6244

BOARD DIPLOMA EXAMINATIONS

OCT/NOV-2019

DME – THIRD SEMESTER

THERMAL ENGINEERING - I

Time: 3 hours   Max. Marks: 80

PART – A   **3X10 = 30M**

Instructions: 1. *Answer **all** questions.*
2. *Each question carries five marks.*
3. *Answer should be brief and straight to the point and shall not exceed five simple sentences.*

1. State the terms involved in the equation $Cp = \dfrac{\gamma R}{\gamma - 1}$

2. Define the following properties

    (1) Density   (2) Temperature

3. State the clausius and kelvin – plank statement of second law thermodynamics.

4. Why Isothermal process is often regarded as hyperbolic process.

5. Write an expression for change in entropy during constant pressure process.

6. Differentiate Otto and Diesel cycles in terms of

    (a) Heat addition and   (b) Applications

7. List out the various components of an I.C. Engine.

8. Differentiate the internal combustion engine with external Combustion engine.

9. List out various pollutants from an I.C. Engine.

10. Draw PV diagram for a single stage reciprocating compressor Without clearance.

[Cont..,

Instructions: 1. *Answer any **Five** questions*
                   2. *Each question carries **TEN** Marks.*
                   3. *Answer should be comprehensive and Criteria for Valuation*
                       is the content but not the length of the answer.
                   4. *Assume data wherever necessary for air R=0.287 kJ/Kg k,*
                       γ=1.4, if not specified.

11. a) State Joule's Law and Renault's Law.

     b) The value of an adiabatic index of a certain gas is 1.4 and its specific heat
        at constant volume 0.65 kJ/kg k. Determine the gas constant.

12. a) Define the reversible and irreversible process and mention the
        conditions for reversibility of a process.

     b) A water manometer shows a pressure, in a vessel of 400mm below
        atmospheric pressure. If the atmospheric pressure is measured as
        763 mm Hg. Determine absolute pressure in the vessel in kN/m^2.

13.   In a steady flow open system, a fluid substance flows at the rate of
        4 kg/sec. It enters the system at a pressure of 600 kN/m^2, a velocity of
        220 m/Sec, internal energy 2200 kJ/kg and specific volume 0.42 m^3/kg.
        It leaves the system at a pressure of 150 kN/m^2, a velocity of 145m/sec,
        internal energy 1650 kJ/kg and specific volume 1.5m^3/kg. During its
        passage through the system, the substance has a loss by heat transfer of 40
        kJ/kg to the surroundings. Determine the power of system, whether it is
        from or to the system. Neglect any change of gravitational potential
        energy.

14. Write any five differences between
    a) Adiabatic and Isentropic Processes.
    b) Isenthalpic and Throttling Processes.

15. a) A Diesel engine has a bore of 200 mm and stroke of 320 mm.
    Cut – off takes place at 9% of stroke. Find the air – standard efficiency
    if clearance volume is 0.000593 m^3.
    b) An engine working on Otto cycle has a compression ratio of 6.
    Find the air – standard efficiency of the cycle.

16. What are different methods adopted in cooling of an I.C engine. Explain in details.

17. Explain the principle of Morse test and State its applications.

18. Explain the working of following Rotary Compressors with line diagram.
    a) Centrifugal Compressor
    b) Axial Flow type Compressor