Reg. No. :

Question Paper Code: 54901

B.E./B.Tech. DEGREE EXAMINATION, DEC 2020

Fourth Semester

Chemical Engineering

15UCH401- CHEMICAL ENGINEERING THERMODYNAMICS-I

(Regulation 2015)

Duration: One hour Maximum: 30 Marks

PART A - (6 x 1 = 6 Marks)

(Answer any six of the following questions)

1. Zeroth law of thermodynamics is concerned with ___. CO1- R

   (a) extent of change in a process (b) entropy change

   (c) crystalline substance (d) thermal equilibrium

2. The system unaffected by the changes in its environment is _____ system. CO1- R

   (a) Closed (b) Open (c) Isolated (d) Mechanical

3. There is no heat interaction between the system and the surroundings in a _____ process CO2- R

   (a) isobaric (b) isothermal (c) adiabatic (d) isochoric

4. All gases at same reduced pressure and temperature have same compressibility factor and all deviate from the ideal behavior to the same extent CO2- R

   (a) Hess's law (b) Principle of corresponding states

   (c) Heat of formation (d) None of the above

5. Entropy is a _____ function CO3- R

   (a) point (b) state (c) Maxwell (d) path

6. The absolute is zero for a perfect crystalline substance at absolute zero of temperatures CO3- R

   (a) Heat (b) Mass (c) Enthalpy (d) Entropy

7. The Helmholtz free energy (A) of a system is defined as ___ where H is enthalpy, S is entropy, U is internal energy and T is the temperature CO4- R

(a) A = H – T S (b) A = U – T S (c) A = U + P V (d) A = U + H S

8. Un measurable quantities are replaced by measurable quantities by CO4- R

(a) Clapeyron equation (b) Maxwell's equation

(c) Equation of state (d) Ideal gas equation

9. Throttling is an example for _____ process. CO5- R

(a) isochoric (b) isoenthalpy (c) polytropic (d) isobaric

10. 1 ton of refrigeration is _____ kJ/h CO5- R

(a)12000 (b) 12660 (c) 3516.67 (d) 4184

PART – B (3 x 8= 24 Marks)

(Answer any three of the following questions)

11. Explain the following terms in the scope of thermodynamics with examples: CO1- U (8)

(a) intensive and extensive properties

(b) reversible and irreversible processes.

12. Discuss the P – V – T behavior and thermodynamic state of a pure water fluid as a function of pressure and volume CO2- App (8)

13. Develop the expression for first law of thermodynamics for steady state flow process CO3-U (8)

14. Derive all Maxwell relations and explain the relationship between characteristics function and thermodynamic parameters. CO4- U (8)

15. Develop the general equations of balance for the duct flow of compressible fluids. CO5- Ana (8)