

**A**

**Reg. No. :**

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**Question Paper Code: R1Y07**

B.E. / B.Tech. DEGREE EXAMINATION, NOV/DEC 2024

First Semester

Civil Engineering

R21UCY107 - CHEMISTRY FOR ENGINEERS

(Regulation R2021)

(Common to EEE, ECE, MECH, Chemical, AGRI, BME & Biotech Branches)

Duration: Three hours

Maximum: 100 Marks

Answer ALL Questions

PART A - (10 x 1 = 10 Marks)

1. Water which does not produce lather readily with soap solution is \_\_\_\_\_ CO1-U  
(a) Hard water (b) Soft water (c) Heavywater (d) Distilled water
2. The flow of solvent from higher concentration to lower concentration through a semi-permeable membrane is \_\_\_\_\_ CO1- U  
(a) Current (b) Osmosis (c) Reverse osmosis (d) Voltage
3. Corrosion is the process of any metal converted to its \_\_\_\_\_ CO1- U  
(a) Ore (b) Reduction product (c) Complex (d) Adduct
4. What is the reaction takes place when Zn is treated with diluted HCl? CO1- U  
(a) Oxidation (b) Hydrogen evolution  
(c) Reduction (d) Both (a) & (b)
5. Which fuel has highest calorific value? CO1- U  
(a) Coal (b) Coke (c) Diesel (d) LPG
6. Which is the electrolyte used in Li-ion battery? CO1- U  
(a) Lead dioxide (b) Aqueous electrolyte (c) H<sub>2</sub>SO<sub>4</sub> (d) Organic electrolyte
7. Lyotropic liquid crystals are \_\_\_\_\_ dependent. CO1- U  
(a) Pressure (b) Temperature (c) Concentration (d) both (a) & (b)
8. Toxic metals found in food and drinking water \_\_\_\_\_ CO1- U  
(a) Pb (b) As (c) Cd (d) All the above

9. Absorption of electromagnetic radiation in the ultraviolet range is \_\_\_\_\_ CO1- U  
 (a) 150-400 nm (b) 400-750 nm (c) above 800 (d) None of the above
10. Which one of the following lamp is used in UV region of UV-Vis spectroscopy? CO1- U  
 (a) Mercury (b) Sodium Vapor (c) Deuterium (d) Tungsten

PART – B (5 x 2= 10 Marks)

11. Why hardness is expressed in terms of CaCO<sub>3</sub> equivalents? CO1-U
12. What are the factors that affect electrode potential? CO1- U
13. Define octane number. CO1- U
14. What are the benefits of green chemistry? CO2-U
15. Write a note on finger print region of FT-IR spectroscopy. CO2-U

PART – C (5 x 16= 80 Marks)

16. (a) A sample of water contains the following dissolved salts are given below in mg/L; Mg (HCO<sub>3</sub>)<sub>2</sub> = 83; Ca(HCO<sub>3</sub>)<sub>2</sub> = 80; CaCl<sub>2</sub> = 100; MgSO<sub>4</sub> = 30, NaCl = 50. Calculate the temporary, permanent and total hardness of water. CO5- Ana (16)
- Or
- (b) Analyze the various steps involved in the treatment of domestic water. CO5- Ana (16)
17. (a) Derive the Nernst equation for a single electrode potential. Using the Nernst equation calculate the single electrode potential of Zn<sup>2+</sup> in 0.05 M ZnSO<sub>4</sub> solution at 25<sup>0</sup>C, E<sup>0</sup> Zn/Zn<sup>2+</sup> = 0.763V. CO3- App (16)
- Or
- (b) How do you prevent the corrosion of Iron by electroplating of copper? Explain with suitable reactions. CO3- App (16)
18. (a) How the non-fissionable U<sup>238</sup> is converted to U<sup>235</sup> and how to utilize the Light water Nuclear power plant. CO4- App (16)
- Or
- (b) Apply the knowledge of electrochemistry to construct 3.0 V of alkaline battery for TV remote with suitable diagram and reactions. CO4- App (16)

19. (a) In terms of energy, LCD and OLED which is best? Justify your answer with working principle and functions. CO2- U (16)
- Or
- (b) Why the green chemistry is important and explain the principles of green chemistry. CO2- U (16)
20. (a) Write some advantages of UV-Visible spectroscopic techniques with working principle and neat diagram. CO2- U (16)
- Or
- (b) How do you analyze the surface morphology of nano material with neat diagram? Justify the selection method. CO2- U (16)

