5686

BOARD DIPLOMA EXAMINATION, (C-16S)

JUNE - 2019

DME - IV SEMESTER EXAMINATION

HEAT POWER ENGINEERING

Time : 3 Hours] [Total Marks : 80

PART - A

3×10=30

Instructions : *(1) Answer **ALL** questions.*
*(2) Each question carries **THREE** marks.*
(3) Answer should be brief and straight to the point.

1 Explain the working principle of reciprocating compressor.

2 Give the classifications of gas turbine.

3 Name different types of engines working on the principle of jet propulsion.

4 Define dryness fraction of a vapour with mathematical expression.

5 What are the requirements of a good boiler ?

6 What is meant by boiler draught ?

7 Dry saturated steam enters a steam nozzle at a pressure of 15 bar and discharged at 2 bar. If the steam at exit is 0 9 dry, find the velocity of steam at exit.

8 What is compounding ? Write different methods of compounding.

9 What are the advantages of steam turbine over steam engine ?

10 Compare between jet condenser and surface condenser.

PART - B

Instructions : (1) *Answer any* ***FIVE*** *questions*
(2) *Each question carries* ***TEN*** *marks*
(3) *Answer should be comprehensive and criterion for valuation is the content but not the length of the answer*

11 Determine the minimum work required to compress 1 kg of air from 1 bar and 15° C to 9 bar in two stages. The law compression is $pV^{1.25}$ = constant and inter-cooling is complete. If the air was compressed in one stage between the same pressure limits, what is the percentage saving in work by compressing it in two stages ? Assume R = 0.287 kJ/kgK.

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

13 1 kg of steam 0.8 dry at 10 bar abs expands during a non flow polytrophic process according to the law $pV^{1.3}$ = C until the pressure becomes 2.8 bar

14 Explain the construction and working of benson boiler

15 (a) In a boiler test, steam at a pressure of 14 bar, having a dryness fraction 0.9, is generated at the rate of 8 kg per kg of coal burnt. The calorific value of coal fired is 35000 kJ/kg and temperature of feed water is 45°C, calculate the thermal efficiency of the boiler.

(b) Compare the impulse turbine and reaction turbine.

16 Dry saturated steam at a pressure of 8.2 bar abs. enters a convergent divergent nozzle and leaves it at a pressure of 1.4 bar abs. If the flow is frictional less adiabatic and the corresponding expansion index is 1.135, if the mass flow rate is 0.65 kg/s, determine the throat and exit diameters.

17 In a simple impulse turbine the nozzle delivers 25 kg of steam per second. The nozzle angle is 15°. The steam issue from the nozzle with a velocity of 900 m/s, the steam blade velocity is 350 m/s and the inlet and outlet angles of the blades are equal. Neglecting the friction, calculate

(a) The blade angles
(b) Power developed

18 Give the classifications of jet condensers. Explain any one with a sketch.