Roll No. | | | | | | | | | | | | | Total No. of Pages : 02

Total No. of Questions : 08

M.Tech. (ME) (2017 Batch) (Sem.–1)

ADVANCED THERMODYNAMICS

Subject Code : MTME-105

M.Code : 74719

Time : 3 Hrs. Max. Marks : 100

INSTRUCTIONS TO CANDIDATES :

1. **Attempt any FIVE questions in all, out of EIGHT questions.**
2. **Each question carry TWENTY marks.**

1. Briefly explain the following :

   (a) Vander Waal's equation 5

   (b) Sensible Heating 5

   (c) Relative Humidity 5

   (d) Refrigeration effect 5

2. (a) What is cooling tower? Explain various types of cooling tower? 10

   (b) Draw and explain the various processes in psychometric chart. 10

3. Determine the molal analysis of the products of combustion when octane C_8H_{18} is burned with 200% theoretical air and determine the dew point of the products if the pressure is 0. IMpa. 20

4. (a) Explain the effects of non-reacting gases equilibrium in multiple reactions. 10

   (b) Explain the enthalpy of formation in detail with context of combustion process. 10

5. In an air-standard Brayton cycle the air enters the compressor at 0.1 MPa and 15°C. The pressure leaving the compressor is 1.0 MPa, and the maximum temperature in the cycle is 1100°C. Determine the pressure and temperature at each point in the cycle and the compressor work, turbine work, and cycle efficiency. For each of the control volumes analyzed, the model is ideal gas with constant specific heat, at 300 K, and each process is steady state with no kinetic or potential energy changes. 20

6. Consider a regenerative cycle using steam as the working fluid. Steam leaves the boiler and enters the turbine at 4 MPa, 400°C. After expansion to 400 kPa, some of the steam is extracted from the turbine for the purpose of heating the feed water in an open feed water heater. The pressure in the feed water heater is 400 kPa and water leaving it is saturated liquid at 400 kPa. The steam not extracted expands to 10kPa. Determine the cycle efficiency. 20

7. Write a short note on following :

   (a) Photovoltaic cells 10

   (b) Magneto Hydrodynamic Generators 10

8. (a) Explain the phenomenological laws in detail. 10

   (b) Discuss Heat flux and entropy production in context of irreversible process. 10

NOTE : Disclosure of Identity by writing Mobile No. or Making of passing request on any page of Answer Sheet will lead to UMC against the Student.