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BOARD DIPLOMA EXAMINATION, (C-14) OCTOBER/NOVEMBER-2018 DME - FIFTH SEMESTER EXAMINATION

HEAT POWER ENGINEERING - II

Time : 3 Hours]

[Total Marks: 80

PART-A

3X10=30

Instructions : 1. Answer All questions.

- 2. Each question carries three marks.
- 3. Answer should be brief and straight to the point and shall not exceed five simple sentences.
- 1. Define internal energy of steam.
- 2. Define dryness fraction and list the four different calorimeters used to find the dryness fraction of the wet steam.
- 3. Write any three factors to be considered for selection of a boiler.
- 4. State the function of the following boiler mountings.

(a) Feed check valve (b) Blow off cock.

- 5. A steam nozzle is supplied with steam having an initial velocity of 50m/s. This initial and exit enthalpy conditions are $h_1 = 3100 \text{ kJ/kg}$ and $h_2 = 2700 \text{ kJ/kg}$. Neglecting friction, find exit velocity of steam.
- 6. Define a nozzle. Write any two applications of steam nozzles.
- 7. Write any two functions of condensers in steam power plant.
- 8. Write any two effects of air leakages into the condensers.
- 9. State the functions of Governors in steam turbines.
- 10. State the necessity of compounding a turbine.

PART-B

Instructions	÷	1. Answer any Five questions.
		2. Each question carries ten marks.

- 11. A rigid vessel has a volume of 0.17 m³. It contains steam at 8 bar abs and 0.95 dry. Cooling takes place till the pressure becomes 2.7 bar abs. Find the mass of steam, final dryness fraction and heat energy transferred.
- 12. Draw a legible sketch of Cochran Boiler with its mountings and explain the constructional details and its working.
- 13. (a) Write any six factors influencing boiler efficiency.
 - (b) A boiler generates 18000 kg/hr of steam at 12 bar with 95 percent quality. Feed water temperature is 110°C. Rate of coal firing is 2000 kg/hr. If H.C.V. of coal is 27,500 kJ/kg. Find:
 - a) Factor of evaporation
 - b) The equivalent evaporation
 - c) The thermal efficiency of steam generator.
- 14. A convergent divergent nozzle has a throat area of 580 mm² and receives steam at 20 bar, 0.98 dry. The back pressure is 0.34 bar. Assuming that all frictional losses take place in divergent cone and that the nozzle efficiency is 80 percent, neglecting the velocity of approach to the nozzle determine:
 - i. The pressure at the throat
 - ii. The discharge in kg/s
 - iii. The exit area.
- 15. (a) Describe with a legible sketch the working of a steam injector
 - (b) Draw a legible sketch of Edward's air pump and explain its working
- 16. (a) In a condenser vacuum is 715mm of Hg when the barometer reads 765mm of Hg. The inlet temperature of cooling water is 15°C and outlet temperature of water is 25°C.
 Determine the condenser efficiency
 - (b) Write any six comparisons of jet condenser and surface condenser.
- 17. In single stage impulse turbine, the steam enters the blade at 420 m/s and the nozzle angle is 18°. The blade speed is 200 m/s. Determine the blade inlet angle. If the axial thrust is zero and frictional factor is 0.9. Determine the exit blade angles. Also determine the work done/kg, the blade efficiency and flow rate for a power of 100 kW.
- 18. Describe the velocity compounding method of steam turbine with the help of legible sketch.

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