Printed Pages: 02 **Sub Code: NAS 202**
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B.TECH
(SEM II) THEORY EXAMINATION 2017-18
ENGINNERING CHEMISTRY

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

Note: Attempt all Sections. If require any missing data; then choose suitably.

SECTION A

1. Attempt *all* questions in brief. 2 x 10 = 20

a. Copper has an FCC structure and an atomic radius of 1.278 Å. Calculate its density given atomic weight of copper as 63.5 gm/mole and Avogadro number i.e. 6.023×10^{23} atom/mole.
b. Define Bond Order. Give its significance.
c. How polymers can be classified on the basis of tacticity?
d. Give monomers and polymer structure of Nylon 6.6.
e. Draw the structures of enantiomers and diastereomers of tartaric acid.
f. Explain the terms chromophore and auxochrome with reference to UV visible spectroscopy.
g. What is calgon? How does it help in water softening?
h. What are scale and sludge,explain.
i. Define HCV and LCV.
j. How plaster of parisis prepared? Give its two applications.

SECTION B

2. Attempt any *three* of the following: 10 x 3 = 30

a. O_2 is paramagnetic while N_2 is diamagnetic. Explain with the help of MOT.
b. Differentiate between:
(1) Chain growths and step growth polymerization.
(2) Thermoplastic and thermosetting resin
c. Explain the mechanism of SN^1 and SN^2nucleophlic substitution.
d. What are equivalent and non-equivalent protons? Find out the number of signals in CH_3CH_2Br, C_6H_5OH,$CH_3CH_2OCH_2CH_3$, $CH_3CH_2CH_2Cl$, C_6H_5.
e. How is proximate and ultimate analysis done for coal?

SECTION C

3. Attempt any *one* part of the following: 10 x 1 = 10

(a) What are liquid crystals? Classify with their salient features and applications.
(b) Derive Bragg's equation.
Discuss stiochiometric defects in ionic solid.

4. Attempt any *one* part of the following: 10 x 1 = 10

(a) What are conducting polymers? Explain. Classify with suitable examples and application.
(b) How Grignard's reagent in synthesized. Give formation reactions of 1°, 2°, 3° alcohol, ketone and aldehyde with the help of Grignard's reagent.

5. Attempt any *one* part of the following: 10 x 1 = 10

(a) How optical isomerization can be generated by the compounds without any chiral carbon. Discuss with example.

(b) Derive Lambert Beer's law.
Give all possible normal modes of vibration for XY_2 molecules for IR spectra.

6. Attempt any *one* part of the following: 10 x 1 = 10

(a) What are zeolites? How zeolites help in softening of water? Explain with diagram and reaction.An exhausted zeolite softener was regenerated by passing 150 litres of NaCl solution having a strength of 1.5 m/l of NaCl. Find the total volume of water that can be softened by the zeolite softener, if the hardness of the water is 600 ppm.

(b) What is Phase rule? Draw phase diagram of water system explaining degree of freedom in each area,point and line.

7. Attempt any *one* part of the following: 10 x 1 = 10

(a) Explain calorific value determined by bomb calorimeter. Give construction, working and principle of bomb calorimeter.
On burning 0.83g of a solid fuel is bomb calorimeter, the temperature of 3500g of water was increased from 26.5^0C to 29.2^0C; water equivalent of calorimeter and latent heat of steam are 385 and 587 cal/g. If fuel contains 0.7% H, calculate HCV and LCV for fuel.

(b) How cement is manufactured? Give scheme and chemical reactions involved in steps. Explain setting and hardning of cement.