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Code No. : 11126 N/O

VASAVI COLLEGE OF ENGINEERING (AUTONOMOUS), HYDERABAD*Accredited by NAAC with A++ Grade***B.E. I-Semester Main & Backlog Examinations, Jan./Feb.-2024****Applied Chemistry**

(Common for Civil & Mech.)

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.	Write any two applications of electrochemical series.	2	2	1	1,2,12
2.	0.02 N solution of an electrolyte offers a resistance of 240 ohms in a conductivity cell whose cell constant is 0.98/cm. Calculate the equivalent conductance of the electrolyte.	2	3	1	1,2,12
3.	Differentiate between primary and secondary batteries.	2	3	2	1,2,7,12
4.	Enlist the applications of lithium-ion battery.	2	1	2	1,2,7,12
5.	Define glass transition temperature and mention any two factors affecting it.	2	2	3	1,2,7,12
6.	Composites have superior properties over conventional materials. Substantiate.	2	3	3	1,2,7,12
7.	What is octane number? Write its significance.	2	1	4	1,2,7,12
8.	A fuel has the following composition: C=84%. H=5.6%, N=1.2%, S=1.2% and ash=2.2%. Calculate its HCV and LCV.	2	3	4	1,2,7,12
9.	Define scales and sludges. What are the consequences of their formation in boilers?	2	2	5	1,2,7,12
10.	Mention the permissible degree of hardness, pH, TDS and F ⁻ ion concentration of potable water.	2	2	5	1,2,7,12
Part-B (5 × 8 = 40 Marks)					
11. a)	Derive Nernst equation and calculate the EMF of the zinc - copper cell, if the concentrations of Zn ⁺² and Cu ⁺² are 0.1M and 0.01 M respectively. (Standard electrode potentials of zinc and copper electrodes are -0.77V and 0.34V respectively)	4	3	1	1,2,12
b)	Discuss the construction and working of quinhydrone electrode. Write its merits and limitations.	4	2	1	1,2,12
12. a)	Compute the energy density and power density of a battery weighing 20g which produces 2 amperes current per hour under a potential gradient of 3V.	4	3	2	1,2,7,12
b)	Illustrate the construction and electrochemistry of lead acid storage cell and write its advantages and applications.	4	1	2	1,2,7,12
13. a)	Sketch a neatly labelled diagram and explain the manufacturing of composite materials by resin transfer method.	4	2	3	1,2,7,12
b)	Define degree of polymerization and functionality. Classify polymers based on i) Monomers ii) Backbone of the polymer.	4	3	3	1,2,7,12

14. a)	Calculate the amount of air required for the complete combustion of 2kg of a fuel having the following composition. C=82.5%. H=7.5%, N=2.4%, S=1.4% and ash=1.8%.	4	3	4	1,2,7,12
b)	Explain the chemistry of transesterification and list the advantages of biodiesel.	4	1	4	1,2,7,12
15. a)	Demonstrate the principle and procedure of electro dialysis. What are its merits and applications?	4	1	5	1,2,7,12
b)	Calculate the permanent, temporary, and total hardness of a water sample from the following data. 100 ml of a standard hard water containing 1gram CaCO_3 per liter, consumed 28 ml of EDTA in a complexometric titration. 50 ml of a water sample consumed 36 ml of same EDTA before boiling and 22ml after boiling.	4	3	5	1,2,7,12
16. a)	With appropriate model graphs, explain the principle of conductometric i) Strong acid Vs strong base ii) Mixture of acids Vs strong base titrations.	4	2	1	1,2,12
b)	Sketch a neatly labelled diagram and explain the construction and working of phosphoric acid fuel cell. Write its advantages.	4	2	2	1,2,7,12
17.	Answer any <i>two</i> of the following:				
a)	Differentiate between addition and condensation polymerization with one example each.	4	3	3	1,2,7,12
b)	Explain the conversion of heavy oil in to petrol using fixed bed catalytic cracking method.	4	2	4	1,2,7,12
c)	With a neatly labeled graph, explain break point chlorination. Mention the advantages.	4	2	5	1,2,7,12

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

i)	Blooms Taxonomy Level – 1	20%
ii)	Blooms Taxonomy Level – 2	40%
iii)	Blooms Taxonomy Level – 3 & 4	40%
