



**HCN-003-001507**

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

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

**October - 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) Question No. 1 carries 20 marks. All other carries 25 marks each.
- (3) Symbols have their usual meaning.
- (4) Right side figures indicate marks.

**1** Answer the following questions in short :

**20**

- (1) Explain cyclic process.
- (2) The change in free energy is a measurement of \_\_\_\_\_.
- (3) Which liquid crystal is soap like ?
- (4) Define : Unit cell
- (5) The heat change when 1 mole of a liquid is converted into vapor or gaseous state at its boiling point is known as \_\_\_\_\_.
- (6) What is amorphous solid ?
- (7) A system with zero degree of freedom is known as \_\_\_\_\_
- (8) Name the intermediate state between solid and liquid.
- (9) For three component system and one phase what will be degree of freedom.
- (10) For a cyclic process the change in internal energy of the system is \_\_\_\_\_.
- (11) Define : Solubility.

- (12) Decomposition of ppt on ignition is \_\_\_\_\_ type of error.
- (13) What is optical density ?
- (14) Normality of 1M Na<sub>2</sub>CO<sub>3</sub> solution is \_\_\_\_\_ N.
- (15) What is useful pH range of methyl orange.
- (16) Which substance is used to remove I<sup>-</sup> from the mixture of Cl<sup>-</sup>, Br<sup>-</sup> and I<sup>-</sup> ?
- (17) Define : Precision
- (18) In photo chemical reaction free energy \_\_\_\_\_.
- (19) How many grams of NaOH is required to prepare 0.2 molar 5 lit. aqueous solution ?
- (20) Name any two redox indicators.

2 (a) Answer any three questions : 6

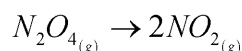
- (1) Write limitations of first law of thermodynamics.
- (2) Discuss effect of pressure on melting point of ice.
- (3) Why only X-rays are used in the study of crystallography ?
- (4) Define :
  - (a) Tie lines
  - (b) Binodal curve
- (5) Discuss Bravais lattice.
- (6) Calculate work efficiency of heat engine during work between 150° C and 50°C.

(b) Answer any three questions : 9

- (1) Describe physical significance of entropy in short.
- (2) Prove that the decrease in work function is equal to maximum work.
- (3) What is phase rule ? Write its mathematical form and explain terms involved in it.
- (4) Write a short note on Liquid Crystal.

(5) Derive  $\Delta s = Cp \ln \frac{T_2}{T_1} + R \ln \frac{P_1}{P_2}$ .

- (6) At 300 Kelvin temp and 1 atm pressure  $N_2O_4$  decomposes by 20%; calculate change in free energy and equilibrium constant for the reaction.



(c) Answer any two questions : 10

- (1) Write and explain Carnot heat theorem.
- (2) Derive Clausius-Clapeyron equation and its integration form.
- (3) Draw and explain phase diagram of one pair of partially miscible liquid mixture.
- (4) Discuss the internal structure of Sylvin (KCl) by X-ray diffraction data.
- (5) The vapour pressure of solid iodine is 47.5 mm at 100°C, vaporization heat ( $\Delta H$ ) of iodine is 14810 cal/mole. Calculate the vapour pressure of iodine at 25°C. [R = 1.987 cal]

3 (a) Answer any three questions : 6

- (1) Explain accuracy with suitable example.
- (2) Explain :
  - (a) End Point
  - (b) Equivalence Point
- (3) Explain Primary Standard.
- (4) State the difference between Iodimetry and Iodometry.
- (5) Explain soluble salt and sparingly soluble salt.
- (6) Calculate the molality of the solution prepared by dissolving 264 gms  $(NH_4)_2 SO_4$  in 5 kg water.

(b) Answer any three questions : 9

- (1) Write short note on significant figures.
- (2) Explain the principle of redox indicator.
- (3) Explain separation of  $Cu^{+2}$  and  $Cd^{+2}$  in detail.
- (4) Derive equation of Lambert's and Beer's law.
- (5) Write note on Q-Test.
- (6) Explain method of prepare standard solution of sodium thiosulfate.

(c) Answer any two questions : 10

- (1) Write note on spectrophotometric estimation.
  - (2) Describe the methods for elimination of error.
  - (3) Write and explain titration curve of weak acid and strong base.
  - (4) Explain Mohr's method for the titration of  $\text{NaCl} \rightarrow \text{AgNO}_3$ .
  - (5) Explain separation of  $\text{Br}^-$ ,  $\text{NO}_2^-$  and  $\text{NO}_3^-$  ions in detail in qualitative analysis.
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