[Total No. of Questions - 5] [Total No. of Printed Pages - 2]
(2068)

18213(M)

B. Tech 6th Semester Examination

Thermal Engineering (CBS)

ME-605

Time : 3 Hours **Max. Marks : 60**

The candidates shall limit their answers precisely within the answer-book (40 pages) issued to them and no supplementary/continuation sheet will be issued.

Note : Attempt all questions. Question no. 5 will be compulsory.

1. Attempt any one of the following:

   (a) What is the function of boiler accessories? Describe in brief, how an air pre heater, feed water heater and super heater can be used to improve the performance of boiler.

   (b) A coal fired boiler plant consumes 400 kg of coal per hour. The boiler evaporates 3200 kg of water at 44.5°C into superheated steam at a pressure of 12 bar and 274.5°C. If the calorific value of fuel is 32760 kJ/kg of coal, determine: (1) Equivalent evaporation "from and at 100°C," and (2) Thermal efficiency of boiler. (10)

2. Attempt any one of the following:

   (a) (i) Starting from fundamentals, show that for maximum discharge through a nozzle, the ratio of throat pressure to inlet pressure is given by (2/n+1) (n/n–1) where n is the index of expansion through the nozzle.

   (ii) What is the purpose of reheating?

   (b) (i) Briefly explain condition for Maximum Discharge through a Nozzle (Critical Pressure Ratio).

   (ii) Dry air at a pressure of 12 bar and 300°C is expanded isentropically through a nozzle at a pressure of 2 bar. Determine the maximum discharge through the nozzle of 150 mm^2 area. (10)

3. Attempt any one of the following:

   (a) The blade speed of a single ring impulse blading is 250 m/s and nozzle angle is 20°. The heat drop is 550 kJ/kg and nozzle efficiency is 0.85. The blade discharge angle is 30° 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, and (ii) The heat equivalent per kg of steam friction of the blading.

   (b) (i) What are the methods of governing a steam turbine? Describe any one method of governing steam turbines.

   (ii) Explain losses in steam turbine. (10)

4. Attempt any one of the following:

   (a) What part is played by a cooling tower? What are the different types of cooling towers? Mention advantage and disadvantage of each type.

   (b) The following observations were recorded during a condenser test: vacuum reading = 700mm of Hg; Barometer reading = 760 mm of Hg; condensate temperature = 34°C; Find (1) partial pressure of air and (2) Mass of air per m^3 of condenser volume. (10)

5. Attempt all of the following:

   (a) Differentiate between boiler mountings and boiler accessories?

   (b) Explain the effect of air leakage in condenser.

   (c) Differentiate between surface and jet condensers.

   (d) What is super saturated flow? State the effects of super saturation in a nozzle. (4×5=20)