Printed pages:2 **Roll No.** | | | | | | | | | | | **Sub Code: EAS-102**

Paper ID: 9033

B TECH
(SEM I) THEORY EXAMINATION 2017-18
ENGINEERING CHEMISTRY

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

Note: 1. Attempt all Sections. If require any missing data; then choose suitably.

SECTION A

1. Attempt *all* questions in brief. 2 x10 = 20

a. Arrange the following molecules / ions in order of their increasing bond length: N_2, N_2^-, N_2^{2-}.

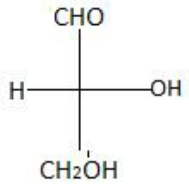
b. What is plaster of Paris? Give reaction for its preparation and setting.

c. Why the Zeolite softener is not recommended for obtaining feed water for high pressure boiler?

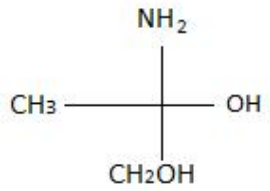
d. Write the monomers of BUNA-S and Polystyrene.

e. Assign R and S configuration of the following:

I.



II



f. Define Tribology.

g. A body centered cubic element of density 10.3 gm cm^{-3} has a cell edge of 314 pm. Calculate the atomic mass of the element

h. Provide any two examples of optically active compounds without chiral Centre?

i. Explain why Toluene undergoes Electrophilic substitution reaction more easily than Nitrobenzene.

j. Why β- carotene absorbs light in visible region?

SECTION B

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

a. Write the structure, preparation, properties and applications of fullerenes?

b. Describe proximate and ultimate analysis of fuels.

c. Explain reverse osmosis. A water sample having the following data $MgCO_3$ =84 mg/I, $CaCO_3$ =40 mg/I, $CaCI_2$ =5.5 mg/I, Mg $(NO_3)_2$ =37 mg/I, KCI =20 mg/I. Calculate

the amount of lime(86%)and Soda(82%pure) needed for the treatment of 80,000 liters of water?

d. i. What is optical activity? Write the possible optical isomerism in tartaric acid.
ii. Explain (i) Racemic mixture (II) Diastereomers

e. What are organometallic compounds? Discuss their classification, preparation and applications.

SECTION C

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

a) Draw the molecular orbital diagram of NO^+ molecule. Explain the bond order and magnetic behavior?

b) What are liquid crystals? Distinguish between Nematic & Smectic liquid crystal and and write its applications?

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

a) Explain the formation of a steroregular polymer of propylene in the presence of heterogeneous catalyst?

b) Differentiate between (a) Thermoplastic and Thermosetting with example
(b) Addition and condensation polymerization.

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

a) Draw the potential energy diagram for the various conformations of n-butane and explain their order of stability.

b) i. What is atropisomerism? Giving examples, discuss the condition under which the compound would exhibit atropisomerism.
ii. Describe E/Z nomenclature.

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

a) What is the importance of IR spectroscopy in finger print region. For an XY_2 bent molecule, show various types of stretching and bending in IR spectroscopy?

b) Define Phase rule. Apply phase rule to S system.

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

a) i. What is Portland cement? Give the chemical reactions involved during setting and hardening of cement?
ii. Explain the conditions in which semi solid lubricant is preferred over lubricating oils.

b) i. What are the characteristics of a good fuel?
A sample of coal containing 92% C, 5% H and 3% ash. When this coal was tested in the laboratory for its calorific value in a bomb calorimeter. The following data were obtained:

Weight of coal burnt	= 0.95 g
Weight of water taken	= 700 g
Water equivalent of calorimeter	=2000 g
Rise in temperature	=2.48^oC
Cooling correction	= 0.02^oC
Fuse wire correction	= 10 cal
Acid correction	= 60 cal

ii. Explain the mechanism of electro chemical or wet theory of corrosion.
Calculate the Net and Gross calorific values of the coal in cal/g (Assume the latent heat of condensation of steam as 580cal/g).