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BOARD DIPLOMA EXAMINATION, (C–16)
OCTOBER—2020
DME—FOURTH SEMESTER EXAMINATION

THERMAL ENGINEERING—II

Time : 3 hours]   [Total Marks : 80

PART—A   3×10=30

Instructions : (1) Answer **all** questions.

(2) Each question carries **three** marks.

(3) Answers should be brief and straight to the point and shall not exceed *five* simple sentences.

1. Determine the enthalpy of 4 kg of wet steam which is 20% wet at a pressure of 10 bar using steam tables.

2. What are the factors which govern the selection of a boiler?

3. 5 kg of steam 80% dry expands hyperbolically from 1·2 MPa to 0·1 MPa. Determine the dryness of steam at the end of expansion.

4. During a test on throttling calorimeter the pressure of steam before and after throttling are 4 bar and 1·2 bar respectively. If the steam after throttling is superheated to 140 °C, determine the quality of steam entering the calorimeter.

5. Dry and saturated steam enters a steam nozzle with a velocity of 60 m/s and at a pressure of 1300 KPa. It expands adiabatically to a back pressure of 15 KPa. Determine the dryness fraction of the steam at the exit of the nozzle.

6. How are the steam turbines classified?

7. What is governing of steam turbines? List out the methods of governing of steam turbines.

8. How are gas turbines classified?

9. What are the fuels used in jet propulsion unit?

10. List out the types of rear axles of automobiles.

PART—B 10×5=50

Instructions : (1) Answer *any* **five** questions.

(2) Each question carries **ten** marks.

(3) Answers should be comprehensive and the criteria for valuation are the content but not the length of the answer.

11. A pressure vessel contains 4 kg of wet steam which is 85% dry at a pressure of 660 KPa. Determine its entropy, enthalpy and internal energy using steam tables.

12. Describe with a neat sketch the construction and working principle of Benson boiler.

13. A piston cylinder arrangement contains 10 kg of 100% dry steam at 1·8 MPa and its expands to a pressure of 0·13 MPa. If the index of expansion is 1·25, determine

    (a) final dryness fraction

    (b) work done during expansion

    (c) heat transferred.

14. A convergent nozzle receives steam at 50 bar and 400 °C with an initial velocity of 80 m/s. Determine the diameter of the nozzle at the exit if the mass flow rate of the steam through the nozzle is 10 kg/s. C_p for superheated steam is 2·1 kJ/kg-K.

15. In an impulse turbine the nozzles are inclined at 18° and deliver 30 kg/s of steam at a velocity of 900 m/s while the blade velocity is 350 m/s. Calculate

    (a) blade angles

    (b) power developed

    (c) diagram efficiency
    neglecting friction

16. Explain the working principle of constant pressure gas turbine with a neat sketch.

17. Write the working principle of RAM jet engine with a neat diagram.

18. Explain with a neat sketch the working principle of the differential of an automobile.

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