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

USCCHT04 - Chemistry Paper-II (Physical Chemistry)

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

Time : Three Hours * 6 5 5 6 * Max. Marks : 50

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1. a) At what value of 'x' the function $x^3 - 12x + 3$ will have a maximum of minimum value. **5**

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

OR

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

d) Solve using logarithm $(125 \times 70.1)^{1/2}$. **2½**

e) What are the different factor affecting the degree of dissociation? **2½**

f) What is buffer solution? Explain the mechanism of buffer action? **2½**

2. a) Define Joule Thomson effect? Explain Joule Thomson porous plug experiment to show expansion of ideal gas is enthalpic process. **5**

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

i) $C_{(graphite)} + O_{2(g)} \longrightarrow CO_{2(g)}; \Delta H_a = -393.5\,kJ$

ii) $2H_2(g) + O_2(g) \longrightarrow 2H_2O(\ell); \Delta H_b = -571.8kJ$

iii) $CH_{4(g)} + 2O_{2(g)} \longrightarrow CO_{2(g)}\,2H_2O_{(g)}; \Delta H_c = -890.3kJ$

OR

c) Explain intensive and extensive property with suitable example. **2½**

d) Define molar heat capacity and derive the relation between c_p and c_v. **2½**

e) Calculate the value of $W, Q, \Delta E \,\&\, \Delta H$ for expansion of ideal gas under isothermal reversible process. **2½**

f) Derive Kirchoff's equation. **2½**

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

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

OR

c) Calculate root mean square velocity of hydrogen molecules at 27° C $\left(R = 8.314\,Jk^{-1}mol\right)$. **2½**

d) State and explain Maxwell's Distribution law of molecular velocities. **2½**

e) What are the causes of deviation from ideal behaviour? **2½**

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

4. a) Define surface tension. How to determine the surface tension of liquid using stalagmometer. **5**

b) Explain powder method of crystallography? What is its advantage over the other method. **5**

OR

c) Write a short notes on Weiss indices and miller indices. **2½**

d) Describe the crystal structure of CsCl. **2½**

e) Explain: **2½**
i) Relative Viscosity ii) Specific viscosity
iii) Intrinsic viscosity

f) Derive Bragg's equation. **2½**

5. Attempt **any ten**.

a) Evaluate 9_{C_5} **1**

b) Evaluate $\int \frac{dx}{(a-x)^2}$ **1**

c) Define common ion effect. **1**

d) Define: **1**
i) Adiabatic process ii) Isobaric process

e) State any two statement of 1st Law of thermodynamic. **1**

f) Define standard state. **1**

g) Define most probable velocity. **1**

h) Write any two postulate of kinetic theory of gas. **1**

i) Define: **1**
i) Critical temperature. ii) Boyle's temperature.

j) Define Parachor. **1**

k) Draw the structure of KCl. **1**

l) Define Space Lattice **1**

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