



HB-003-001507

Seat No. \_\_\_\_\_

**Third Year B. Sc. (Sem. V) (CBCS) Examination**

May / June - 2017

**Chemistry : C - 503**

*(Physical & Analytical Chemistry) (New Course)*

**Faculty Code : 003**

**Subject Code : 001507**

Time :  $2\frac{1}{2}$  Hours]

[Total Marks : 70

- Instructions :** (1) All questions are compulsory.  
(2) Right side figures indicate marks.

**1** Answer the following objective questions : **20**

- (1) Write Planck's statement for 2<sup>nd</sup> law of thermodynamics.
- (2) What will be total work done by the system in a cyclic process ?
- (3) Define Adiabatic process.
- (4) State the law of mass action.
- (5) For a reaction  $A + B \rightleftharpoons C + D$ , the value of  $\Delta G^\circ$  is zero, what will be the value of  $K_p$  (equilibrium constant) ?
- (6) Which liquid crystal is thread like ?
- (7) Define crystallography.
- (8) Define Unit Cell.
- (9) What is called Amorphous solid ?
- (10) Who has given easy method to describe three component system in phase rule ?
- (11) What is called Deviation ?
- (12) Explain : Error.
- (13) What is called Precision ?
- (14) What is normality of 0.2 M  $\text{Na}_2\text{CO}_3$  solution ?
- (15) Define solubility.
- (16) What happens when  $\text{CuSO}_4$  is added to the aq. solution containing mixture of  $\text{Cl}^-$ ,  $\text{Br}^-$  and  $\text{I}^-$  ions.
- (17) Define End Point.
- (18) Name the indicator used for the titration of weak base and strong acid.

- (19) What is called self indicator ?  
 (20) What is the wavelength range of radiation for photochemical reaction ?

- 2 (a) Answer any three questions : 6
- (1) Explain Quintupul point and Binodal curve.
  - (2) Write limitations of 1<sup>st</sup> law of thermodynamics.
  - (3) Explain smectic liquid crystal.
  - (4) Discuss effect of pressure on melting point of ice.
  - (5) What is Miller indices ?
  - (6) Wavelength of X-ray is  $1.54 \text{ \AA}$ . The distance between two adjacent planes is  $4.04 \text{ \AA}$ . Calculate glancing angle  $\theta$  for 1<sup>st</sup> order reflection.
- (b) Answer any three questions : 9
- (1) Derive vant Hoff isochore equation.
  - (2) Prove  $\Delta G = -W_{net}$ .
  - (3) Write physical significance of entropy.
  - (4) Discuss powder method to determine structure of crystal.
  - (5) Derive equation  $\Delta S = c_p \ln \frac{T_2}{T_1} + R \ln \frac{P_1}{P_2}$ .
  - (6) What is phase rule ? Write its mathematical form and explain terms involved in it.
- (c) Answer any two questions : 10
- (1) Write and explain Carnot heat theorem.
  - (2) Discuss internal structure of Rock Salt (NaCl) by X-ray diffraction data.
  - (3) Derive vant Hoff isotherm equation.
  - (4) Discuss ternary system for one pair of partially miscible liquids with phase diagram.
  - (5) For a reaction  $x \rightarrow y$  at  $27^\circ\text{C}$  temp. equilibrium constant is 0.002. With increase in temperature by  $20^\circ\text{C}$ , equilibrium constant increases three times. Calculate heat of reaction  $\Delta H$  and equilibrium constant at  $37^\circ\text{C}$  temp.

- 3 (a) Answer any three questions : 6
- (1) Calculate molarity of 4 lit. aqueous solution containing 200 grams of NaOH (Na = 23, O = 16, H = 1).
  - (2) Explain accuracy with suitable example.
  - (3) Write Grotthus-Draper law.
  - (4) Define Transmittance and coefficient of variance (C.V)
  - (5) Explain role of KCN in the separation of  $\text{Cu}^{+2}$  and  $\text{Cd}^{+2}$  ions.
  - (6) Explain secondary standard.
- (b) Answer any three questions : 9
- (1) Discuss student T test.
  - (2) Explain separation of  $\text{CO}_3^{-2}$ ,  $\text{SO}_3^{-2}$  and  $\text{S}^{-2}$  ions by any one method.
  - (3) Differentiate photochemical and thermal reactions.
  - (4) Explain method to prepare standard solution of sodium thiosulfate ( $\text{Na}_2\text{S}_2\text{O}_3$ )
  - (5) Derive equation of Lambert's and Beer's law.
  - (6) Explain external indicator taking suitable example.
- (c) Answer any two : 10
- (1) What is adsorption indicator ? Explain Fajan's adsorption method.
  - (2) What is called error ? Explain types of error.
  - (3) Explain spectrophotometric titration with diagram of (i) Lacking of absorbance by reactant and reagent and (ii) lacking of absorbanic bye-product.
  - (4) Write and explain titration curve of weak acid and strong base.
  - (5) State iodometry and iodimetry titration. Explain usefulness of starch indicator in iodometry and iodimetry titration. Also write its merits and demerits.
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