

Hall Ticket Number:

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Code No. : 12212

VASAVI COLLEGE OF ENGINEERING (AUTONOMOUS), HYDERABAD

Accredited by NAAC with A++ Grade

B.E. II-Semester Main & Backlog Examinations, September-2022

Material Chemistry

(Common to CSE, AIML & IT)

Time: 3 hours

Max. Marks: 60

Note: Answer all questions from Part-A and any FIVE from Part-B

Part-A (10 × 2 = 20 Marks)

Q. No.	Stem of the question	M	L	CO	PO
1.	Why do electrochemical cells stop working after some time?	2	1	1	1,12
2.	Conductance decreases first and then increases as titration proceeds between strong acid Vs strong base – justify.	2	3	1	1,12
3.	Write the anodic and cathodic reactions of Ag ₂ O-Zn battery.	2	1	2	1,7
4.	What are the advantages of molten carbonate fuel cell?	2	1	2	1,7
5.	What is mean by functionality of a polymer? Give the functionality of phenol and vinyl chloride.	2	3	3	1,12
6.	Poly ethylene does not conduct electricity whereas poly acetylene conduct electricity-Reason.	2	3	3	1,7
7.	What are Smectic liquid crystals? Explain.	2	1	4	1,12
8.	Distinguish between liquid crystals from solid crystals.	2	2	4	1,12
9.	Pt and Au are inert in bulk state whereas they are good catalyst in nano state explain.	2	3	5	1,12
10.	Distinguish between two dimensional (2D) nanomaterials from three dimensional (3D) nanomaterials.	2	3	5	1,12
Part-B (5 × 8 = 40 Marks)					
11. a)	How is pH calculated using glass electrode? Explain the principle and applications.	4	1	1	1,2
b)	The standard reduction potentials of Zn and Ag are -0.76 and 0.80 V respectively. The concentrations of Zn ²⁺ and Ag ⁺ ions are 0.1 M and 0.2 M respectively. Write cell representation and cell reactions. Calculate Cell potential of the cell.	4	3	1	1,2
12. a)	What are secondary Cells? Explain the construction and working of lithium ion cell. Give the advantages of lithium ion cell.	4	1	2	1,7,12
b)	Explain the principle involved in phosphoric acid fuel cell? What are the advantages and disadvantages of the fuel cell?	4	2	2	1,7,12

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13. a)	Explain the preparation and properties of phenol formaldehyde and polycarbonate.	4	1	3	1,7
b)	What is vulcanization process and discuss its chemistry. Explain the advantages of vulcanized rubber over natural rubber.	4	2	3	1,7
14. a)	What are thermotropic liquid crystals? What are the phases in which they can exist?	4	2	4	1,12
b)	Write a note on fiber reinforced composites.	4	3	4	1,12
15. a)	How are nanomaterials characterized using Scanning Electron Microscope and draw neat its block diagram?	4	3	5	1,12
b)	How is graphene prepared by chemical vapour deposition method? Explain.	4	3	5	1,12
16. a)	A galvanic cell consists of Cu and H ₂ electrodes was used to determine the pH of an unknown solution which was placed in H ₂ electrode compartment and partial pressure of H ₂ is 1 atm. Concentration of Cu ²⁺ was 0.5 M and emf of cell at 25 °C was found to be 0.40 V. Calculate the pH of this unknown solution, given that E ⁰ of hydrogen and copper electrodes are 0 and 0.34V respectively. E of hydrogen electrodes is -0.0591pH.	5	3	1	1,2,12
b)	Explain the construction of Zn-MnO ₂ battery with relevant reactions occurring during discharging.	3	2	2	1,7
17.	Answer any <i>two</i> of the following:				
a)	What are biodegradable polymers? How is poly lactic acid prepared? Explain its properties.	4	2	3	1,7
b)	Explain the preparation methods of layered composites using hand lay up and pultrusion methods.	4	2	4	1,7,12
c)	Explain mechanical and optical properties of nanomaterials.	4	2	5	1,12

M : Marks; L: Bloom's Taxonomy Level; CO; Course Outcome; PO: Programme Outcome

i)	Blooms Taxonomy Level – 1	25%
ii)	Blooms Taxonomy Level – 2	36.25%
iii)	Blooms Taxonomy Level – 3 & 4	38.75%
