Roll No. [redacted]

AJAY KUMAR GARG ENGINEERING COLLEGE, GHAZIABAD
Department of Applied Sciences and Humanities

Course: B.Tech
Session: 2024-25
Subject: Engineering Chemistry
Max Marks: 70

Pre-University Test

Semester: I
Section: S-11 to S-20
Sub. Code: BAS-102
Time: 3 Hrs.

OBE Remarks:

S..No.	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17
CO No	CO1	CO2	CO	CO4	CO 5	CO4	CO5	CO	CO	CO	CO2	CO3	CO4	CO4	CO4 5	CO5	CO3
Bloom's Level	L1	L2	L2	L1	L3	L3	L1	L2	L2	L3	L2	L3	L3	L1	L2	L2	L2
						Weightage of CO4:16						Weightage of CO5:16					

Note: Answer **all** the Sections.

Section-A

Attempt all the parts. **(2x 7 =14)**

1. How Paracetamol is synthesized via conventional route and Green Route.
2. Explain Chromophore and Auxochrome with example.
3. What is plaster of Paris, with its reactions of manufacturing, setting with its applications.
4. Covert 150 ppm hardness of water in terms of mg/L and degree French.
5. Give preparation and applications of Kevlar.
6. 4.2 g of a sample of coal was Kjeldahalized and evolved ammonia gas was absorbed in 30 ml of 0.1N H_2SO_4. After absorption excess acid required 5 ml of 0.1 N NaOH for neutralization. Calculate the % of nitrogen in coal sample.
7. What are polymer blends explain..

Section-B

C. Attempt **Any three**. **(7x3=21)**

8. Draw molecular orbital diagram of F_2 with bond order and magnetic behavior. Explain Stability order of NO and NO^+ with the help of molecular orbital diagram.
9. Explain intrinsic properties of nanomaterial. Give applications of nanomaterial in electronics and medical field.
10. Explain intensity and absorption shifts in uv-visible spectroscopy with examples. An organic compound having molecular formula C_7H_6O shows absorption peaks at 3010, 2700, 1600, 1580, 1520, 1480 and 1720 cm-1 in its IR spectrum. Suggest its structure.
11. What are Functional group and fingerprint region in IR Spectroscopy, explain how structure elucidation is done. Give applications of IR Spectroscopy.

Faculty Signature

HOD Signature

12. Write importance of Electrochemical series? Calculate using Nernst equation cell potential of the following electrochemical cell at 298K.
$Zn(s)|Zn^{2+}(eq)(0.04\ M)||Sn^{2+}(eq)|Sn(s)(0.03M)$
(Given $E_\circ$=−0.76 V, $E_\circ$=−0.14 V).

Section-C

C. Attempt all the parts. (5 X 7 = 35)

13. Attempt anyone.

a). What are scale and sludge. How this problem can be sort by zeolite water softening method Explain with proper reaction and diagram advantages and limitations. A zeolite softener was 95% exhausted, when 50000L of hard water was passed through it. The softener required 100L of NaCl solution of strength 50 g/l of solution. What is the hardness of water?

b). Discuss RO process for water softening. Calculate the amount of lime and soda needed for softening 1,50,000 lit of water containing the following: $Ca(HCO_3)_2$=200 mg/l, $CaSO_4$ 120 mg/l, $MgCl_2$ 125 mg/l, NaCl 29.25 mg/l.

14. Attempt anyone.

a).Discuss construction working and formulation of GCV using Bomb calorimeter, with all corrections is to be done. A sample of coal contain C=90%, H =5%, and ash= 2%. The following data were obtained when the above coal was tested in bomb calorimeter.
Weight of coal= 0.80 g, Weight of water taken= 2000 g,
Water equivalent= 2200g, Rise in temperature= 3^0C, fuse wire correction= 2 cal,
Acid correction= 10 cal, Cooling correction= 0.05 ^{0}C
Calculate gross and net calorific value of coal.

b).Explain the steps involved in Biogas preparation. Explain ultimate analysis of coal in detail.

15. Attempt anyone.

a). Give preparation and uses of Buna S, Nylon 6, Bakelite, Dacron.

b). What are organometallic compounds Give general method of synthesis. How Grignard reagent is prepared. Explain with reactions how Grignard reagents are used in different synthesis.

16. Attempt anyone.

a). Explain Conducting polymer with its classification and application.

b).Differentiate between Thermoplastic and Thermosetting polymers
Give a brief about Polymer composites

17. Attempt anyone.

a). Give composition of Portland Cement. Explain reaction involved in setting, and hardening and decomposition. What is role of Gypsum in setting and hardening process of Cement.

b). Explain Why lower part of pole is generally get corroded easily. What are corrosion inhibitors explaining with examples?

Faculty Signature

HOD Signature