Reg. No. : | | | | | | | | | | |

Question Paper Code: 55901

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

Fifth Semester

Chemical Engineering

15UCH501-CHEMICAL ENGINEERING THERMODYNAMICS-II

(Regulation 2015)

(Steam table and compressibility chart permitted in examinations)

Duration: One hour Maximum: 30 Marks

PART A - (6 x 1 = 6 Marks)

(Answer any six of the following questions)

1. The activity of component "i" in a homogeneous solution is defined as CO1- R

   (a) $f^{\wedge}/f_t^0$ (b) $f_t^0/ f^{\wedge}$ (c) $f^{\wedge} f_t^0$ (d) $\sqrt{f^{\wedge} f_t^0}$

2. In a gaseous mixture, the fugacity of any component in the gaseous mixture can be described by Lewis Randall rule, which is CO1 R

   (a) $f^{\wedge}=Y_i f_i$ (b) $f^{\wedge}=Y_i g_i$ (c) $f^{\wedge}= f_i$ (d) $f^{\wedge}=Y_i$

3. Pure water is boiling in a closed container with water vapor above. What is the associated degree of freedom? CO2- R

   (a) 0 (b)1 (c) 2 (d) 3

   (c) Depends on temperature as well as pressure (d) Is independent of temperature and pressure

4. Gibbs-Helmholtz equation is given by CO2- R

   (a) $[\delta(\Delta g/T)/\delta T]_p = -[\Delta h/T^2]$ (b) $[\delta(\Delta g)/\delta T]_p = -[\Delta h/T^2]$

   (c) $[\delta(\Delta g/T)/\delta T]_p = [\Delta h/T^2]$ (d) $[\delta(\Delta g/T)/\delta T]_p = -[\Delta h/T]$

5. UNIQUAC has found by CO3- R

   (a) Abrams and Prausnitz (b) Marguels

   (c) Wilson (d) Van Laar

6. If f_i is the fugacity of a component, f_i^0 the fugacity of the same component at standard state, P_i the partial pressure of the component, then activity and fugacity coefficient are given respectively as, CO3 R

(a) $a_i = f_i/P_i$ (b) $a = f_i/f_i^0$ (c) $a = f_i \times P_i$ (d) $a = f_i \times f_i^0$

7. The equilibrium constant at 427°C for the reaction: $N_2(g) + 3H_2(g) \rightleftarrows 2NH_3(g)$ is $K_p = 9.4 \times 10^{-5}$. Calculate the value of ΔG^o for the reaction at 427°.c CO4- R

(a) -33 kJ (b) -54 kJ (c) 54 kJ (d) 33 kJ

8. The conventional equilibrium constant expression (K_c) for the system below is: $2ICl(s) \rightleftarrows I_2(s) + Cl_2(g)c$ CO4- R

(a) $[I_2][Cl_2]/[ICl]^2$ (b) $[I_2][Cl_2]/2[ICl]$ (c) $[Cl_2]$ (d) $([I_2] + [Cl_2])/2[ICl]$

9. In traditional Refrigerators in home appliances, what is the type of condenser used CO5- R

(a) Natural convection type (b) Forced convection type

(c) Furnace Type (d) Rotary condensers

10. A vapour compression heat pump has CO5- R

(a) compressor (b) evaporator

(c) condenser (d) all of the mentioned

PART – B (3 x 8= 24 Marks)

(Answer any three of the following questions)

11. Derive the Gibbs – Duhem equation for the calculation of solution properties from knowledge of the partial properties CO1-U (8)

12. What are azoetrope's ? Explain maximum and minimum boiling a zoetrope's with the help of diagrams CO2- U (8)

13. Derive Redlich –kister method or zero Area method CO3- App (8)

14. Derive the relationship between the equilibrium constant and standard free energy change CO4- App (8)

15. List out the important properties of a refrigerant CO5- U (8)