Graphic Era HILL UNIVERSITY

Established by an Act of the State Legislature of Uttarakhand (Act No. 12 of 2011)
University under section 2(f) of UGC Act 1956

Term Evaluation (Even) Semester Examination March 2025

Roll no.....

Name of the Course: **B.Tech**
Semester: **II**
Name of the Paper: **Engineering Chemistry**
Paper Code: **TCH 201**
Time: 1.5 hour **Maximum Marks: 50**

Note:
(i) Answer all the questions by choosing any one of the sub-questions
(ii) Each question carries 10 marks.

Q1. (10 Marks)
a. Arrange the following molecules or ions in order of increasing bond dissociation energy:
O_2, O_2^-, O_2^+, O_2^{--} (CO1)

OR

b. Explain on the basis of Hydrogen bond: (CO1)
i) Ice floats on water
ii) p-Nitrophenol is more acidic as compared to O-nitrophenol
iii) Alcohol has a higher boiling than acetone
iv) Ice is less dense than liquid water

Q2. (10 Marks)
a. Calculate the amount of lime (95% pure) & soda (98% pure) required for treatment of 20,000 liters of water whose analysis is as follow: (CO2)

$Ca(HCO_3)_2$ = 220 ppm $Mg(HCO_3)_2$ = 56 ppm
$CaSO_4$ = 98 ppm $MgSO_4$ = 84 ppm
$CaCl_2$ = 27.75 PPM KCl = 10 PPM

OR

b. Explain the following term:
Scale, Sludge, Caustic Embrittlement and Priming (CO2)

Q3. (10 Marks)
a. The hardness of 20,000 liters of a sample of water was completely removed by passing it through a zeolite softener. The softener then required 100 liters of NaCl solution containing 100 g/l of NaCl for regeneration. Calculate the hardness of the water sample. (CO2)

OR

b. Describe the Ion exchange process of softening of water (CO2)

Q4. (10 Marks)
a. What are Nanomaterials? Give their classification and applications (CO1)

OR

b. Explain Semiconductor, Conductor and Insulator with the help of Metallic Bond theory (CO1)

Q5. (10 Marks)
a. What are the Zeolites? How do they function in removing hardness of water? What are the limitations of this process ? (CO2)

OR

b. Describe the electronic transition in UV spectroscopy with their applications. (CO1)