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MAL-003-001507 Seat No. _____

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

October / November – 2016

Chemistry : Paper - 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 the 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 indicates marks.

1 Answer the following questions in short : **20**

(1) Explain cyclic process.
(2) What is amorphous solid ?
(3) Which type of membrane is used in Vant-Hoff equilibrium box ?
(4) Name the intermediate state between solid and liquid.
(5) Define : Unit cell
(6) Which thermodynamics function represents net OR useful work ?
(7) Write Kelvin-Plank statement.
(8) What is Binodal curve ?
(9) What is spontaneous change ?
(10) For three component system and one phase what will be degree of freedom ?
(11) What is sparingly soluble salt ?
(12) Define : Standard deviation
(13) Explain Grothus-Draper's law.
(14) How many grams of NaOH is required to prepare 0.2 molar 5 Lit. aqueous solution ?
(15) What is useful pH range of methyl orange ?
(16) Define : Solubility.

(17) Why Mohr's method is not used in acidic medium ?

(18) Name any two redox indicators.

(19) Which substance is used to remove I^- from the mixture of Cl^-, Br^- and I^- ?

(20) Define : Precision

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

(1) Discuss Bravais lattice.

(2) Explain effect of pressure on the melting point of paraffin wax.

(3) Give the limitations of first law of thermodynamics.

(4) Define :

(a) Quintple point

(b) Tie Lines

(5) Calculate work efficiency of heat engine during work between 150°C and 50°C.

(6) Calculate Miller indices from the intercept of crystal 2a, –3b, –3c.

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

(1) Describe physical significance of entropy in short.

(2) Write a short note on liquid crystal.

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

(4) Explain phase rule with its terms.

(5) Derive $\Delta S = C_p \, |n \frac{T_2}{T_1} + R |n \frac{P_1}{P_2}$.

(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.

$$N_2O_{4(g)} \rightarrow 2NO_{2(g)}$$

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

(1) Prove : $\eta = \frac{W_{max}}{Q_2} = \frac{Q_2 - Q_1}{Q_2} = \frac{T_2 - T_1}{T_2}$.

(2) Draw and explain phase diagram of two pair of partially miscible liquid mixture.

(3) Derive Clausius-Clapeyron equation and its integration form.

(4) Explain the internal structure of NaCl by X-ray diffraction method.

(5) 2.8 litre O_2 and 19.6 litre H_2 mixed at STP at mixing calculate the entropy change.

3 (a) Answer any three questions : **6**

(1) Explain Absolute and Relative error.

(2) Explain in short "Common ion effect".

(3) How many grams of $KMnO_4$ is required to prepare 500 ml 0.5 M $KMnO_4$ solution (M.W. $KMnO_4$ = 158)

(4) Define :

(a) Absorbance

(b) Transmittance.

(5) State the difference between iodimetry and iodometry titration.

(6) Explain primary standard.

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

(1) Write short note on Q-Test.

(2) Derive equation of Lambert's and Bear's law.

(3) Explain principle of Neutralization Indicator.

(4) State the disadvantages of starch as an indicator.

(5) Calculate molarity of 2 litre solution containing 100 gm NaOH.

(6) Explain roll of KCN in the separation of Cu^{+2} and Cd^{+2}.

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

(1) Explain neutralization titration of strong acid and strong base with diagram.

(2) Describe the methods for elimination of error.

(3) Explain Mohr's method for the titration of NaCl $\rightarrow$ $AgNO_3$.

(4) Write note on spectrophotometric estimation.

(5) Explain separation of PO_4^{-3}; ASO_4^{-3} and ASO_4^{-3} ions in detail in qualitative analysis.
