PAPER ID-421531

Subject Code: RAS202

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

BTECH
(SEM II) THEORY EXAMINATION 2021-22
ENGG CHEMISTRY

Time: 3 Hours ***Total Marks: 70***

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

SECTION A

1. Attempt *all* questions in brief. 2x7 = 14

a.	Why is a block of magnesium attached through an insulated metallic wire to an underground iron pipeline?
b.	100 ml of water sample has hardness equivalent to 12.5 ml of 0.08 N MgSO4 solutions. Calculate the hardness of this water sample.
c.	Why TMS is taken as a standard reference in NMR Spectroscopy
d.	Which stereo specific isomer of polypropylene can be prepared by ZieglerNatta catalyst?
e.	What is Schottky defect? Give examples.
f.	The standard reduction potential of three metallic cations X,Y,Z are 0.52,-3.03 and -1.18 V respectively, arrange them in decreasing order of their reducing power.
g.	Predict the number of signals in $CH_3CH_2CH_2OH$

SECTION B

2. Attempt any *three* of the following: 7x3 = 21

a.	Draw the Molecular Orbital diagram of NO and O2. Calculate its bond order and predict the magnetic behavior.
b.	i. What is the composition of Biogas and the raw materials that can be used for generation of biogas? ii. Discuss the process of reverse osmosis.
c.	Explain the principle of IR spectroscopy. For XY_2 bent molecule show various types of stretching and bending vibrations in IR spectroscopy. Discuss the significance of Finger print region
d.	i. Calculate the no. of P, C and F in the following systems- i.NH4Cl(S) NH3 (g) + HCl (g) (open system) ii.NH4Cl(S) NH3 (g) + HCl (g) (closed system) ii. Write a note on polymer composites.
e.	Explain proximate analysis of coal. On burning 0.3 gm of a solid fuel in a bomb calorimeter, the temperature of 3500 gm of water increased from 26.5° C to 29.2° C. Water equivalent of calorimeter and latent heat of steam are 385.0 gm and 587.0 cal/ gm, respectively. If the fuel contains 0.7% hydrogen, calculate its gross and net calorific value.

SECTION C

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

a.	What is rank of coal? Describe proximate and ultimate analysis of coal.
b.	Outline the salient features of the phase diagram of water system highlighting the name of system (areas, curves and points), phase in equilibrium and degree of freedom in each case

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

a.	What are organometallic compounds? Give the classification and applications of organometallics.
b.	Differentiate between (i) Thermoplastic and Thermosetting (ii) Addition and condensation polymerization

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

a.	Explain the preparation, properties and applications of an allotrope of Carbon having truncated icosahedron geometry.
b.	What do you understand by liquid crystal state? Classify them on the basis of temperature and mention three important applications of it.

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

a.	What is Portland cement? Explain setting and hardening of cement.
b.	What is corrosion, explain the wet theory of corrosion on the basis of Hydrogen evolution and oxygen absorption mechanism.

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

a.	Explain the basic principle of lime-soda process. Calculate the amount of lime and soda required for softening 30000 liters of water, using 20 ppm of sodium aluminate as coagulant. Impurities in water are as follows: Ca^{2+} =160 ppm, Mg^{2+} = 96 ppm, dissolved CO2 = 34 ppm and HCO^{3-} = 403 ppm.
b.	Explain shielding and deschielding in NMR spectroscopy. ii. An aromatic compound (Molecular mass=135) give the following signals in NMR Spectrum. (i) Singlet (2.09 δ),3H (ii)A distorted singlet (3.09 δ),1H (iii)A multiplet(7.27 δ),3H (iv)A multiplet (7.75 δ),2H. Predict the structure of the compound.