

Seat No.: _____

Enrolment No. _____

GUJARAT TECHNOLOGICAL UNIVERSITY
BE SEM-IV Examination-Nov/Dec-2011

Subject code: 140501

Date: 25/11/2011

Subject Name: Physical and Inorganic Chemistry

Time: 02.30 pm -5.00 pm

Total marks: 70

Instructions:

1. Attempt all questions.
2. Make suitable assumptions wherever necessary.
3. Figures to the right indicate full marks.

- Q.1 (a)** Answer the following: **14**
- (i) 'For one component system, triple point is an invariant point'. Justify the statement.
 - (ii) Define hydrogen bond, with an illustration.
 - (iii) State Beer - Lambert law and explain its significance.
 - (iv) What are liquid crystals? How are they different from true liquids?
 - (v) Define dipole moment. Mention any one use of dipole moment measurement.
 - (vi) Differentiate between resonance and inductive effect, with an illustration.
 - (vii) Write two non-ferrous alloys and their applications.
- Q.2 (a)** Define heat (enthalpy) of reaction. Derive Kirchoff's equations representing the variation of heat change of reaction with temperature at constant volume and at constant pressure. **07**
- (b)** Deduce Gibbs phase rule equation from thermodynamic considerations. **07**
- OR**
- (b)** Draw the phase diagram of silver-lead eutectic system and discuss its salient features. State its importance. **07**
- Q.3 (a)** What is a buffer solution? What are the two common types of buffer solutions? How do they operate? **07**
- (b)** Define emf of a cell. Calculate the emf of the cell **07**
- $$\text{Zn} | \text{Zn}^{2+} (0.001\text{M}) || \text{Ag}^+ (0.1\text{M}) | \text{Ag}$$
- The standard potential of Ag/Ag^+ half - cell is +0.80 V and Zn/Zn^{2+} is - 0.76 V.
- OR**
- Q.3 (a)** Write a note on fuel cells. **07**
- (b)** What do you understand by endothermic and exothermic reactions? The heat of combustion of ethylene at 17° C and at constant volume is - 332.19 kcal. Calculate the heat of combustion at constant pressure considering water to be in liquid state. ($R = 2 \text{ cal degree}^{-1} \text{ mol}^{-1}$). **07**
- Q.4 (a)** What are the advantages of conductometric titrations? How does the conductance change when a strong acid like hydrochloric acid is titrated against a strong base like sodium hydroxide? Explain the variation. **07**

- (b) Explain the principle of vv - visible spectroscopy and infra-red spectroscopy techniques. 07

OR

- Q.4 (a) Discuss about the various types of heat treatment of steels and their effect on the properties of steels. 07
(b) Briefly describe any three processes of ore dressing used in metallurgy. 07

- Q.5 (a) What are explosives? Discuss the classification of explosives with examples. State the precautions to be taken while storing the explosives. 07
(b) Write a note on rocket propellants. 07

OR

- Q.5 (a) Explain ionic, covalent and metallic bonds with suitable examples. Also explain the effect of type of bonding on the properties of materials. 07
(b) Give a brief account of valence bond (VB) and molecular orbital (MO) theories of bonding. 07
