[6186]-562

S.E.(Automobile & Mechanical /Mechanical S.W)
(Insem) ENGINEERING THERMODYNAMICS
(2019 Pattern) (Semester - III)) (Theory) (202043)

Time : 1 Hour]   *[Max. Marks : 30*

Instructions to the candidates:
1) *Answer Q.1 or Q.2, Q.3 or Q.4.*
2) *Neat diagrams must be drawn wherever necessary.*
3) *Figures to the right side indicate full marks.*
4) *Use of electronic pocket calculator is allowed.*
5) *Assume suitable data if necessary.*

Q1) a) Explain in detail   **[8]**

     i)   Macroscopic and Microscopic approach.

     ii)   Path function and point function

   b) A gas having initial pressure, volume, temperature as $275kN/m^2$, $0.09m^3$, 185°c is compressed at constant pressure until its temperature is 15°c. Calculate the amount of heat transferred and work done during the process. Take $R = 290$ kJ/kg-K $C_p = 1.005$ kJ/kg-K.   **[7]**

OR

Q2) a) State "Steady Flow Energy Equation" (S.F.E.E.) and applications of steady flow energy equation on   **[8]**

     i)   Pump

     ii)   Turbine

   b) A gas expands ideally, insulated nozzle following a reversible polytropic law $p\, v^{1.2} = C$ there is no change in potential energy but pressure drops form 20 bar to 2 bar and the specific volume increases from $0.05m^3$ to $0.3m^3$. If the entrance velocity is 80 m/s determine the exit velocity. **[7]**

P.T.O.

Q3) a) State Kelvin Plank and Clausius statement of second law of thermodynamics and prove that violation of Kelvin plank statement results into violation of Clausius statement? **[7]**

b) Explain **[8]**

    i) Boyles Law

    ii) Avogadro's law

        1) Charles Law

        2) Universal gas constant

<div align="center">OR</div>

Q4) a) Explain Carnot cycle with PV and TS diagram give expression for the efficiency of Carnot cycle? **[5]**

b) State the limitations of first law of thermodynamics? **[3]**

c) An engineer claims his engine to develop 3.75 kW. On testing the engine consumes 0.44 kg of fuel per hour having calorific value of 42000 kJ/kg. The maximum temperature recorded in the cycle is 1400 °C and minimum is 350 °C. Find whether the engineer is justified in his claim? **[7]**