fuel burned, find the following: (i) The theoretical draught in mm of water. (ii) Velocity of the flue gases passing through the chimney if 50% of the theoretical draught is lost in friction at the gate and passage.

3 (a) Explain the functions of nozzles used with steam turbines.

(b) Steam at a pressure of 10 bar and 210^{0}C is supplied to a convergent divergent nozzle with a throat area of 1500 m^2. The exit is below critical pressure. Find the coefficient of discharge, if the flow is 7200 kg of steam per hour.

4 (a) What is the principle of operation of steam turbines?

(b) The blade speed of a single ring impulse blading is 250 m/s and nozzle angle is 20^0. The heat drop is 550 kJ/kg and nozzle efficiency is 0.85. The blade discharge angle is 30^0 and the machine develops 30 kW, when consuming 360 kg of steam per hour. Draw the velocity diagram and calculate: (i) Axial thrust on the blading. (ii) The heat equivalent per kg of steam friction of the blading.

5 Define the term 'Degree of Reaction' as applied to a steam turbine. Show that for parson's reaction turbine the degree of reaction is 50%.

6 (a) State the comparison between jet and surface condensers.

(b) Calculate the vacuum efficiency of a condenser from the following data:
Vacuum at steam inlet to condenser= 725 mm
Barometer=760mm
Hot well temperature = 26.4^{o}C.

7 Is the use of regenerator in a Simple Cycle Gas Turbine limited? Discuss the lubricating system of Gas Turbine.

8 With the help of a neat diagram, explain the description, advantages and disadvantages of a Turbo-jet engine.

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