6448

BOARD DIPLOMA EXAMINATION

JUNE - 2019

DIPLOMA IN MECHANICAL ENGINEERING

THERMAL ENGINEERING II

FOURTH SEMESTER EXAMINATION

Time: 3 Hours **Total Marks: 80**

PART - A (3m x 10 = 30m)

Note 1:Answer all questions and each question carries 3 marks

2:Answers should be brief and straight to the point and shall not exceed 5 simple sentences

1. Write expression for specific enthalpy of a. wet steam b. dry steam c. superheated steam at a given pressure
2. What is the difference between steam separator and steam trap?
3. Dry saturated steam at a pressure of 10 bar expands polytropically according to $pv^{1.13}$ = constant to a pressure of 2 bar. Find the final condition of steam
4. Draw T-s and h-s diagrams for Hyperbolic process
5. What are the applications of nozzles?
6. Write expression for
   a. Work done by the steam on blades
   b. Power developed by the turbine in case of reaction turbine
7. Write the necessity of governing of steam turbine.
8. Write are the essential components of closed cycle gas turbine?
9. State the principle of rocket propulsion
10. Write the function of universal joint

PART - B (10m x 5 = 50m)

Note 1:Answer any five questions and each carries 10 marks

2:The answers should be comprehensive and the criteria for valuation is the content but not the length of the answer

11. A vessel contains 2.5 m^3 of steam at a pressure of 25 bar. Determine the mass of the steam under following conditions.
    a. Steam is wet having dryness fraction 0.85
    b. Steam is dry saturated
    c. Steam is superheated at constant pressure to 310^0C.Take C_p of superheated steam as 2.21 kJ/kg^{0}K

12. During a test on a boiler the following data were collected.
    Steam pressure: 9.487 bar gauge
    Steam condition: Dry and saturated
    Feed water temperature: 35^0C
    Rate of evaporation: 12 kg/kg of coal
    Calorific value of coal = 37500 kJ/kg.
    Determine
    a. Thermal Efficiency b. Factor of evaporation c. Equivalent Evaporation.

13. **If 5 kg of steam with a dryness fraction of 0.9 expands polyropically according to the law $pv^{1.13}$ = constant from a pressure of 8 bar to 1.5 bar. Deterine.**
    a. Final dryness fractoin
    b. heat Transferred
    c. Work done.
    d. Change in internal energy.

14. Dry saturated steam at a pressure of 16 bar abs enters a convergent-divergent nozzle and leaves at a pressure of 4.8 bar abs. If the flow is frictionless adiabatic and the corresponding expansion index is 1.135 if the mass flow rate is 0.85 kg/s. Find
    a. The pressure at throat
    b. Throat and exit diameters

15. In an impulse turbine, the steam issues from the nozzle with a velocity of 300m/s. The nozzle is inclined at 14^0 to the wheel tangent. The mean diameter of the wheel is 300mm. The wheel runs at 10000 RPM. Determine the blade inlet angle for shock less entry. If the blade exit angle is equal to the inlet angle, determine the work done per kg of steam and also axial thrust

16. Explain constant pressure gas turbine with a neat sketch

17. Explain working of Ram jet engine

18. Explain briefly the components of differential with a neat sketch

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