Printed Pages-03------- **Subject Code: AAS0102**

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NOIDA INSTITUTE OF ENGINEERING AND TECHNOLOGY, GREATER NOIDA

(An Autonomous Institute Affiliated to AKTU, Lucknow)

BACHELOR TECHNOLOGY (B.Tech)
B. Tech. (First Semester) Theory Examination (2020-2021)
SUBJECT NAME: ENGINEERING CHEMISTRY

Time: 3:00 Hours **Max. Marks:100**

General Instructions:

- All questions are compulsory. Answers should be brief and to the point.
- This Question paper consists of 03 pages & 8 questions.
- It comprises of three Sections, A, B, and C. You are to attempt all the sections.
- Section A -Question No- 1 is objective type questions carrying 1 mark each, Question No- 2 is very short answer type carrying 2 mark each. You are expected to answer them as directed.
- Section B - Question No-3 is Long answer type -I question with external choice carrying 6 marks each. You need to attempt any five out of seven questions given.
- Section C - Question No. 4-8 are Long answer type –II (within unit choice) questions carrying 10 marks each. You need to attempt any one part *a* or *b*.
- Students are instructed to cross the blank sheets before handing over the answer sheet to the invigilator.
- No sheet should be left blank. Any written material after a blank sheet will not be evaluated/checked.

SECTION A

1- Answer all the parts-

a. A good fuel is one which: **(1)** **CO1**
(a) Is readily available.
(b) Produces a large amount of heat.
(c) Leaves behind many undesirable substances
(d) Burns easily in air at a moderate rate.

b. Silicon is a? **(1)** **CO5**
(a) Semiconductor
(b) Conductor
(c) Insulator.
(d) None of above

c. Generation of heat takes place in _____ lubrication. **(1)** **CO1**
(a) Thin lubrication
(b) Thick lubrication
(c) Extreme pressure lubrication
(d) Boundary lubrication

d. In a single-component condensed system, if degree of freedom is zero, maximum number of Phases that can co-exist are_____. **(1)** **CO2**
(a) 0
(b) 2
(c) 1
(d) 3

e. The presence of chlorides of calcium and magnesium causes **(1)** **CO2**
(a) Temporary Hardness
(b) Permanent hardness
(c) Total hardness
(d) None of these

f.	The anode of the galvanic cell has _____ (a) Positive polarity (b) Negative polarity (c) No polarity (d) Neutral	**(1)**	**CO3**
g.	The e.m.f of Daniel cell is _____ (a) 1.02V (b) 1.00V (c) 1.10 V (d) 2V	**(1)**	**CO3**
i.	Name the polymer which is used for making ropes. (a) Polypropene (b) Polyester (c) Polystyrene (d) None of the above	**(1)**	**CO4**
j.'	Natural rubber is basically a polymer of (a) Propylene (b) Ethylene (c) Isoprene (d) Chloroprene	**(1)**	**CO4**
	Which type of material expands and contract in response to an applied electric field? (a) Advanced material (b) Smart material (c) Biomaterial (d) Nanomaterial	**(1)**	**CO5**

2.	**Answer <u>all</u> the parts-**	**[5 x 2 =10]**	**CO**
a.	Write short note on Sanitizers and disinfectants	**(2)**	**CO1**
b.	Compare the Top to down and Bottom to up approaches of nanotechnology?	**(2)**	**CO5**
c.	What is the sacrificial anodic protection?	**(2)**	**CO3**
d.	Why hardness is expressed in $CaCO_3$ Equivalents?	**(2)**	**CO2**
e.	Complete the following reaction: Ethylene Glycol + Terephthalic acid $\longrightarrow$ ____ _____	**(2)**	**CO4**

SECTION B

3.	**Answer any <u>five</u> of the following-**	**[5×6=30]**	**CO**
a.	With the help of Band theory, explain conductors, insulators and semi-conductors.	**(6)**	**CO3**
b.	How do IR Spectra help in differentiating the following compounds: a. Aldehydes and Ketones b. Carboxylic acid and Esters	**(6)**	**CO5**
c.	Write the structure, preparation and applications of following polymers: i) Urea -formaldehyde resin ii) Nylon 6,6 iii) Terylene	**(6)**	**CO4**
d.	What is Corrosion? Give the mechanism of Corrosion based on Wet Theory.	**(6)**	**CO3**
e.	A Zeolite softener was 80% exhausted, when 50,000L of hard water was passed through it. The softener required 200L of NaCl solution of Strength 100 gm/L of NaCl solution. What is the hardness of water?	**(6)**	**CO2**
f.	What are ion exchangers? With the help of neat sketch, discuss ion-exchange process for water softening.	**(6)**	**CO2**
g.	Explain proximate analysis of coal. On burning 0.3 gm of a solid fuel in a bomb calorimeter, the temperature of 3500 gm of water increased from 26.5° C to 29.2° C. Water equivalent of calorimeter and latent heat of steam are 385.0 gm and 587.0 cal/ gm, respectively. If the fuel contains 0.7% hydrogen, calculate its gross and net calorificvalue.	**(6)**	**CO1**

SECTION C

4.	**Answer any one of the following:**			
	a.	Discuss Bomb calorimeter method for determination of calorific value of solid fuel with corrections.	**10**	**CO1**
	b.	What are lubricants, classify them with suitable examples. Explain Mechanism of lubrication of any one type of lubricant	**10**	**CO1**
5.	**Answer any one of the following:**			
	a.	Calculate the quantities of lime (74%) and soda (92%) required for cold softening of 125,000 L of water with the following analysis, using 10 ppm of $NaAlO_2$ as coagulant. Analysis of raw water: **Ca^{2+}=** 160ppm, Mg^{2+}= 48ppm, CO_2= 66ppm, HCO_3^- = 264ppm, H^+ =20ppm, NaCl = 4.7 ppm**.**	**10**	**CO2**
	b.	Outline the salient features of the phase diagram of Water System highlighting the name of system (areas, curves and points), phase in equilibrium and degree of freedom in each case.	**10**	**CO2**
6.	**Answer any one of the following:**			
	a.	What do you mean by battery? Give reactions of charging and discharging of lead storage battery?	**(10)**	**CO3**
	b.	Explain the different methods of prevention from metallic corrosion.	**(10)**	**CO3**
7.	**Answer any one of the following:**			
	a,	Give the example of some polymeric composite materials and polymer blends with their commercial applications.	**(10)**	**CO4**
	b.	Differentiate between addition polymers and condensation polymers with suitable examples?	**(10)**	**CO4**
8.	**Answer any one of the following:**			
	a.	Define IR spectroscopy? Describe the various molecular vibrations in the technique?	**(10)**	**CO5**
	b.	What are liquid crystals? Differentiate between Nematic and smectic liquid crystal? Write at least five applications of liquid crystals.	**(10)**	**CO5**