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

Question Paper Code:R2Y05

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

Second Semester

R21UCY205- APPLIED CHEMISTRY FOR ENGINEERS

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

(Regulation R2021)

Duration: Three hours Maximum: 100 Marks

Answer All Physics

PART A - (10 x 1 = 10 Marks)

1. Lateral overlapping of atomic orbitals results in _____ bond formation. CO1- U

   (a) Π (b) ionic (c) σ (d) none of these

2. The bond angle between the sp^2 hybrid orbitals is _____. CO1- U

   (a) 90 ° (b) 180 ° (c) 120 ° (d) 109 ° 29’

3. The chemical name for calgon is _____. CO1- U

   (a) sodium phosphate (b) calcium hydroxide

   (c) magnesium chloride (d) sodium hexa meta phosphate

4. Sea water contains _____ ppm of dissolved solids. CO1- U

   (a) >1000 (b) < 1000 (c) >35000 (d) < 35000

5. Liquid crystals have _____ order. CO1- U

   (a) Orientation (b) position (c) both a and b (d) none of above

6. Thermotropic liquid crystals have shown LC phases in _____. CO1- U

   (a) Liquid state (b) Solid state (c) Molten state (d) Gaseous state

7. ------ method produce green energy. CO1- U

   (a) Solar (b) OTEC (c) Wind (d) All the above

8. Which one is not an e-waste? CO1- U

   (a) Remote (b) Head phone (c) Computer (d) plastic

9. Which of the following battery is rechargeable _____? CO1- U

(a) Primary (b) Secondary (c) Flow (d) Dry cell

10. The byproduct produced in H_2-O_2 fuel cell is _____. CO1- U

(a) H_2 (b) O_2 (c) H_2O (d) CO_2

PART – B (5 x 2= 10 Marks)

11. Write the electronic configuration of calcium and Copper. CO3-Ap

12. Analyze the zeolite process cannot be used for treating turbid and acidic water. CO5-An

13. Comment the Shape memory alloys. CO1-U

14. What is meant by Xenobiotic and Endogenous substances? CO1-U

15. Point out the important of storage battery for new generation? CO4-Ap

PART – C (5 x 16= 80 Marks)

16. (a) How does a chemical bond formed? Explain the types of chemical bonds in NaCl and H_2 molecule. CO3-Ap (16)

Or

(b) Identify the types of hybridization in methane, ethylene and acetylene and explain the reason. CO3-Ap (16)

17. (a) Identify the method for the removal of cations and anions of hard water? Discuss the various steps involved with suitable diagram. CO5-An (16)

Or

(b) (i)A sample of water is found to contain 16.8 mg/L of $Mg(HCO_3)_2$, 12 mg/L of $MgCl_2$, 29.6 mg/L of $MgSO_4$ and 5.0 mg/L of NaCl. Calculate the temporary and permanent hardness. CO5-An (16)

(ii) Calculate the carbonate and non-carbonate hardness of a sample water containing the dissolved salts given (in mg/L) Mg(HCO3)2, = 14.6, $MgCl_2$ = 9.5, $Ca(HCO_3)_2$, = 16.2, $MgSO_4$, = 6.0,and NaCl =50.

(At. wt of Ca, Mg, O, C, Cl, S, H are 40,24,16,12,35.5,32 and 1)

18. (a) Explain the working principle with neat diagram and applications of OLED device. CO2-U (16)

Or

(b) What is meant by Shape Memory Alloys? Explain the different type of Shape memory Alloys with the elements. CO2-U (16)

19.	(a)	Discuss the twelve principles of Green chemistry.	CO2-U	(16)
		Or		
	(b)	Write e-waste management techniques known to you. Briefly explain three methods of e-waste disposal.	CO2-U	(16)
20.	(a)	Compare the dry cell and lead acid battery with neat diagram. Mention its advantages and disadvantages.	CO4-AP	(16)
		Or		
	(b)	Briefly discuss the H_2-O_2 fuel cell and give its application, advantages and disadvantages.	CO4-AP	(16)