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C16-M–403

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BOARD DIPLOMA EXAMINATION, (C-16)

OCTOBER/NOVEMBER—2024

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.

(4) Use steam tables, wherever necessary.

1. Define *(a)* Wet steam, *(b)* Dry steam and *(c)* Super heated steam.

2. List out any six mountings of a steam generator.

3. One kg of steam at a pressure of 8 bar and dryness fraction 0·75 is heated at constant volume to pressure of 10 bar. Determine final condition of steam.

4. Draw T-S and h-S diagrams for Polytropic process.

5. Write any three applications of steam nozzles.

6. How do you classify steam turmines according to *(a)* Action of steam and *(b)* Direction of steam flow relative to the rotor.

7. State any three differences between Impulse turbline and Reaction turbine.

8. Write any three merits of closed cycle gas turbine over open cycle gas turbine.

9. List out any six fuels used in jet propulsion.

10. Write any three functions of automobiles differential.

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.

(4) Use steam tables, wherever necessary.

11. Calculate the enthalpy and entropy of steam at 10 bar when it is *(a)* Dry Saturated steam *(b)* 0·85 dry *(c)* Super heated at 250°C using steam tables. Take C_p = 2·09 kJ/kg K. 2+4+4=10

12. Describe the working principle of the Cochran boiler with a legible sketch. 10

13. If 5 kg steam with a dryness fraction of 0·9 expands adiabatically from a pressure of 8 bar to 1·5 bar according to the law $pv^{1·13}$ = constant. Determine *(a)* Final dryness fraction *(b)* Heat transferred *(c)* work done and *(d)* change in internal energy. 3+2+3+2=10

14. Dry saturated steam at a pressure of 15 bar expands isentropically in a steam nozzle and is discharged at a pressure of 1 bar. Find the dryness fraction of steam at the exit of nozzle and also find the final velocity of steam neglecting the initial velocity. (using steam tables). 5+5=10

15. Steam with a velocity of 600 m/s enters the row of blades of an impulse turbine. The blade angle at entry is 25°. The mean blade speed is 250 m/s. The exit angle of the blade is 30°. There is 10% loss in relative velocity due to friction in the blades. Draw the velocity diagram and find *(a)* the nozzle angle, *(b)* work done per kg of steam *(c)* diagram efficiency *(d)* axial thrust per kg of steam. 2+3+3+2=10

16. Describe the working principle of constant volume gas turbine with a legible sketch. 10

17. Explain the working principle of rocket engine with a neat sketch. 10

18. Describe the working principle of 3-speed sliding mesh type gear box with a legible sketch. 10

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