

Seat No.: _____

Enrolment No. _____

GUJARAT TECHNOLOGICAL UNIVERSITY
BE - SEMESTER– IV(NEW) EXAMINATION – SUMMER 2015

Subject Code: 2140501**Date: 05/06/2015****Subject Name: Physical and Inorganic Chemistry****Time: 10:30am-1.00pm****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) With a suitable example, explain Hess's law of constant heat summation. State its application. **07**
- (b) What is the basic principle used in conductometry titration? Briefly discuss any two of its applications. **07**

- Q.2** (a) What do you understand by reduced phase rule? Draw a neat phase diagram of silver-lead eutectic system and discuss its salient features. **07**
- (b) What are the methods of detection and measurement of radioactivity? Explain any one in detail. **07**

OR

- (b) What is buffer solution? What are its types? With an example, explain how a buffer operates. **07**
- Q.3** (a) The heat of combustion of methane is $-890.65 \text{ kJ mol}^{-1}$ and heat of formation of CO_2 and H_2O are -393.5 and $-286.0 \text{ kJ mol}^{-1}$ respectively. Calculate the heat of formation of methane **07**
- (b) Write Henderson – Hasselbalch equation and state its significance. **07**
 Find the pH of a buffer solution containing 0.20 mole per litre CH_3COONa and 0.15 mole per litre CH_3COOH . The dissociation constant, K_a , for acetic acid is 1.8×10^{-5}

OR

- Q.3** (a) Differentiate between order and molecularity of a reaction. **07**
 The following data was obtained on hydrolysis of methyl acetate at 25°C in 0.35N hydrochloric acid. Establish that it is a first order reaction.

time (sec)	0	4500	7140	∞
Volume of alkali used (ml)	24.36	29.32	31.72	47.15

- (b) Derive the relationship between ΔH and ΔE and solve the following. **07**
 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. ($R = 2 \text{ cal degree}^{-1} \text{ mol}^{-1}$)
- Q.4** (a) State the properties of good propellant. Briefly discuss the classification and applications of propellant. **07**
- (b) Cite any three applications to explain the inter-relationship between bonding, structure and properties. **07**

OR

- Q.4** (a) Write a short note on 'reference electrodes and their applications'. **07**
(b) Explain the basic principle used in chromatography technique. Briefly discuss about liquid chromatography. **07**
- Q.5** (a) Write Beer–Lambert's law and state its limitation. Also explain the basic principle used in infra-red spectroscopy technique. **07**
(b) With suitable examples, explain nuclear fission and fusion reactions. Discuss about nuclear reactor and nuclear waste disposal. **07**
- OR**
- Q.5** (a) State any three general metallurgical operations and discuss about them briefly. **07**
(b) What are the uses of aluminium? Briefly describe the extraction of aluminium from its ore. **07**
