



Paper id: 252284

Printed Page: 1 of 2
Subject Code: KAS202T

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BTECH
(SEM II) THEORY EXAMINATION 2024-25
ENGINEERING CHEMISTRY

TIME: 3 HRS**M.MARKS: 100****Note:** Attempt all Sections. In case of any missing data; choose suitably.**SECTION A****1. Attempt all questions in brief. 2 x 10 = 20**

Q No.	Question	CO	Level
a.	What is a liquid crystal?	1	K1
b.	What do you understand by nano-materials?	1	K1
c.	What is rotational spectroscopy?	2	K2
d.	what are the conditions for microwave active molecules?	2	K2
e.	Describe the relationship between EMF and Gibbs free energy.	3	K2
f.	Explain why corrosion occurs more rapidly in coastal regions.	3	K3
g.	Define calorific value.	4	K1
h.	Write the Dulong's formula for calculating calorific value.	4	K2
i.	What are polymer composites? Give one example.	5	K2
j.	Predict the product when Grignard reagent reacts with acetaldehyde.	5	K3

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

Q No.	Question	CO	Level
a.	Differentiate between graphite and fullerene in terms of structure and application.	1	K3
b.	Explain the principle of UV-Visible spectroscopy.	2	K2
c.	Design a simple experimental setup to demonstrate the working of a lead-acid battery. Explain the construction, charging/discharging process, chemical reactions involved, and its practical significance.	3	K3
d.	Explain the process of determination of calorific value using Bombcalorimeter method.	4	K3
e.	Write down synthesis and application of following polymers (i)-BUNA-S(ii)-Neoprene (iii)- Nylon 66 (iv)- Dacron	5	K2/K3

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

Q No.	Question	CO	Level
a.	Apply molecular orbital theory to explain the magnetic behavior of O ₂ & O ₂ ⁺¹ molecule.	1	K3
b.	How would you identify the presence of Schottky and Frenkel defects in a crystal experimentally?	1	K3



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TIME: 3 HRS**M.MARKS: 100****4. Attempt any one part of the following: 10 x 1 = 10**

Q No.	Question	CO	Level
a.	Explain the principle of the Raman Effect and differentiate between Stokes and Anti-Stokes lines. How can Raman spectroscopy help in distinguishing between symmetric and asymmetric molecules?	2	K2
b.	Define infrared (IR) spectroscopy and discuss its significance in molecular structure determination. Describe the working principle and components of an IR spectrometer. What are the essential molecular conditions for a compound to be IR active?	2	K2

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

Q No.	Question	CO	Level
a.	Apply electrochemical principles to explain the mechanism of corrosion of iron in acidic and basic media. Discuss the preventive methods using examples like cathodic protection and galvanization.	3	K3
b.	Using phase rule, analyze the behavior of water as a one-component system during phase transitions. Draw and explain the phase diagram of water, describing the different regions and important points such as triple point and critical point.	3	K3

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

Q No.	Question	CO	Level
a.	Apply zeolite method to soften a sample of hard water. Explain the procedure. The hardness of a 1000-litre water sample was completely removed using a zeolite softener. For regeneration of the exhausted zeolite, 50 litres of sodium chloride (NaCl) solution containing 2.0 grams of NaCl per litre were required. Calculate the total hardness of the water sample in terms of mg/L (ppm) as CaCO ₃ .	4	K3
b.	Explain how permanent hardness of water is removed by lime-soda process. Apply the lime-soda process to remove permanent hardness from a water sample containing 100 mg/L of CaCl ₂ and 84 mg/L of MgSO ₄ . Calculate the amount of lime and soda required, and explain the chemical reactions involved.	4	K3

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

Q No.	Question	CO	Level
a.	What are conducting polymers? Explain their classification based on structure and conductivity, and describe their major applications in various fields.	5	K2
b.	What is a Grignard reagent? Explain the method of its preparation and describe how its structure and reactivity make it useful in organic synthesis. Give suitable examples to illustrate its applications.	5	K2