Printed Pages : 4　　　　　　　　　　TAS-202 / CY – 201

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

PAPER ID : 9928　　Roll No.

B. Tech.
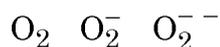
(SEM. II) EXAMINATION, 2006-07
CHEMISTRY

Time : 3 Hours]　　　　　　　　　*[Total Marks : 100*

Note :　(1)　Attempt **all** the questions.

　　　　　(2)　In case of numerical problems, assume data wherever not provided.

1　Attempt any **two** parts of the following :　　10×2

　(a)　With the help of molecular orbital diagram arrange the following molecule/ion in order of their increasing bond length.

$$O_2 \quad O_2^- \quad O_2^{--}$$

　(b)　What is meant by Intermolecular and Intramolecular H-bonding ? Explain the consequences of H-bonding.

　(c)　Explain the structure of graphite. Also explain the reasons for its electrical and lubricating properties.

OR

Explain crystal field theory for octahedral compounds, giving suitable example.

V–9928]　　　　　　　1　　　　　　　[Contd...

2 Attempt any **four** parts of the following : 5×4

    (a) Give the structure consistent with the following NMR data :

$$C_3H_5Cl_3 - \quad \text{a Singlet, } \delta \ 2.20, \ 3H$$
$$\text{b Singlet, } \delta \ 4.20, \ 2H$$

    (b) Define the terms chromophore and auxochrome, in UV spectroscopy

    (c) Explain vulcanisation and state the improvement in properties of rubber after vulcanisation is carried out.

    (d) Write the structures (only) of the following polymer :

        (i) Polyacrylonitrile

        (ii) Buna-**S**

        (iii) Dacron

        (iv) Nylon-**6**.

    (e) Give the mechanism of addition and condensation polymerisation.

    (f) Explain the different modes of vibration in a poly atomic molecule.

3 Attempt any **two** parts of the following : 10×2

    (a) Explain the mechanism of nucleophilic substitution reactions.

    (b) Give the mechanism of following reactions :

        (i) Hofmann rearrangement

        (ii) Aldol condensation

        (iii) Canizzaro reaction.

(c) What is optical activity? Give the stereoisomers of Tartaric acid ? How do you account for lack of optical activity in meso-forms and racemic mixtures.

4 Attempt any **four** parts of the following : **5×4**

(a) The rate constant of a reaction is $1.5 \times 10^7 \text{ sec}^{-1}$ at **50°C** and 4.5×10^7 at **100°C.** Evaluate the Arrhenius parameters **A** and **Ea.**

(b) Derive the equation for half life of first order reaction.

(c) With the help of phase diagram of water, calculate the degree of freedom at triple point.

(d) Explain four methods for prevention of corrosion.

(e) Derive Nernst's equation for single electrode potential and explain the terms involved in it.

(f) Write short note on Galvanic cell.

OR

Write short note on solar energy.

5 Answer any **four** of the following : **5×4**

(a) Explain the zeolite method for softening of water.

(b) A water sample contains **408 mg** of $CaSO_4$ per litre. Calculate the hardness in terms of $CaCO_3$ equivalent.

V–9928] 3 [Contd...

(c) The following data were obtained in a bomb calorimeter experiment :

Weight of coal = **0.85 gm**, weight of water taken = **750 gm**

Water equivalent of Calorimeter = **2000 gm**

Rise in temp. = **0.30°C**,

Acid correction = **0.03°C**

If the sample contains **10% H**, calculate net and gross calorific value.

(d) Give the composition of Biogas. With the help of a diagram, explain a bio-gas plant.

(e) Write short notes on Acid rain and formation and depletion of ozone.

(f) What is pollution ? Give two air pollutants and their effect on human life.

———————