B.Sc. (Part-I) (New CBCS Pattern) Semester - II

USCCHT04 - Chemistry Paper-II (Physical Chemistry)

P. Pages : 2 **GUG/S/23/11575**

* 1 7 0 6 *

Time : Three Hours Max. Marks : 50

Notes : 1. All questions are compulsory and carry equal marks.
2. Draw diagram wherever necessary.

1. a) Find minimum and maximum value of **5**

$f(x) = x^3 - 6x^2 + 12x - 5$

b) Define hydrolysis constant? Describe the relationship between hydrolysis constant and dissociation constant of salt of strong acid and weak base. **5**

OR

c) Calculate the value of $\log_{10}30 + \log_{10}4 - \log(62)^{1/2}$ by using log table. **2½**

d) Find the equation of line passing through point (3,2) & (–4, –5). **2½**

e) What is buffer solution? Explain mechanism of buffer action. **2½**

f) Write a notes on common ion effect. **2½**

2. a) State Joule-Thomson effect? Describe Joule's Thomson porous plug experiment. **5**

b) State and explain Hess's Law of constant heat of summation. Calculate heat of formation of Benzene from following data: **5**

i) $C_6H_6(l) + {}^{15}/_{2}O_2(g) \rightarrow 6CO_2(g) + 3H_2O(l)\ \Delta H = -3267.7\,kJ$

ii) $C(S) + O_2(g) \rightarrow CO_2(g)\ \Delta H = -393.5\,kJ$

iii) $H_2(g) + {}^{1}/_{2}O_2(g) \rightarrow H_2O(l)\ \Delta H = +285.9\,kJ$

OR

c) Define extensive and intensive properties with suitable example. **2½**

d) Define Molar heat capacity. Show the relation $c_p - c_v = R$ **2½**

e) Derive Kirchoff's equation. **2½**

f) A gas expands isothermally reversibly against a constant external pressure of 1 atm from a volume of $10\,dm^3$ to a volume of $20\,dm^3$. In this process 800J of thermal energy transfer from its surroundings. Calculate internal energy Δu in Joules. **2½**

3. a) Derive the kinetic gas equation for one mole of an ideal gas. **5**

b) Derive Vander Waal's equation of state. **5**

OR

c) Deduce the Boyle's law from kinetic gas equation. **2½**

d) Write a notes on effect of temperature on molecular velocity. **2½**

e) What are the causes of deviation from ideal behavior. **2½**

f) State and explain law of corresponding state. **2½**

4. a) Define viscosity. Explain Ostwald viscometer method for the determination of viscosity liquid. **5**

b) State and explain. **5**
i) Law of constancy of interfacial angles. ii) Element of symmetry.

OR

c) Find miller indices of Lattice plane which intersect coordinate axis at 2, –3, 1. **2½**

d) Derive Bragg's equation. **2½**

e) Describe the crystal structure of CsCl by Laue's method. **2½**

f) Explain. **2½**
i) Relative Viscosity. ii) Specific Viscosity. iii) Intrinsic Viscosity.

5. Attempt **any ten.**

a) Evaluate $\frac{6!}{(4!)(3!)}$ **1**

b) Define **1**
i) Solubility ii) Solubility product.

c) The pH of acidic solution is 2.70. Calculate the hydrogen ion concentration of this solution. **1**

d) Define **1**
i) Isothermal process ii) Path function.

e) Write any two statements of 1^{st} law of thermodynamic. **1**

f) Define Bond Dissociation energy. **1**

g) State Avogadro's law. **1**

h) Define **1**
i) Mean free path ii) Collision Number.

i) Define – Boyle temperature. **1**

j) What are Bravais lattice? **1**

k) Define **1**
i) Lattice point ii) Unit cell.

l) Define and write unit of surface tension. **1**

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