Hall Ticket No ☐☐☐☐☐☐☐☐☐☐ Question Paper Code: AME003

INSTITUTE OF AERONAUTICAL ENGINEERING
(Autonomous)
B.Tech IV Semester End Examinations (Supplementary) - June, 2018
Regulation: IARE – R16
THERMODYNAMICS

Time: 3 Hours   **(AE)**   Max Marks: **70**

Answer ONE Question from each Unit
All Questions Carry Equal Marks
All parts of the question must be answered in one place only

UNIT – I

1. (a) Define intensive and extensive properties. **[7M]**
   (b) Define specific heat capacity at constant volume and specific heat at constant pressure. **[7M]**

2. (a) What is open system, closed system and isolated system. **[7M]**
   (b) A System contains $0.15 M^3$ of air at a pressure of 3.8bar and 150^0c. It is expanded adiabatically till the pressure falls to 1 bar. The gas is then heated at a constant pressure till its enthalpy increases by 70KJ. Determine the total work done. **[7M]**

UNIT – II

3. (a) Define the change in internal energy of a system **[7M]**
   (b) Explain the principle of entropy increase. **[7M]**

4. (a) Explain Kelvin Planck and clausius statement of second law with neat sketch. **[7M]**
   (b) Sketch the PV and TS diagrams of Carnot cycle **[7M]**

UNIT – III

5. (a) What is critical state? Explain the terms critical pressure, critical temperature and critical volume of water. **[7M]**
   (b) A reversible engine operates between a source at 927º C and two sinks at 127º C and 27º C. The energy reflected at both the sinks is the same compute the engine efficiency. Define the following,
   i) Dry bulb temperature **[7M]**
   ii) Wet bulb temperature
   iii)Dew point temperature
   iv)Specific humidity

6. (a) Derive the Clausius Claperon equation **[7M]**
   (b) Platinum wire is used as a resistance thermometer. The wire resistance was found to be 10 ohm and 16 ohm at ice point and steam point respectively, and 30 ohm at sulphur boiling point of 444.6°C. Find the resistance of the wire at 500°C,if the resistance varies with temperature by the relation. **[7M]**

UNIT – IV

7. (a) Derive Dalton's law of partial pressures for mixture of gases. **[7M]**
   (b) Define mole fraction? Explain about volumetric and gravimetric analysis **[7M]**

8. (a) Define bypass factors. Represent adiabatic mixing of two air streams on psychrometric chart?

[7M]

   (b) Derive specific heats and internal energy of an ideal gas . **[7M]**

UNIT – V

9. (a) Compare the Otto, Diesel and dual cycles for same constant compression ratio, Constant Maximum pressure and same heat input. **[7M]**

   (b) Write the processes involved in Brayton cycle with the help of PV diagram. **[7M]**

10. (a) Define compression ratio. What is its range for SI engines and CI engines? What Factors limit the compression ratio in each type of engine **[7M]**

   (b) What is the difference between Otto and Diesel cycle? Show that the efficiency of Diesel cycle is always lower than the efficiency of the Otto cycle for the same compression ratio . **[7M]**

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