**Registration no:** | | | | | | | | | | |

**Total Number of Pages: 2**

**B.Tech**
**BS1103**

# 1st Semester Back Examination 2016-17
## CHEMISTRY - I
### BRANCH(S): ALL
### Time: 3 Hours
### Max Marks: 70
### Q.CODE: Y803

**Answer Question No.1 which is compulsory and any five from the rest.**
**The figures in the right hand margin indicate marks.**

**Q1** **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)** Write some examples of subsidiary reference electrodes.
**f)** State Hess's Law.
**g)** What is state function?
**h)** Find the number of phases in supersaturated salt solution.
**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.

**Q2** **a)** With the help of molecular orbital diagram show that $He_2$ does not exist. **(5)**

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

**Q3** **a)** 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)**

**b)** Briefly explain the Frenkel defect in an ionic crystal. **(5)**

**Q4** **a)** Show that **(5)**

(i)

$$\left(\frac{\partial T}{\partial V}\right)_S = -\left(\frac{\partial P}{\partial S}\right)_V$$

(ii)

$$\left(\frac{\partial S}{\partial V}\right)_T = \left(\frac{\partial P}{\partial T}\right)_V$$

**b)** State and explain second law of Thermodynamics. **(5)**

**Q5** **a)** What is phase rule? Draw and explain phase diagram for a one component three phase system. **(7)**

**b)** Discuss the significance of triple point. **(3)**

**Q6** **a)** Derive the expression of rate constant of a first order reaction. **(5)**

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

**Q7** **a)** Draw and explain the structure and working of $H_2$-$O_2$ fuel cell. **(6)**

**b)** Calculate the emf of a cell at $25^0$C consisting of two silver electrodes immersed in solutions of $AgNO_3$ of 0.1M and 0.01M concentrations. **(4)**

**Q8** **Write short answer on any TWO:** **(5 x 2)**

**a)** Collision theory of reaction rates

**b)** Order and molecularity of a reaction

**c)** Quinhydrone electrode

**d)** Eutectic system