



Paper ID : 260770

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Subject Code: BAS202

Roll No:

BTECH

(SEM. II) THEORY EXAMINATION 2025-26
ENGINEERING CHEMISTRY

TIME: 3 HRS

M.MARKS: 70

Note: Attempt all Sections. In case of any missing data; choose suitably.

SECTION A

1. Attempt all questions in brief.

02 x 7 = 14

Q no.	Question	CO	Level
a.	On the basis of MO theory, calculate the bond order of NO. Will it be diamagnetic or paramagnetic—Explain.	CO-1	K1
b.	Predict the number of signals and their splitting patterns in ^1H NMR spectra of $\text{CH}_3\text{CCl}_2\text{CH}_3$ and $\text{CH}_3\text{OCH}_2\text{CH}_3$.	CO-2	K1
c.	What is electrochemical series? Give important applications of electrochemical series.	CO-3	K1
d.	Why does soap not give lather with hard water? Write chemical reactions in support of your answer.	CO-4	K1
e.	State the differences between addition and condensation polymerization.	CO-5	K1
f.	Why lithium exists as diatomic but beryllium remains as monoatomic?	CO-1	K1
g.	What is salt bridge? Mention its function in an electrochemical cell.	CO-3	K1

SECTION B

2. Attempt any three of the following:

07 x 3 = 21

Q no.	Question	CO	Level
a.	Discuss the principles of Green Chemistry. Explain the green synthesis of Paracetamol and mention the environmental benefits of Green Chemistry.	CO-1	K3
b.	What is the finger print region in IR spectroscopy? Write its applications. Two molecules (X and Y) both having molecular formula $\text{C}_3\text{H}_6\text{O}$ give IR band at 3550 cm^{-1} and 1717 cm^{-1} respectively. Propose the structure of X and Y consistent with their IR bands.	CO-2	K3
c.	Define corrosion. How corrosion can be minimized by sacrificial anodic protection and impressed current cathodic protection methods?	CO-3	K3
d.	What are resins? How hard water can be softened by ion exchange resins? Compare its merits and demerits over lime –soda process.	CO-4	K3
e.	Give preparation, properties and applications of following polymer: (i) Buna-S (ii) Dacron (iii) Bakelite	CO-5	K3

SECTION C

3. Attempt any one part of the following:

07 x 1 = 07

Q no.	Question	CO	Level
a.	What are nanomaterials? How the physical and chemical properties of nanoparticles vary with their size? Write important applications of nanomaterials.	CO-1	K3
b.	What do you understand by liquid crystalline state? Distinguish between nematic and smectic liquid crystals. Give their important applications.	CO-1	K3

4. Attempt any one part of the following:

07 x 1 = 07

Q no.	Question	CO	Level
a.	Why TMS is used as an internal standard in NMR spectroscopy? Explain shielding effect in NMR spectroscopy. A compound having molecular formula $\text{C}_4\text{H}_9\text{Br}$ give following signals in ^1H NMR spectra: δ 1.04 (6H, d) δ 1.95 (1H, m) δ 3.33 (2H, d) Assign the structure of the compound citing suitable reason.	CO-2	K3



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b.	(i) Define chromophore. Identify the chromophoric groups present in cyclopentene, toluene, butanone and methanethiol. (ii) Discuss electronic transitions involved in UV-Visible spectroscopy and explain the effect of polar solvent on $n - \pi^*$ transition in acetone.	CO-2	K3
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5. Attempt any one part of the following:

07 x 1 = 07

Q no.	Question	CO	Level
a.	What is battery? Differentiate between primary and secondary batteries. Explain the construction and working of secondary battery by taking an account of lead storage battery.	CO-3	K3
b.	What is the composition of cement? Illustrate the various steps involved during manufacturing of Portland cement with the help of a labeled diagram.	CO-3	K3

6. Attempt any one part of the following:

07 x 1 = 07

Q no.	Question	CO	Level
a.	Explain zeolite process of water softening. What are the advantages and limitations of this process? Calculate the amount of lime and soda required for the treatment of 10,000 litres of water whose analysis is as follows (in mg/L): $Mg(HCO_3)_2=73$; $CaSO_4=102$; $MgCl_2=95$; $MgSO_4=24$; $Ca(HCO_3)_2=121.5$; $NaCl=55$.	CO-4	K3
b.	Explain ultimate and proximate analysis of coal. A sample of fuel having following percentage composition C= 70%, H = 6%, O = 4%, N = 3%, S = 3%, ash = 6% and moisture = 8%. Calculate the quantity of air required for complete combustion of 1 Kg of fuel.	CO-4	K3

7. Attempt any one part of the following:

07 x 1 = 07

Q no.	Question	CO	Level
a.	(i) Differentiate between chain growth and step growth polymerization. (ii) Write note on the preparation and applications of Grignard reagent.	CO-5	K3
b.	Differentiate between thermosetting and thermoplastic polymers. Write a note on conducting polymers along with examples.	CO-5	K3