A **Reg. No. :** | | | | | | | | | | | | |

Question Paper Code: R1Y07

B.E. / B.Tech. DEGREE EXAMINATION, DEC 2025

First Semester

Civil Engineering

R21UCY107 - CHEMISTRY FOR ENGINEERS

(Regulation R2021)

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

Duration: Three hours Maximum: 100 Marks

Answer ALL Questions

PART A - (10 x 1 = 10 Marks)

1. The indicator used in hardness of water determination titration is _____ CO1- U

   (a) Ethylene Diamine Tetra Acetic Acid (b) Erio Chrome Black-T

   (c) Ethylene Diphenyl Tri Acetic Acid (d) None of These

2. WHO permissible range of pH for drinking water is _____ CO1- U

   (a) 1-2 (b) 3-4 (c) 6.5-8.5 (d) 10-12

3. The cell constant of a conductivity cell _____ CO1- U

   (a) Vary with concentration (b) Remains constant

   (c) Varies with pressure (d) Vary with pressure

4. The potential of standard hydrogen electrode is _____ CO1- U

   (a) Positive (b) Negative (c) Zero (d) Anode

5. Which fuel has highest calorific value? CO1- U

   (a) Coal (b) Coke (c) Diesel (d) LPG

6. Alkaline battery is an example of_____. CO1- U

   (a) Secondary battery (b) Capa-battery

   (c) Primary battery (d) Inverter

7. Which of the following televisions delivers the best picture quality? CO2- U

   (a) LCD (b) CRT (c) 3D (d) OLED

8. Green chemistry is also called as _____ CO2- U

(a) Life chemistry (b) Environmental chemistry

(c) Organic chemistry (d) Sustainable chemistry

9. A linear relationship between absorbance and the concentration of the absorbing molecule _____ CO2- U

(a) Beer - Lambert law (b) Hooke's law

(c) Bragg law (d) All of the above

10. FT-IR is one of the most common and widely used _____ in analyzing the organic and inorganic molecules CO2- U

(a) Spectroscopic techniques (b) Microscopic techniques

(c) Macroscopic techniques (d) None of the above

PART – B (5 x 2= 10 Marks)

11. Define Hard and soft water. CO1-U

12. Write any two differences between electrolytic cells and electrochemical cells. CO1-U

13. Define calorific value. CO1-U

14. Define quantum dots. What do they used for? CO2-U

15. State Beer and Lambert law. CO2-U

PART – C (5 x 16= 80 Marks)

16. (a) Evaluate the hardness of unknown sample water by EDTA method along with principle and reactions. CO5-Ana (16)

Or

(b) Analyze the advantages and disadvantages of disinfection process in a municipal water treatment plant? CO5-Ana (16)

17. (a) Apply the Nernst equation to calculate the single electrode potential of Zn^{2+}/Zn in 0.05 M $ZnSO_4$ at 25 °C, given $E°Zn^{2+}/Zn$ = 0.763 V along with derivation. CO3-App (16)

Or

(b) You are assigned to electroplate a steel keychain with a thin layer of copper for decorative purposes. How would you set up the electroplating process — specify the anode, cathode, electrolyte, and electrochemical reactions with suitable diagram? CO3-App (16)

18.	(a)	Illustrate the working principle of light water nuclear power plant with a neat diagram.	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)	Discuss the working principle and applications of bilayer OLED with neat diagram.	CO2-U	(16)
		Or		
	(b)	Elaborate the twelve principles of green chemistry?	CO2-U	(16)
20.	(a)	Explain atomic absorption spectroscopy and its applications.	CO2-U	(16)
		Or		
	(b)	Brief notes on Field Emission Scanning Electron Microscopy	CO2-U	(16)