PAR-003-001507   Seat No. _____

B. Sc. (Sem. V) (CBCS) Examination

October / November - 2018

C - 503 : Physical And Analytical Chemistry

Faculty Code : 003
Subject Code : 001507

Time : $2\frac{1}{2}$ Hours]   [Total Marks : **70**

Instructions : (1)   Question one contains 20 short questions of one mark each. All are compulsory.

(2)   Question 2 and 3 carries 25 marks each with internal option.

1   Answer the following questions :   **20**

(1)   Write Plank's statement of second law of thermodynamics.

(2)   Define: Work function.

(3)   What is cyclic process ?

(4)   Write relation between ΔG and equilibrium constant K.

(5)   Give the definition of Unit cell.

(6)   Write Vant Hoff isochore equation.

(7)   What is an Anisotropoc?

(8)   Draw the structure of BCC lattice crystal.

(9)   What is Tie line in phase diagram?

(10) Give one example of one pair of partially miscible liquid.

(11) Give formula for student T-test.

(12) Give example of external indicator.

(13) Give example of basic buffer.

(14) Define : Standard deviation.

(15) Give wavelength range of photo chemical reaction.

(16) What is Back titration?

(17) Draw titration curve of H_3PO_4

(18) Give formula of Magnesia mixture.

(19) Which reagent is used for separation of mixture of Cl^{-1}, Br^{-1} and I^{-1} ?

(20) What is transmittance?

2   (a)   Answer the following questions : (any **three**)   **6**

    (1)   Derive a question $\Delta G = nRT \ln \dfrac{V_1}{V_2}$

    (2)   Give the Boltzmann equation related with entropy.

    (3)   What is free energy?

    (4)   Discuss Bravais lattice.

    (5)   Discuss Critical point in short.

    (6)   One heat engine is working at that time temperature of source is $120°C$ and sink is $15°C$, calculate the work efficiency of heat engine.

    (b)   Answer the following questions : (any **three**)   **9**

    (1)   Prove that the decrease in work function is equal to maximum work.

    (2)   Discuss the effect of pressure on the m. p. of paraffin wax and ice.

    (3)   Explain Liquid crystal in short.

    (4)   Explain any two applications of Gibbs Helmholtz equation.

    (5)   Derive Bragg's equation.

    (6)   At $27°C$ temperature, 5 mole of an ideal gas expanded 8 litre to 80 litre in volume, calculate the entropy change. $\left[R = 1.987 \, cal / \deg. \, Mole \right]$

(c) Answer the following questions : (any **two**) 10

(1) Explain Carnot's cycle with derivation.

(2) Derive Clausius Clapeyron equation with its integration form.

(3) Discuss the ternary system for one pain of partially miscible liquid with phase diagram.

(4) Explain Powder method for the internal analysis of crystal.

(5) For the reaction, $N_{2(g)} + O_{2(g)} \rightarrow 2NO_{(g)}$ at $2300K$ equilibrium constant is 16.9×10^{-4} and at $3000K$ equilibrium constant is 160.6×10^{-4}, calculate the enthalpy change.

$[R = 1.987 \, cal/\deg.mole]$

3 (a) Answer the following questions : (any three) 6

(1) Explain Absolute error and Relative error.

(2) Explain soluble salt and sparingly soluble salt.

(3) Explain factors affecting Beer's law.

(4) Define : Equivalent weight and Normality.

(5) Explain Primary standard.

(6) How many grams of $KMnO_4$ is required to prepare $0.05N, 250ml$ aqueous $KMnO_4$ solution?

(b) Asnwer the following questions : (any three) 9

(1) What are significant figures?

(2) If there is a lack of absorbance by product and reactant explain by diagram.

(3) Explain precipitation titration by Volhard's method.

(4) Explain separation of PO_4^{-3}, AsO_4^{-3} and AsO_4^{-3} present in the mixture.

(5) Give difference between Accuracy and Precision.

(6) Derive Lambert's – Beer's law.

(c) Answer the following questions : (any two)   10

(1) Explain methods of minimization of error.

(2) Explain neutralization titration of strong acid-strong base with graph.

(3) What is Iodimetry and Iodometry estimation? Explain Iodimetry titration.

(4) Explain separation of CO_3^{-2}, SO_3^{-2} and S^{-2} present in mixture.

(5) What is spectrophotometric estimation? Explain any two titrations.

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