F 3207 (Pages : 2) Reg. No.....

Name.....

B.TECH. DEGREE EXAMINATION, NOVEMBER 2014

Fifth Semester

Branch : Mechanical Engineering/Automobile Engineering

THERMAL ENGINEERING – I (M, U)

(Old Scheme—Prior to 2010 admissions)

[Supplementary/Mercy Chance]

Time : Three Hours Maximum : 100 Marks

Use of Mollier diagrams and steam tables are permitted.

Part A

Answer **all** *questions.*
Each question carries 4 *marks.*

1. What is meant by temperature of heat addition ?
2. Why is Carnot cycle not practicable for a steam power plant ?
3. How will you accurately estimate mass flow rate of a steam nozzle ?
4. Discuss how to choose throat area of a steam nozzle.
5. What is a back pressure turbine ?
6. Distinguish between re-heating and regeneration.
7. Briefly discuss solar water heating.
8. What are solar receivers ?
9. Draw a neat sketch of coal burner.
10. Write a note on coal handling techniques.

(10 × 4 = 40 marks)

Part B

Answer **all** *questions.*
Each full question carries 12 *marks.*

11. A steam power station uses the following cycle : Steam at boiler outlet – 150 bar, 550°C. Reheat at 40 bar to 550°C, Condenser at 0.1 bar.

    Using the Mollier chart and assuming ideal processes, find (a) quality at turbine exhaust ; (b) cycle efficiency ; (c) steam rate.

Or

12. What is Rankine cycle ? Explain Rankine cycle for wet, dry and superheated steam.

Turn over

13. Discuss the characteristics of a super saturated flow. What is the effect of friction on mass flow rate in a steam nozzle ?

Or

14. What do you mean by governing of steam turbine ? Discuss the techniques for governing of steam turbines.

15. A gas turbine plant operates on the Brayton cycle using an optimum pressure ratio for maximum network output and a regenerator of 100% effectiveness. Derive expressions for network output per kg of air and corresponding efficiency of the cycle.

Or

16. Discuss different combustion chambers of gas turbine. What are cylindrical, annular and industrial combustion chambers ? Explain.

17. Explain the working of liquid flat plate collectors. Discuss how to perform a detailed thermal analysis.

Or

18. Discuss the steps in solar thermal power generation. Explain with a block diagram.

19. With neat sketches, explain the working of diesel power plant. Discuss the energy interactions involved.

Or

20. Discuss the working of the following :

    (i) Cooling tower.

    (ii) Chimneys.

    (iii) Precipitators.

(4 + 4 + 4 = 12 marks)

[5 × 12 = 60 marks]