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

Total Number of Pages : 02 **B.Tech**

15BS1103

2nd Semester Back Examination 2018-19

CHEMISTRY

BRANCH : AEIE, CIVIL, CSE, ECE, EEE, ELECTRICAL, ETC, IEE, IT, MECH, MINERAL, MINING, MME, TEXTILE

Max Marks : 100

Time : 3 Hours

Q.CODE : F524

Answer Question No.1 (Part-1) which is compulsory, any EIGHT from Part-II and any TWO from Part-III.

The figures in the right hand margin indicate marks.

Part- I

Q1 **Only Short Answer Type Questions (Answer all -10)** **(2 x 10)**

a) Write down the Gibbs's Helmholtz equation and define term involved therein.

b) What do you mean by degrees of freedom? What is value above and below critical points.

c) Enthalpy/mole is extensive or intensive property. Justify your answer.

d) Give the number of components of the system:

$$Fe_{(S)} + H_2O_{(g)} \leftrightarrow FeO_{(S)} + H_{2(g)}$$

e) What is the relationship between free energy and equilibrium constant of a reaction.

f) What do you mean by the zero –order reaction? Give an example of it.

g) Aqueous solution of glucose has one phase. Whereas aqueous solution of carbon tetrachloride has two phase. Explain.

h) Distinguish between electrolytic cell and battery.

i) What do you mean by the planes of symmetry and center of symmetry?

j) Write down electrode reaction of quinhydrone electrode.

Part- II

Q2 **(Answer Any Eight out of Twelve)** **(6 x 8)**

a) What do you mean by Order and molecularity of a reaction? Derive an expression for second order reaction when two reactants are different.

b) What is the standard EMF of the Electrochemical cell made of Cd Electrode in a 1.0M Cd $(NO_3)_2$ solution and Cr electrode in 1.0M $Cr(NO_3)_3$ solution E^0 (Cd/Cd^{+2}) =- 0.40V $E^0(Cr^{+3}/Cr)$= -0.74V?

c) What do you mean by the catalytic poisoning? Discuss the various type of catalytic poisoning with example.

d) What do you mean by the reaction rate? Discuss the effect of temperature on reaction rate(Derive the Arrhenius equation).

e) Prove that $Cp-Cv=[P+\{\partial U/\partial V\}_T][\partial V/\partial T]p$

f) A first order reaction takes 40.5 minutes for 25% decomposition of the reactant. Calculate the rate constant of the reaction.

g) State and explain Hess's law of constant heat summation.

h) Write the construction, cell representation and cell reaction of standard hydrogen electrode.

i) Prove that $E = -\partial H/nF + T\{(\partial E)/\partial T\}_P$

j) Write down the condition for overlapping of atomic orbitals.

k) Write the reactions of charging discharging in lead-storage battery.

l) Define term phase, component and degrees of freedom with at least one example of each state.

Part-III
Only Long Answer Type Questions (Answer Any Two out of Four)

Q3 Write down the condition for overlapping of atomic orbital. Justify the paramagnetic behavior of NO, O_2 and O^{2-} with help of molecular orbital diagram. **(16)**

Q4 Make a Sketches representing schematically(Name each curve)each of following :

a) A temperature and pressure diagram for one component system involving more than one triple point **(8)**

b) A temperature –composition phase diagram for a binary system having eutectic point. **(8)**

Q5 What do you mean by order and molecularity in a chemical reaction? Derive an expression for second order reaction when two reactants are different? **(16)**

Q6 **a)** What do you mean by the lattice energy? How can you explain lattice energy with help of Born-Haber cycle. **(8)**

b) The pH of solution in cell **(8)**
$Pt/H_2(g)$ /HCl(g)/Agcl(s)/Ag is 0.65 calculate the EMF of cell E^0 Cl^-/Ag,Ag = 0.2224V