Printed Page: **NAS102**

(Following Paper ID and Numbers to be filled in your Answer book)

Paper ID: 1 9 9 1 2 4 Roll No.: | | | | | | | | | | |

B.TECH

(SEM. I) (ODD SEM) THEORY EXAMINATION, 2015-16

ENGG. CHEMISTRY

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

Section-A

Q.1 Attempt all parts. All parts carry **equal** marks. Write answer of each part in short. **(2x10 = 20)**

(a) SN^2 reaction gives inverted products. Why?

(b) Explain why the value of NCV is greater than GCV.

(c) F_2 is diamagnetic while O_2 is paramagnetic. Why?

(d) Calculate density of bcc crystal. Side of cube is 5 Å and M=65.(Avogadro's Number = 6.023×10^{23})

(e) Classify the following as electrophile and nucleophile:

H_3O^+, NH_3, BF_3, ROH, $AlCl_3$

(f) How many NMR signal is present in CH_3CH_2OH and $CH_3OCH_2CH_3$.

(g) Name different forms of coal and arrange them in ascending order of % of carbon.

(h) Arrange in increasing order of stability:

$C_2H_5^+$, $C_6H_5CH_2^+$, $(CH3)_3C^+$ and $(CH_3)_2CH^+$.

(i) What is the cause of temporary hardness of water?

(j) Write the monomer of Teflon and PET.

Section- B

Note: Attempt any **five** questions from this section. **(10x5 = 50)**

Q.2 (a) State and explain Phase rule. Discuss the silent features of phase diagram of water system

(b) Describe the conformational isomers of n-butane.

Q.3 (a) Describe preparation, Properties and application of: Buna-s and Nylon 6, 6.

(b) 0.72 gm of fuel containing 80% carbon, 5% hydrogen when burnt in bomb calorimeter, increased the temperature of water from 27.3^0C to 29.1^0C. If the calorimeter contains 250 gm of water and its water equivalent is 150 gm. calculate the HCV and LCV of fuel.

Q.4 (a) What is hardness of water? Describe zeolite process for making soft water from hard water.

(b) Calculate the amount of lime (84% pure)and Soda (92% pure) required for the treatment of 20,000 litre of water whose analysis is as follows: $Ca(HCO_3)_2$ = 40.5 ppm, $Mg(HCO_3)_2$ = 36.5 ppm, $MgSO_4$ = 30.0 ppm, $CaSO_4$ = 34.0 ppm. $CaCl_2$ = 27.75 ppm and NaCl = 10 ppm.

Q.5 (a) Draw the MOD of N_2^+ molecular ion, write its electronic configuration and write its magnetic character.

(b) A sample of coal was found to have the following percentage composition: C=75%, H=5.2%, N= 3.2% and ash= 4.5%. Calculate the minimum air required for complete combustion of 1 kg of coal.

Q.6 (a) Explain Metallic bond on the basis of molecular orbital theory.

(b) 0.2gm of coal sample was used in bomb calorimeter for sulphur estimation. The weight of precipitate was found to be 0.05gm calculate the percentage of sulphur.

Q.7 (a) Calculate the bond order of N_2^-, CO, NO, F_2 and O_2^- and arrange them on increasing order of stability.

(b) Write wet or electrochemical theory of corrosion.

Q8. (a) Derive Bragg's equation for diffraction of x-ray by crystals.

(b) Derive an expression for the density of a cubic crystal.

Q9. (a) Differentiate between addition and condensation polymers.

(b) Discuss the classification and application of liquid crystal.

Section- C

Note: Attempt any **two** questions from this section. **(15x2 = 30)**

Q.10 (a) Write a note on setting and hardening of cement.

(b) Write the mechanism and stereochemistry of SN^1 reaction.

(c) Discuss properties and application of fullerenes.

Q.11 (a) Assign R, S or E,Z nomenclature to the following compounds;

(b)How proximate analysis of coal is carried out.

(c) What are the main functions of lubricant?

Q.12 (a) Calculate the temporary, permanent and total hardness of water sample having the following analysis: Mg $(HCO_3)_2$=73mg/l, $Ca(HCO_3)_2$ = 162mg/l, $CaSO_4$ = 136 mg/l, $MgCl_2$ = 95 mg/l, $CaCl_2$ = 111mg/l and NaCl = 100 mg/l.

(b)What are carbanions? Show hybridization in carbanion and discuss its stability.

(c)Differentiate between Recemic mixture and mesocompounds.