Paper Id: 199105 Roll No: | | | | | | | | | | | | | |

B. TECH.
(SEM-I) THEORY EXAMINATION 2019-20
ENGINEERING CHEMISTRY

Time: 3 Hours ***Total Marks: 70***

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

SECTION A

1. Attempt *all* questions in brief. 2 x 7 = 14

a.	Why He_2 does not exist in environment?
b.	Distinguish between addition and condensation polymerization.
c.	Describe principle of galvanic cell.
d.	Define frenkel defect with example.
e.	What are Chromophor and Auxochrome? Give example.
f.	Why hardness is expressed in terms of $CaCO_3$ equivalents.
g.	Define gross and net calorific value of fuel.

SECTION B

2. Attempt any *three* of the following: 7 x 3 = 21

a.	i) With the neat labeled diagram, explain the conductivity and lubricating properties of Graphite. ii) Explain the conductivity of solids on the basis of band theory.
b.	i) What are composites? Give their classification. ii) Give the preparation and applications of the Neoprene and Terylene.
c.	i) Discuss the discharging and charging process of Lead Storage Battery. ii) Write short note on Flash and fire point and their determination.
d.	i) How hard water can be purified by Ion exchange process? ii) Discuss the process of reverse osmosis.
e.	i) Discuss the electronic transition and shifts in UV –Visible Spectroscopy. ii) Comment on Finger print region in IR Spectroscopy.

SECTION C

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

(a)	Draw the Molecular Orbital diagram of NO molecule. Calculate its bond order and predict its magnetic behavior.
(b)	What are Liquid crystals? Classify them on the basis of temperature and mention four important applications of it.

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

(a)	How is Grignard reagent prepared? Give the reaction of CH_3CH_2MgBr with HCHO, CH_3CHO and CH_3COCH_3?
(b)	What are conducting polymers? How can we improve the conducting property of a polymer?

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

(a)	Discuss the electrochemical theory of corrosion in metals on the basis of Hydrogen evolution and Oxygen absorption mechanism.
(b)	What are the constituents of cement? Discuss the mechanism of setting and hardening of cement.

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

(a)	A Water sample containing following salts. $CaCl_2$ = 55.5 mg, $NaHCO_3$ =12.6 mg, $MgSO_4$ = 48 mg, Fe (SO_4) = 2pm. Mg (HCO_3)$_2$ =43.8 mg. CO_2 = 2.2 ppm, CO_3^{2-} = 60 ppm OH^- = 32 ppm, $NaAlO_2$ =8.2 ppm. Calculate the quantity of lime (85% pure) and soda (90% pure) for softening 50000 liters of water.
(b)	Outline the salient features of the phase diagram of Water system highlighting the name of system (areas, curves and triple point), phase in equilibrium and degree of freedom in each case.

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

(a)	With a help of a neat diagram, explain how calorific value is determined by bomb calorimeter. A sample of coal contain C=89%, H=8% and ash=3%. The following data were obtained when the above coal was tested in bomb calorimeter: Weight of coal burnt= 0.85 g Weight of water taken= 650 g Water equivalent of bomb and calorimeter= 2500 Rise in temperature= 2.5˚C Fuse wire correction= 10 Cal Acid correction= 50 Cal Cooling Correction= 0.03˚ Assuming that the latent heat of condensation of steam as 580 cal/gm, calculate the (i) gross and (ii) net calorific values of coal in cal/gm.
(b)	Why Tetra Methyl Silane is used as reference in NMR spectroscopy? Give the number of ^1H NMR signals and their splitting pattern in the following compounds: (i) $(CH_3)_3COCH_3$ (ii) $CH_3CH(Cl)CH_2Cl$ (iii) $CH_3CH_2CH_2OH$ (iv) $CH_3CH{=}CHCHO$.