

**A**

Reg. No. :

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**Question Paper Code: R2Y06**

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

Second Semester

Computer Science & Engineering

R21UCY206 – PRINCIPLES OF CHEMISTRY IN ENGINEERING

(Common to IT, CSD, AI&DS, CSE(AI&ML), Cyber Security & IOT branches)

(Regulations R2021)

Duration: Three hours

Maximum: 100 Marks

Answer ALL Questions

PART - A (10 x 1 = 10 Marks)

1.  $\text{Ca}(\text{HCO}_3)_2$  and  $\text{Mg}(\text{HCO}_3)_2$  salts are responsible for \_\_\_\_\_ CO1- U  
(a) Soft water (b) Permanent hardness  
(c) Total hardness (d) Carbonate hardness
2. The unit of water hardness is \_\_\_\_\_ CO1- U  
(a) mg/L (b) ml (c) meter (d) nanometer
3. Which one of the following represents the correct order of electron releasing tendency of metals? CO1- U  
(a)  $\text{Zn} > \text{Cu} > \text{Ag}$  (b)  $\text{Ag} > \text{Cu} > \text{Zn}$   
(c)  $\text{Cu} > \text{Zn} > \text{Ag}$  (d) None of the above
4. The potential of standard hydrogen electrode is \_\_\_\_\_ CO1- U  
(a) Positive (b) Negative (c) Zero (d) Anode
5. TEL is act as a \_\_\_\_\_ CO1- U  
(a) Cracking agent (b) Oxidizing agent  
(c) Doping agent (d) Anti knocking agent
6. In Li-TiS<sub>2</sub> battery, what type of electrolyte is used? CO1- U  
(a) Solid (b) Liquid (c) Aqueous (d) Metal
7. Quantum dots can be used in \_\_\_\_\_ CO1- U

- (a) Crystallography (b) Optoelectronics  
(c) Mechanics (d) Quantum physics
8. How many layers does MWCNTs consists of \_\_\_\_\_ CO1- U  
(a) One (b) Two (c) Three (d) Multiple
9. A light emitting diode (LED) converts CO2- U  
(a) Optical signal into thermal energy (b) Thermal energy into electrical signal  
(c) Electric current into optical signal (d) Sound energy into optical signal
10. Quantum dots are known for its \_\_\_\_\_ CO2- U  
(a) Fluorescence (b) Semiconducting nature  
(c) Phosphorescence (d) Diffraction

PART– B (5 x 2= 10 Marks)

11. Soft water is not demineralized water, but demineralized water is soft water.How? CO1-U  
12. What is EMF series? CO1-U  
13. Comment on energy density and power density. CO1-U  
14. Write some applications of CNTs. CO1-U  
15. Give some real-life applications of green chemistry. CO2-U

PART– C (5 x 16= 80 Marks)

16. (a) Illustrate the demineralization (ion exchange) process with a neat diagram. CO5-Ana (16)  
Or  
(b) A well water contains the carbonate hardness and pond water contains non-carbonate hardness of a sample of water containing the dissolved salts as given below in mg/lit  $Mg(HCO_3)_2=7.3$ ;  $Ca(HCO_3)_2=40.5$ ;  $CaSO_4=13.6$ ;  $MgCl_2=21.75$  and  $NaCl=50$ . Analyze the total hardness of well water. CO5-Ana (16)
17. (a) Interpret the importances and factors affecting electrochemical series. CO3-App (16)  
Or  
(b) Murugan was drinking coffee from an iron (Fe) cup. After some time the iron cup was corroded. How to utilize the electroplating approach to reuse this cup again? CO3-App (16)
18. (a) Demonstrate the working principle of light water nuclear power plant with a neat diagram. CO4-App (16)

Or

(b) Construct the Li-ion battery for electric vehicle with neat diagram and write its advantages. CO4-App (16)

19. (a) Infer the chemical vapor deposition (CVD) and hydrothermal method used for the preparation of nanomaterial. CO4-App (16)

Or

(b) Illustrate the applications of nanomaterials in medical field. CO4-App (16)

20. (a) Discuss the working principle and applications of bilayer OLED with neat diagram. CO2-U (16)

Or

(b) Discuss the environmental related issues associated to green chemistry? CO2-U (16)

