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BOARD DIPLOMA EXAMINATION, (C-16)

JUNE/JULY—2022

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) Use of steam tables is allowed.

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

1. Define dryness fraction of vapour with mathematical expression.

2. Differentiate between fire tube boiler and water tube boiler.

3. One kg of steam at 10 bar and 0·4 dry is heated at constant volume until the pressure is 22 bar. Find the final condition of steam.

4. Draw *T-S* and *H-S* diagrams for throttling process of steam.

5. Define the term nozzle. List types of nozzles.

6. Define *(a)* stage efficiency and *(b)* degree of reaction for reaction turbine.

7. What is compounding of steam turbine? Name any two types of compounding.

8. Write the applications of gas turbines.

9. Write any six applications of rocket engines.

10. What is clutch? State its function.

PART—B   10×5=50

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

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

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

11. *(a)* Define critical point. What are the pressure and temperature of steam at critical point?

(b) One kg of steam enters an engine at a pr of 12·5 bar withessure 70 °C of superheat and exhaust at 0·15 bar and 0·95 dry. Estimate the change of internal energy between admission and exhaust conditions.

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

13. One kg of steam having a pressure of 8·4 bar abs and dryness fraction 0·9 is expanded in a cylinder to a pressure of 0·35 bar abs. If the expansion is hyperbolic. Determine the quantity of heat which passes through the cylinder walls into the steam.

14. Dry saturated steam at a pressure of 8 bar enters a convergent divergent nozzle and leaves it at a pressure of 1 bar. If the flow is isentropic and the corresponding expansion index is 1·135. Find the ratio of cross-sectional area at exit and throat for maximum discharge.

15. Steam issues from a nozzle at 800 m/s the velocity of moving blade is 200 m/s and mass of steam flow is 2 kg/s. The nozzles are inclined at an angle of 16° to the plane of the wheel, talking friction factor 0·8 and outlet angle of blade as 30° find :

(a) Power developed

(b) The blade angle at inlet

(c) The blade efficiency

(d) Axial thrust

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

17. Explain the working principle of rocket engine with a neat sketch.

18. Explain the working of sliding mesh type gear box with a neat sketch.

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