PAPER ID-310851

Subject Code: KAS102

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

B TECH
(SEM-I) THEORY EXAMINATION 2020-21
CHEMISTRY

Time: 3 Hours ***Total Marks: 100***

Note: 1. Attempt all Sections. If require any missing data; then choose suitably.

SECTION A

1. Attempt *all* questions in brief. 2 x 10 = 20

Q no.	Question	Marks	CO
a.	Explain why N_2 is diamagnetic while O_2 is paramagnetic.	2	1
b.	Define Schotky defect. Give example.	2	1
c.	Identify chromophoric group in the following compounds. (i)Methane Thiol (CH_3SH), (ii) Butanone	2	2
d.	Write down the stretching frequency of corresponding to the structural units: (i) -OH (ii) --CHO	2	2
e.	Why is block of magnesium attached through an insulated metallic wire to the hull of the ship?	2	3
f.	Calculate the cell potential of the given cell at 25^0 C, (R= 8.314 JL^{-1} mol^{-1}, F = 96500C mol^{-1}). Ni(s) / Ni^{+2} (0.01 M) // Cu^{+2} (0.1 M) / Cu(s) Given E^0 Cu^{+2} / Cu(s) = +0.34 V; E^0 Ni^{+2} / Ni(s) = -0.25 V	2	3
g.	Why does magnesium bicarbonate require double amount of lime for softening?	2	4
h.	Write short note on biomass.	2	4
i.	Write down the structure of ferrocene and Zeise's salt.	2	5
j.	Draw the steroregular and steroirregular forms of polystyrene.	2	5

SECTION B

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

Q no.	Question	Marks	CO
a.	What is Crystal imperfection? Explain the zero dimensional imperfection in solid?	10	1
b.	Explain Finger print region in IR spectroscopy. Two Isomers I and II of the molecular formula C_3H_6O give I.R. absorption band near 3550 cm^{-1} and 1717 cm^{-1} respectively. Assign structural formula to A and B consistent with their IR absorption bands.	10	2
c.	Describe electrochemical theory of corrosion. How corrosion can be prevented by sacrificial anodic protection and impressed current cathodic protection.	10	3
d.	What do you understand by temporary and permanent hardness of water? Describe the Zeolite process for removal of hardness from water. The hardness of 10,000 liter of water sample was removed by passing it through a Zeolite softener. The Zeolite softener then required 200 liters of sodium chloride solution containing 150 g/L of NaCl for regeneration. Calculate the hardness of water sample.	10	4
e.	What are Organometallic compounds? Explain their classification, synthetic method and applications.	10	5

SECTION C

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

Q no.	Question	Marks	CO
a.	Discuss the preparation, properties and applications of an allotrope of carbon having truncated icosahedron geometry.	10	1
b.	Explain BMO and ABMO and differentiate between them. Draw molecular orbital diagram of HF. Calculate its bond order and predict its magnetic properties.	10	1

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

Q no.	Question	Marks	CO
a.	State and derive the Lambert-Beer's law. The percentage transmittance of an aqueous solution of unknown compound is 20% at 25^0 C and 300 nm for a 2×10^{-5}M solution in a 4 cm cell. Calculate the absorbance and the molar extinction coefficient.	10	2
b.	Discuss the quantum theory of Raman Spectroscopy and how the Stokes and anti -Stokes lines appear in the Raman Spectroscopy?	10	2

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

Q no.	Question	Marks	CO
a.	Define and explain the terms involved in phase rule. Draw a neat labeled phase diagram of water system and calculate degree of freedom of areas and curves in it. What is the significance of the triple point and metastable curve in the system?	10	3
b.	Derive Nernst Equation. The voltage of the cell $Pb/PbSO_4/Na_2SO_4/Hg$ is 0.9647 V at 25 ^{0}C the temperature coefficient is 1.74×10^{-4} $VK^{-1.}$ Calculate the values of $\triangle G$, $\triangle S$ and $\triangle H$	10	3

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

Q no.	Question	Marks	CO
a.	What is hardness of water? 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 CO_2 = 34 ppm and HCO_3^- = 403 ppm.	10	4
b.	What are the characteristic of a good fuel? List the raw materials which can be utilized for biogas manufacture. Explain the stages involved in production of biogas from cattle dung.	10	4

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

Q no.	Question	Marks	CO
a.	Give preparation, properties and applications of any two of the following polymer: (i) Neoprene (ii) Terylene (iii) Nylon 6, 6.	10	5
b.	Write a note on (i) Applications of Grignard Reagent (ii) Polymer Composites.	10	5