C14-M-304

4251

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

BASIC THERMODYNAMICS

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

1. Define open system? Give two examples.
2. Explain Quasi-static process.
3. State first law of thermodynamics and give mathematical expression.
4. State Boyle's law and its applications?
5. A given mass of a gas at -73^0 C exerts a pressure of 60cm of mercury. Determine the magnitude of pressure exert at 27^0C if the volume remains constant.
6. Represent the constant volume process on P-V diagram.
7. Derive an expression for work done in an isobaric process.
8. List any six advantages of liquid fuels.
9. Write the dulong's formulae and the terms involved in the expression.
10. Distinguish between conduction and convention modes of heat transfer.

PART-B

10X5=50

Instructions :

1. Answer any **five** questions.
2. Each question carries **ten** marks.
3. Answer should be comprehensive and the criterion for valuation is the content but not the length of the answer

11. In a steady flow system, a fluid flows at the rate of 4kg/s. It enters at a velocity of 300m/s and has enthalpy of 2330 KJ/Kg. It leaves the system at a velocity of 150m/s and its enthalpy at outlet is 1656KJ/Kg. during its passage through the system fluid has a loss of heat transfer by 30 KJ/Kg to the surroundings. Determine the power of the system in KW. Neglect any change in the potential energy.
12. (a) Derive the relationship between the specific heats and gas constant.
    (b) One kg of ideal gas is heated from 18.30 C to 93.40 C.
    Assuming R=0.265KJ/kg k and γ = 1.18 for the gas Find (i) Specific heat (ii) Change in internal energy.
13. (a) State Kelvin-plank and explain it briefly.
    (b) Explain characteristic gas equation.
14. Derive an expression for work done in an adiabatic process.
15. One kg of nitrogen contained in a cylinder at a pressure of 7bar and temperature of 300k expands 4 times of its original volume. The process of expansion is assumed to take place at constant pressure. Calculate (a) Initial volume (b) Final temperature (c) work done (d) Head added. For nitrogen assume Cp=1.045KJ/kgK,R=296KJ/kgK.
16. Calculate the change of entropy of 1 kg of air expanding polytropically in a cylinder behind a piston from 7 bar and 600^0C to 1.05bar. the index of expansion is 1.25.
17. Explain the working of bomb calorimeter with a neat sketch.
18. A fuel contains of 64% carbon, 26% hydrogen, 5% oxygen and remaining ash. During a test the volumetric analysis of the flue gas is recorded as CO-3.5%, CO_2-18%, O_2-2.1% & N_2-76.4% Calculate (a) Mass of carbon present per kg of flue gas.
    (b) Mass of flue gas per kg of fuel.

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