Registration No: | | | | | | | | | | |

Total Number of Pages: 02

B.TECH
15BS1103

1st Semester Back Examination 2016-17
CHEMISTRY
BRANCH(S): ALL
Time: 3 Hours
Max Marks: 100
Q.CODE: Y802

Answer Part-A which is compulsory and any four from Part-B.
The figures in the right hand margin indicate marks.

Part – A (Answer all the questions)

Q1 **Answer the following questions:** **(2 x 10)**

a) The bond order and number of unpaired electrons in O_2 is _____ & _____ respectively.
b) The radius ratio of cation to anion in a tetrahedral arrangement varies from _____ to _____.
c) The number of components in C_2H_5OH-H_2O system is/are_____.
d) Melting point of a substance is a _____property. (extensive/intensive)
e) The elements present above hydrogen in the electrochemical series have _____ reduction potential values.
f) The unit of rate of reaction for a n-th order reaction is _____.
g) The momentum and wavelength of a moving particle are related as _____.
h) The no of atoms per unit cell in a simple cubic cell is _____.
i) The relation between ΔG, ΔH and ΔS at a particular temperature (T) are related as _____.
j) The half life period of a chemical reaction is independent on the initial concentration of the reactant. The order of the reaction is_____.

Q2 **Answer the following questions:** **(2 x 10)**

a) Write down the time independent Schrodinger wave equation.
b) Show that the bond order of H_2 is one.
c) What is the Miller indices of a plane which makes intercepts 2a, 3b, 2c?
d) Arrange the following crystal structure in the increasing order of their void space: SCC, FCC, BCC
e) State Hess's Law.
f) Write some examples of subsidiary reference electrodes.
g) What is path function?
h) What is metastable state?
i) What is condensed phase rule and when it is applied?
j) Write down the relation between the rate constant and the temperature of a reaction.

Part – B (Answer any four questions)

Q3 **a)** Draw the molecular orbital diagram for N_2 molecule. Write down the electronic configuration, bond order and magnetic behavior of it. **(10)**

b) Calculate the kinetic energy of a moving object which has a wavelength of 4.8pm. (Mass of the object is 9.1×10^{-28}gm.) **(5)**

Q4 **a)** Briefly explain the imperfections in an ionic crystal. **(10)**

b) KBr has fcc structure. The density of KBr is 2.73g cm^{-3}. Calculate the length of the unit cell. (At. Mass of K=39, Br=80) **(5)**

Q5 **a)** Write down all the four Maxwell's Thermodynamic relations and derive each one. **(10)**

b) Comment on the statement "the entropy of the universe is always increasing". **(5)**

Q6 **a)** What is phase rule? Draw and explain phase diagram for a one component four phase system. **(10)**

b) An alloy of Cd and Bi contains 50% Cd by mass. Calculate the mass of eutectic in 2kg of alloy, if the eutectic system contains 60% Bi by mass. **(5)**

Q7 **a)** Derive the expression of rate constant of a second order reaction in which (i) the reactant is same, (ii) the reactants are different. **(10)**

b) What is catalysis? Discuss homogeneous and heterogeneous catalysis with examples. **(5)**

Q8 **a)** Write the construction of (i) quinhydrone electrode (ii) glass electrode. How can you determine the pH of a solution by using the above two electrodes? **(10)**

b) Calculate the emf of a cell at 25^0C consisting of two silver electrodes immersed in solutions of $AgNO_3$ of 0.1M and 0.01M concentrations. **(5)**

Q9 **a)** What are the factors affect the rate of a reaction? Discuss each factor briefly. **(10)**

b) Write the difference between crystalline and amorphous solids. **(5)**