

Roll No.

22BTCS0249

SHAMBHUNATH INSTITUTE OF ENGINEERING AND TECHNOLOGY

Subject Code: BAS102

Subject: ENGG. CHEMISTRY

Course: B. TECH

SEMESTER: I

SECOND SESSIONAL EXAMINATION, ODD SEMESTER, (2022-2023)

Branch: ALL

Maximum Marks -45

Time -2Hr

SECTION - A

1. Attempt ALL questions in brief.

Q N	QUESTION	Marks	CO	BL
a.	What is the formula of gypsum and POP.	2	CO3	L1
b.	Write the function of salt bridge.	2	CO3	L1
c.	100 ml of water sample has a hardness equivalent of 12.5ml of 0.08 N $MgSO_4$. What is its hardness in ppm.	2	CO4	L3
d.	Calculate the GCV and NCV of coal having the following compositions: C=85%, H=7%, S=1%, N=2%, ash=4% and heat capacity of steam=587 cal/gm	2	CO4	L5
e.	Write two examples of optical isomerism in compounds without chiral carbon.	2	CO2	L2
f.	Calculate absorbance if percentage transmittance of a solution(%T) is 80.	2	CO2	L1

SECTION - B

2. Attempt any ONE part of the following:

Q N	QUESTION	Marks	CO	BL
a.	Define the term corrosion. Describe the mechanism of electrochemical corrosion.	5	CO3	L1
b.	What is Nernst equation? The emf of a cell measured by means of a hydrogen electrode against a saturated calomel electrode at 298K is 0.4188 V. If the pressure of the H_2 (g) was maintained at 1atm, calculate the pH of the unknown solution, given potential of reference calomel electrode is 0.2415 V.	5	CO3	L5

3. Attempt any ONE part of the following:

a.	4.2 g of a sample of coal was Kjeldahalyzed and evolved ammonia gas was absorbed in 30 ml of 0.1 N H_2SO_4 . After absorption excess acid required 5 ml of 0.1N NaOH for neutralization. Calculate % of nitrogen in coal sample.	5	CO4	L1
b.	A zeolite softener was regenerated by passing 50 liters of NaCl solution having strength of 14.625 g/l of NaCl. Calculate the hardness of water if 10000 lrs of hard water was softened by using this zeolite.	5	CO4	L2

4. Attempt any ONE part of the following :

a.	What is the basic concept of NMR? How many signals in following molecule, (i) CH_3COCH_3 (ii) C_6H_5Cl	5	CO2	L3
----	--	---	-----	----

b.	What is geometrical isomerism? Assign E and Z system in following molecule,	5	CO2	L4
(i)	$\begin{array}{c} \text{HO} \quad \text{Cl} \\ \diagdown \quad \diagup \\ \text{C} = \text{C} \\ \diagup \quad \diagdown \\ \text{F} \quad \text{CH}_3 \end{array}$	(ii)	$\begin{array}{c} \text{H} \quad \text{NH}_2 \\ \diagdown \quad \diagup \\ \text{C} = \text{C} \\ \diagup \quad \diagdown \\ \text{CH}_3 \quad \text{H} \end{array}$	
(iii)	$\begin{array}{c} \text{H} \quad \text{CHO} \\ \diagdown \quad \diagup \\ \text{C} = \text{C} \\ \diagup \quad \diagdown \\ \text{NH}_2 \quad \text{OH} \end{array}$	(iv)	$\begin{array}{c} \text{Br} \quad \text{CH}_2\text{CH}_3 \\ \diagdown \quad \diagup \\ \text{C} = \text{C} \\ \diagup \quad \diagdown \\ \text{I} \quad \text{CH}_3 \end{array}$	

SECTION - C

Attempt All Questions.

5. Attempt any ONE part of the following .

Q N	QUESTION	Marks	CO	BL
a.	Write the composition of Portland cement. Explain the setting and hardening of Portland cement.	6	CO3	L5
b.	Define the term batteries. Explain the construction of Lead acid battery. Write all the chemical reactions taking place during charging and discharging of lead acid battery.	6	CO3	L2

6. Attempt any ONE part of the following :

Q N	QUESTION	Marks	CO	BL
a.	Outline demineralization process of water softening. Compare the merits and demerits of zeolite process with demineralization process.	6	CO4	L3
b.	<p>Explain the construction and working principle of Bomb calorimeter. A sample of coal contains 80% C, 15% H, and 5% Ash. The following data were obtained when the above coal sample was tested in bomb calorimeter</p> <p>Weight of coal burnt = 0.98 g</p> <p>Weight of water taken = 1000 g</p> <p>Water equivalent of bomb calorimeter = 2500 g</p> <p>Observed rise in temperature = 2.5 °C</p> <p>Fuse wire correction = 8 cal</p> <p>Acid correction = 50 cal</p> <p>Cooling correction = 0.02 °C</p> <p>Calculate gross and net calorific value of coal if the latent heat of condensation of water is 580 cal/g.</p>	6	CO4	L5

7. Attempt any ONE part of the following :

Q N	QUESTION	Marks	CO	BL
a.	What type of electronic transition is involved in UV-visible spectroscopy? Explain the absorption and intensity shift in the UV spectroscopy.	6	CO2	L1
b.	For XY ₂ bent molecule show various types of Stretching and Bending vibrations in IR Spectroscopy.	6	CO2	L1

Roll No.

22BTC50249

SHAMBHUNATH INSTITUTE OF ENGINEERING AND TECHNOLOGYSubject Code: **BAS 102**Subject: **ENGG. CHEMISTRY**Course: **B. TECH****SEMESTER: I****FIRST SESSIONAL EXAMINATION, ODD SEMESTER, (2022-2023)****Time -1hr 30 min Maximum****Marks - 30****SECTION - A**

1. Attempt all questions in brief.

Q N	QUESTION	Marks	CO	BL
a.	Arrange the following molecules or ions in order of their increasing bond length (a) O_2 , O_2^- , O_2^{2-} , O_2^+ (b) NO , NO^- , NO^+	2	CO1	L3
b.	What are nano materials? How they are different from bulk materials?	2	CO1	L1
c.	What are Bio-degradable polymers?	2	CO5	L2
d.	What do you understand by the polymer blends?	2	CO5	L1

SECTION - B2. Attempt any ONE of the following.

Q N	QUESTION	Marks	CO	BL
a.	Write the properties and application of Carbon Nano Tubes(CNT)	5	CO1	L1
b.	Write molecular orbital diagram of O_2 and CO molecule. Calculate their bond order and predict their magnetic behavior.	5	CO1	L3

3. Attempt any ONE of the following.

a.	What are conducting polymers? Discuss the classification and application of conducting polymers.	5	CO5	L1
b.	Give preparation, properties and uses of NYLON 6,6 and Buna -S rubber.	5	CO5	L1

SECTION - C4. Attempt any ONE part of the following :

Q N	QUESTION	Marks	CO	BL
a.	What is liquid crystal? Briefly describe the different types of liquid crystals. Give their applications.	6	CO1	L1
b.	Give the structure properties and application of an allotrope of carbon having truncated icosahedron's structure.(fullerene)	6	CO1	L2

5. Attempt any ONE part of the following :

Q N	QUESTION	Marks	CO	BL
a.	What are Grignard reagents? Write at least five application of Grignard reagent.	6	CO5	L1
b.	What are polymer composite? Discuss its classification.	6	CO5	L1