24173

B.Tech. 4th Semester (ME)

Examination, May–2016

STEAM AND POWER GENERATION

Paper–ME-210-F

Time allowed : 3 hours] *[Maximum marks : 100*

Note : *Attempt any **five** questions in total, at least **one** question from each section. **Question No. 1 is compulsory**. Each question carries equal marks (20 marks).*

1. Explain the following :

(a) Purpose of steam generator

(b) Impulse turbine

(c) Fire Tube boiler

(d) Use of steam table

(e) Governing of Steam turbine

(f) Artificial Draught

(g) Stochiometric air fuel ratio

(h) Sources of air leakage in condenser

(i) Shape of nozzle for subsonic flow of steam

(j) Boiler Mountings. 20

Section–A

2. (a) How does Rankine cycle differ from the Carnot cycle for a vapour ? Is the thermal efficiency of a Rankine cycle equal to that of a Carnot cycle operating between the same temperature limits ? Explain in detail. 14

(b) Why does the efficiency of a Rankine cycle increase with the decreasing condenser pressure ? 6

3. (a) Discuss the working of a Lancashire boiler with the help of a neat sketch. 10

(b) Write a short note on Draught. Also explain the design consideration kept in mind for making natural draught chimney. 10

Section–B

4. (a) Define the function of steam nozzles. What is the difference between the coefficient of discharge and velocity coefficient for a nozzle ? What is the relation between nozzle discharge and critical pressure ratio ? 14

(b) Explain the design of steam nozzle. 6

5. A double acting single cylinder steam engine with cylinder 15 cm diameter and 20 cm stroke, is to develop 20 KW of indicated power at 100 rpm with a cut-off at 20% of the stroke. The back pressure is 0.28 bar. Determine the admission pressure if the diagram factor is 0.72. Also calculate the indicated thermal efficiency of the engine if it receives 222 kg of dry steam per hour. 20

Section–C

6. A steam jet enters the row of blades with a velocity of 375m/s at an angle of 20° with the direction of the motion of the moving blades. If the blade speed is 165m/s, find the suitable inlet and outlet blade angles

assuming that there is no thrust on the blades. The velocity of steam passing over the blades is reduced by 15%. Also determine power developed by the turbine per kg of steam flowing over the blades per second. 20

7. (a) Why Binary vapour cycle is used in power plants ? Discuss Binary vapour cycle working with the help of schematic and T-S diagrams. 10

(b) The efficiency of regenerative cycle equal to Carnot cycle efficiency, explain. Also describe the regenerative feed heating cycle in detail. 10

Section–D

8. (a) The vacuum reading of condenser is 70.5 cm of Hg when the barometer shows 76 cm of Hg and the condenser temperature is 31°C. Find the vacuum efficiency. 10

(b) How the condensers classified ? Describe the working of surface and jet condenser. 10

9. (a) How you classify the various types of fuels ? Discuss each with their application. 10

(b) Discuss the method for determining the calorific value of solid and liquid fuels. 10