PAPER ID-310852

Subject Code: KAS102T

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

B TECH
(SEM-I) THEORY EXAMINATION 2020-21
ENGINEERING 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 impurity defects.	2	1
b.	Why Teflon is highly chemically resistant?	2	5
c.	What is selection rule?	2	2
d.	On the basis of IR spectra, distinguish between intermolecular and intramolecular hydrogen bonding.	2	2
e.	Calculate Phase, Component and Degree of freedom in the given system; $C_{(s)} + \frac{1}{2} O_2 \rightleftarrows CO(g)$ $C_{(s)} + O_2 \rightleftarrows CO_2(g)$	2	3
f.	Why calgon is better than other internal process for water treatment?	2	4
g.	Give the preparations of Grignard reagent.	2	5
h.	Why O_2 is paramagnetic and N_2 is diamagnetic?	2	1
i.	How can sulfur be estimated by ultimate method?	2	5
j.	How much rust ($Fe_2O_3.3H_2O$) can be produced by 3g of iron?	2	3

SECTION B

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

Q no.	Question	Marks	CO
a.	With the help of Molecular orbital theory how Metallic bonding in metals can be explained?	10	1
b.	Write the criteria for a molecule to show Raman, IR, Rotational and UV Spectra. Give the possible electronic transitions (UV spectra) in- $CH_3CH_2CH_3$, $CH_3CH=CH_2$, $CH_3CH=O$ and CH_3-CH=CH-CH=CH-CH_3. How many fundamental Vibrational degrees of freedom are expected. for the following molecules: CO_2, H_2O and C_2H?	10	2
c.	The percentage composition of coal sample is: C = 70 %, H_2 = 10 %, $O_2$1%,S= 5%,ash = 0.5 %and N = 0.3 %. i.Calculate the quantity of air needed for complete combustion of 1kg of coal, if 60% excess of air is supplied. ii. Calculate the gross and net calorific value of the coal using dulong's formula.	10	4
d.	Give significance of Nernst equation. Consider a cell reaction: Zn / Zn^{2+} [0.1M] || Cu^{2+}[0.2M] / Cu Standard reduction potential of Zn^{2+} and Cu^{2+} are -0.76V and 0.34V respectively. Write half-cell reactions, complete cell reaction and calculate EMF of the cell.	10	3
e.	Distinguish between addition and condensation polymerization. Give monomers and one use each of PMMA, Polyethylene, Bakelite, PVC, nylon6,6.,Buna S.	10	5

SECTION C

3. Attempt any *one* part of the following:

Q no.	Question	Marks	CO
a.	i. Explain types of Non stoichiometric defects with examples. ii. Calculate bond order, magnetic behavior and order of stability of NO, NO^-, NO^+	10	1
b.	Write a note on liquid crystal describing classifications and applications of liquid crystals.	10	1

4. Attempt any *one* part of the following:

Q no.	Question	Marks	CO
a.	The e.m.f. of the cell cd | $cdcl_2$, 2.5 H_2O (Saturated) || $AgCl_{(s)}$ | Ag involving following reaction $Cd(s)+2AgCl_{(s)}aq \leftrightarrow cdcl_2$ $2.5H_2O(Saturated)+2Ag_{(s)}$ is 0.6753V and 0.6915V at 25^0C and O^0C. Calculate Δ H, ΔG and ΔS at 25^0C.	10	3
b.	Draw the Phase diagram of water and explain triple point and metastable state.	10	3

5. Attempt any *one* part of the following:

Q no.	Question	Marks	CO
a.	Write Notes on chromophores and Auxochrome. Explain Transitions in UV spectra.	10	2
b.	Explain the Microwave (Rotational) spectra of diatomic molecule and write their applications.	10	2

6. Attempt any *one* part of the following:

Q no.	Question	Marks	CO
a.	Draw diagram of Bomb calorimeter. Explain proximate analysis of coal.	10	4
b.	Explain Ion exchange process of water softening. Zeolite softener was 90% exhausted, when 10,000 hard water was passed through it. The softener required 200 L of NaCL solution of strengths 50 gm/L. Calculates the hardners of water.	10	4

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

Q no.	Question	Marks	CO
a.	Explain with equations preparations of acid, ketone, alcohol, alkanes and Organometallic compound from Grignard reagent.	10	5
b.	What are composite materials? Give the classifications of composite materials?	10	5