PAPER ID-411304

Roll No: | | | | | | | | | | | | | |

BTECH
(SEM I) THEORY EXAMINATION 2021-22
ENGINEERING 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.	Define the significance of triple point.
b.	At what glancing angle would the first order diffraction from the plane of the crystal be observed using X-ray of wavelength 77 pm? The dimension of the unit is 157.5 pm
c.	How many NMR signals are found in $CH_3CHOHCH_2CH_3$?
d.	A water sample contains 10 ppm of $CaCl_2$, 3.2 mg/lt NaCl, 21.1 °Fr of Al_2O_3. Calculate the hardness of water.
e.	What is aniline point of a lubricant?
f.	Write a short note on biogas.
g.	Define the term degree of polymerization.
h.	What is the mesomorphic state?
i.	Define the term chromophore with example.
j.	Classify polymer on the basis of tacticity.

SECTION B

2. Attempt any *three* of the following: 10x3=30

a.	What is optical activity? Explain the optical activity in tartaric acid. What will happen if a carboxylic group of tartaric acid is replaced by amino group?
b.	Explain the preparation, properties and applications of third allotrope of Carbon.
c.	Explain the electrochemical corrosion involving- (i) evolution of hydrogen gas (ii) absorption of basic medium. How corrosion can be prevented by sacrificial cathodic protection and impressed current cathodic protection?
d.	What is Gibb's phase rule? Define the term; phase, component and degree of freedom. Draw a phase diagram of sulphur system and also give the significance of triple point.
e.	Calculate temporary and total hardness of water sample of water containing $Mg(HCO_3)_2$ = 9.3 mg/l, $Ca(HCO_3)_2$ = 17.4 mg/l, $MgCl_2$ = 8.7 mg/l and $CaSO_4$ = 12.6 mg/l.

SECTION C

3. Attempt any *one* part of the following: 10x1=10

a.	What is lubricant? Giving suitable examples classify them and explain the mechanism of lubrication.
b.	What is coal? On what basis the coal should be classified? 3.25 g of coal was kjeldahlized and NH_3 gas thus evolved was absorbed in 45 ml of 0.1 N H_2SO_4. To neutralize excess of acid, 11.5 ml of 0.1 N NaOH was required. Calculate the % of N in the coal sample.

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4. Attempt any *one* part of the following: 10x1=10

a.	What do you understand by shielding and deshielding? A compound having the molecular formula $C_{10}H_{14}$ gave the following ^{1}HNMR data- i. 0.88 δ (6H, doublet) ii. 1.86 δ (1H,multiplet) iii. 2.45 δ (2H, doublet) iv. 7.12 δ (5H, singlet). Identify the compound based on proper explanation.
b.	What is finger print region? Two isomers A and B of the molecular formula C_3H_6O gives an IR absorption at 1650 cm^{-1} and 1710 cm^{-1} respectively. Assign structural formula to A and B isomers.

5. Attempt any *one* part of the following: 10x1=10

a.	With the help of a neat diagram, explain the working of bomb calorimeter. A sample of coal contain C=90%, H=8% and ash=2%. The following data were obtained when the above coal was tested in bomb calorimeter: Weight of coal burnt=0.90 g , Weight of water taken=800 g Water equivalent of bomb and calorimeter= 2000 g , Rise in temperature=2.40˚C Fuse wire correction =10 cal , Acid correction= 60 cal , Cooling correction=0.02 ˚C. Calculate gross and net calorific values of the coal.
b.	Describe the preparation, properties and application of PMMA and BUNA - S. Differentiate between thermosetting and thermoplastic polymers.

6. Attempt any *one* part of the following: 10x1=10

a.	What are ion exchange resins? Discuss their role in ion exchange process of water softening
b.	Give a brief account of the treatment of boiler feed water by Calgon conditioning. Calculate the amount lime and soda required for 50,000 lt. of water containing the following salt: Ca $(HCO_3)_2$ = 8.1 mg/lt., Mg $(HCO_3)_2$ = 7.5 mg/lt., $MgCl_2$ = 2.0 mg/lt., $MgSO_4$ = 12.0 mg/lt., NaCl = 4.7 mg/lt. and $CaSO_4$ = 13.6 mg/lt..

7. Attempt any *one* part of the following: 10x1=10

a.	What is organometallic compound? Explain various methods of preparation of Grignard reagent and also write at least five applications of Grignard reagent.
b.	What is Portland cement? Give the chemical reactions involved during setting and hardening of cement