

Bachelor of Science (B.Sc. – IIInd Year) Third Semester (Old)
B.Sc. 2352 - Chemistry Paper-II (Physical Chemistry)

P. Pages : 2

Time : Three Hours



GUG/W/18/1259

Max. Marks : 50

1. a) Explain intensive and extensive properties with suitable examples. 5
Derive an expression for maximum work in an isothermal reversible process.
- b) State and explain Hess's law of constant heat of summation. 5
Calculate the heat of reaction.
 $C_2H_4(g) + H_2(g) \rightarrow C_2H_6(g)$
at 25°C if the heat of combustion of ethylene, hydrogen and ethane are -337.0, -68.4 and 373.0 Kcal respectively at 25°C.

OR

- c) Explain state function and path function. 2½
- d) Define heat capacity? Derive the relationship between C_P and C_V . 2½
- e) Find out amount of heat supplied to Carnot cycle working between 250K and 160K if maximum work obtained is 750J. 2½
- f) Derive Kirchhoff equation. 2½
2. a) Explain entropy as a criteria of spontaneity & equilibrium. Derive an expression for entropy change for isothermal expansion of an ideal gas. 5
- b) Derive Gibbs – Helmholtz equation. The free energy change accompanying the given process is -85.28 KJ at 32°C and -82.28 KJ at 42°C. Calculate the change in enthalpy ΔH at 37°C. 5

OR

- c) Discuss the physical significance of entropy. 2½
- d) What is Helmholtz free energy? Show that $-\Delta A = W_{max}$. 2½
- e) Derive relation between standard free change and equilibrium constant. 2½
- f) What are partial molar properties. Define chemical potential. 2½
3. a) What is one component system? Describe Sulphur system with the help of phase diagram. 5
- b) Discuss the nicotine – water system. What is the effect of impurity on two liquid component system? 5

OR

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| c) | Deduce the phase rule. | 2½ |
| d) | State and explain Raoult's law of ideal solution. | 2½ |
| e) | State and explain Nernst distribution law. State any two limitations. | 2½ |
| f) | Describe Pattinson's process of desilverisation of lead. | 2½ |
| 4. a) | State and explain law of symmetry show that there are 23 elements of symmetry in a cubical system. | 5 |
| b) | Derive Bragg's equation. Discuss X-ray diffraction method for determination of crystal structure. | 5 |

OR

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| c) | State and explain law of constancy of interfacial angle. | 2½ |
| d) | Explain Bravais lattices. | 2½ |
| e) | Calculate Miller indices of plane 2a and 3b on X-axis and Y-axis respectively. and one is parallel to Z-axis. | 2½ |
| f) | Describe powder method for crystal structure determination. | 2½ |
| 5. | Solve any ten. | 1x10
=10 |
| i) | Define | |
| a) | Isolated system. | |
| b) | Isothermal process. | |
| ii) | Calculate efficiency of an engine operating between 100°C and 25°C. | |
| iii) | What is bond dissociation energy? | |
| iv) | State any two statements of 2 nd law of thermodynamics. | |
| v) | Define standard free energy. | |
| vi) | State Law of mass action. | |
| vii) | What is degree of freedom? | |
| viii) | State Henry's law. | |
| ix) | Define upper consolute temperature. | |
| x) | What is Unit cell? | |
| xi) | What is space lattice? | |
| xii) | Draw the crystal structure of NaCl. | |
