Seat No.: _____ Enrolment No._____

GUJARAT TECHNOLOGICAL UNIVERSITY

BE - SEMESTER – IV • EXAMINATION – SUMMER 2014

Subject Code: 140501 Date: 16-06-2014

Subject Name: Physical and Inorganic Chemistry

Time: 10:30 am to 01:00 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)** 1. Define the term Degree of Freedom. **07**
2. What is inductive effect?
3. What is thermo chemistry?
4. Define 'cell constant'.
5. Write two non-ferrous alloys and their applications.
6. Define the term hybridization.
7. What are rocket propellants?

(b) Explain the principle of gas chromatography technique with a neat schematic diagram of gas chromatography (GC) instrument. **07**

Q.2 **(a)** 1. State and derive Lambert – Beer's Law. **04**

2. A buffer solution contains 0.015 M ammonium hydroxide and 0.025 M ammonium chloride. Calculate the pH value of the solution. Dissociation constant of NH_4OH at room temperature is 1.8×10^{-5}. **03**

(b) Give Instrumental set up of spectrophotometer describing its components with diagram. **07**

OR

(b) Draw the phase diagram of silver-lead eutectic system and discuss its salient features. State its importance. **07**

Q.3 **(a)** With a neat block diagram of thermogravimetry apparatus, explain thermogravimetric analysis (TGA) by giving a suitable illustration. **07**

(b) 1. Define the term standard emf of a cell. What is the potential of a half-cell consisting of zinc electrode in 0.01 M $ZnSO_4$ solution at 25°C, E°= 0.763 V. **04**

2. Write short note on calomel electrode. **03**

OR

Q.3 **(a)** What is Phase rule? Describe phase diagram of Triple point of one Component system. **07**

(b) 1. The heat of formation of methane at 298 K at constant pressure is -17.890 kcal. Calculate its heat of formation at constant volume. (R = 1.987 cal $degree^{-1}$ mol^{-1}) **04**

2. Explain Hess's law of constant heat summation, with a suitable example. **03**

Q.4 **(a)** Explain the terms with examples: Steric effect, Hyper conjugation **07**

(b) 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**

OR

Q.4 **(a)** Mention the effects of nickel, chromium, vanadium and tungsten alloying elements on the properties of steels. Also state the important applications of various alloy steels. **07**

	(b)	What is metallurgy? Write different physical properties of metals which are required to enhance the metals characteristics.	**07**
Q.5	**(a)**	Compare valence bond (VB) and molecular orbital (MO) theories of bonding.	**07**
	(b)	Define and Classification of Rocket propellant. Describe with reason why Bipropellant is more widely used in a Rocket?	**07**

OR

Q.5	**(a)**	Write a preparation of following (1) lead azide (2) Tri nitro toluene (3) RDX	**07**
	(b)	Give the molecular orbital configuration of NO molecule. Calculate the bond order and comment on its magnetic property.	**07**

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