Z-9914/9928-1000

Printed Pages : 4 TAS – 102 / 202

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

PAPER ID : 9914/9928 Roll No.

B. Tech. (Sem. I & II)

SPECIAL CARRYOVER EXAMINATION, 2006-07

CHEMISTRY

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

Notes : *(1) Attempt **all** questions.*
*(2) All questions carry **equal** marks.*

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

(a) Calculate the bond order of N_2^-, O_2^+, NO^- and NO^+.

(b) With the help of molecular orbital theory, explain the paramagnetic character of oxygen.

(c) What is metallic bond ? Explain it on the basis of molecutar orbital theory.

(d) Write a short note on fullerenes.

(e) What do n, d, λ and θ signify in the Bragg's law $n\lambda = 2d \sin\theta$?

(f) Account for the following :

Graphite and diamond are both allotropic forms of carbon yet graphite is soft, while diamond is hard.

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

(a) How many NMR signals do you expect from each of the following compounds. Indicate also the splitting pattern of the various signals.

(i) CH_3OCH_3 (ii) $CH_3COCH_2CH_3$

(iii) CH_3CH_2OH

(b) Describe in brief the terms :

(i) Chromophore (ii) Bathochromic shift

(iii) Hyperchromic shift (iv) Hypochromic shift

(c) IR spectra is often characterised as molecular finger prints. Comment on it.

(d) Write a short note on synthetic rubbers. How does butyl rubber differ from Buna-S ?

(e) What are graft and block co-polymers ? Give examples.

(f) Why is teflon highly chemical resistant ?

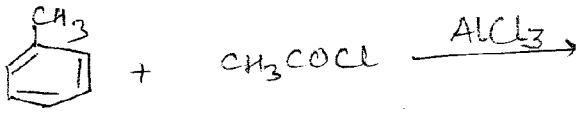
3 Attempt any **four** of the following : 5×4

(a) What are carbonium ions ? Arrange the following according to increasing stability :

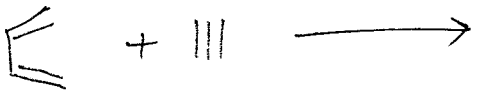
(i) $CH_3CH_2CH_2\overset{\oplus}{C}H_2$ (ii) $(CH_3)_3\overset{\oplus}{C}$

(iii) $CH_3 - CH_2 - \overset{\oplus}{C}H\,CH_3$

(b) Complete the following equations and name them :

(i) 

(ii) 

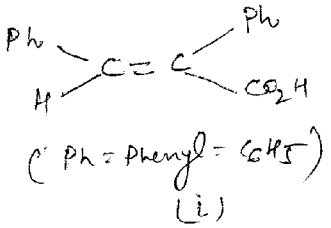
(iii) 

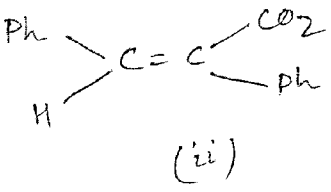
(c) What are substitation reactions in organic compounds ? Discuss the mechanism of SN and SN_2 reaction.

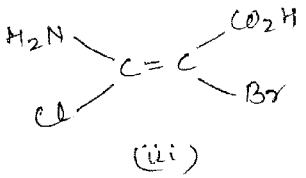
(d) Discuss the mechanism of Cannizzaro reaction.

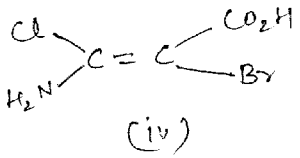
(e) Draw the potential energy diagram for the various conformation of n-butane.

(f) Allocate the symbol E or Z to each of the following compounds :









4 Answer any **two** of the following : **10×2**

(a) (i) Calculate the cell potential for the cell containing 0.10 M Ag^{+} and 4.0 M Cu^{+2} at 298 K. Given,

$$E^{\circ}_{Ag^{+}/Ag} = 0.80\ V;\ E^{\circ}_{Cu^{+2}/Cu} = 0.34\ V;$$

(ii) Write note on electrochemical series.

(b) What is Gibbs' phase rule ? Explain the application of phase rule to one-component system. Mention the merits of phase rule.

(c) (i) Explain why the hydrolysis of an ester in the presence of dilute acid follows first order kinetics while that in the presence of dilute alkali follows the second order kinetics.

(ii) A first order reaction is 15% completed in 20 minutes. How long will it take to be 60% completed ?

5 Attempt any **two** of the following :

(a) (i) Calculate the temporary hardness and permanent hardness of a sample of water containing –

$Mg(HCO_3)_2 = 7.3\ mg/L$; $Ca(HCO_3)_2 = 16.2\ mg/L$;

$MgCl_2 = 9.5\ mg/L$; $CaSO_4 = 13.6\ mg/L$

(ii) Briefly explain the construction and working of continuous hot lime soda water softener.

(b) (i) A coal has the following composition by weight : C = 90%, O = 3.0%, S = 0.5%, N = 0.5% and ash = 2.5%. Net calorific value of the coal was found to be 8,490.5 kcal/kg. Calculate the % of Hydrogen and gross calorific value of coal.

(ii) Write short note on Bio-gas.

(c) What is meant by Green House Effect ? Describe two monitoring techniques for green house effect.