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M.F

Printed Pages—3

TAS—102

(Following Paper ID and Roll No. to be filled in your Answer Book)

PAPER ID : 9914

Roll No.

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FIRST

**B.Tech.**

FIRST SEMESTER EXAMINATION, 2005-2006

**CHEMISTRY**

Time : 3 Hours

Total Marks : 100

- Note :** (i) Answer **ALL** questions.  
(ii) All questions carry equal marks.  
(iii) Make suitable assumptions and structures /fig. where required.  
(iv) Be precise in your answer.

1. Attempt **any four** of the following questions : (5x4=20)
- Write down the molecular orbitals of NO, NO<sup>-</sup> and NO<sup>+</sup>. Arrange them in increasing order of stability.
  - Discuss the structure of Graphite and hence comment on its conducting nature.
  - X-rays of wave length 1.54 Å is falling at an angle of 14°12' on a crystal to show first order diffraction/reflection. Calculate the separation between two parallel planes of the crystal.
  - Define radius ratio and derive formula for radius ratio of an octahedral crystal.
  - What is hydrogen bond ? How does an inter molecular hydrogen bond differ from intramolecular hydrogen bond ?

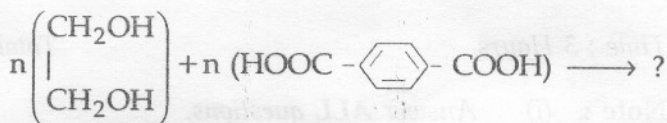
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2. Attempt *any four* of the following questions : (4x5=20)

- (a) For a  $XY_2$  bent molecule, show various type of stretching and bending vibrations in IR.
- (b) Write a note on vulcanisation of rubber
- (c) Through chemical reactions, illustrate the preparations of butyl rubber and Buna-N.
- (d) (i) What is synthetic fibre ?  
(ii) Complete the chemical reaction -

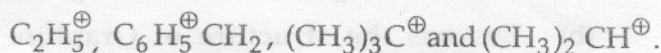


Name the product of the reaction and its use.

- (e) Discuss about preparation and conducting nature of poly pyrrole.

3. Attempt *any two* of the following questions : (10x2=20)

- (a) (i) Arrange in increasing order of Stability -



- (ii) Show hybridisation in  $\dot{C}H_3$  (free radical) and predict its structure.
- (b) (i) Name different types of organic reactions with examples.
- (ii) Discuss the mechanism of Hoffmann rearrangement and cannizzro reaction.
- (c) (i) Define - optical activity, enantiomers, and racemic mixture.
- (ii) With the help of energy profile diagram discuss the conformation of butane.

4. Attempt *any two* of the following questions : (10x2=20)
- (a) (i) Write a note on activation energy. Is activation energy related with rate constant of the reaction ?
- (ii) What is half life of a chemical reaction ? Show that time required to complete 99.9% of a first order reaction is about 10 times of its half life.
- (b) (i) Define - Phase, component and degree of freedom.
- (ii) For one component system water, find degree of freedom at its triple point of the phase diagram.
- (c) Describe construction of a Galvanic cell. Write down the electrode reactions and formula for its E.M.F.
5. Attempt *any two* of the following questions : (10x2=20)
- (a) (i) What is reverse osmosis ? How this process is helpful in making soft water.
- (ii) Calculate temporary and permanent hardness of a water sample which analysed as :  
 $\text{Ca}(\text{HCO}_3)_2 = 21.0 \text{ mg/Lit}$ ,  $\text{Mg}(\text{HCO}_3)_2 = 25 \text{ mg/Lit}$   
 $\text{CaCl}_2 = 16.4 \text{ mg/Lit}$  and  $\text{MgCl}_2 = 5.2 \text{ mg/Lit}$ .
- (b) (i) Name different forms of coal and arrange them in ascending order of % of carbon.
- (ii) What is biogas ? Discuss its advantages.
- (iii) Why there are two types of calorific values of a fuel ?
- (c) (i) Define the terms pollution and pollutants with examples.
- (ii) Write a note on the formation and depletion of ozone.

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