

Reg No.: _____

Name: _____

APJ ABDUL KALAM TECHNOLOGICAL UNIVERSITY
B.Tech Degree S2 (R,S) Examinations April 2026 (2024 Scheme)



Course Code: GCCYT122

Course Name: CHEMISTRY FOR PHYSICAL SCIENCE

Max. Marks: 60

Duration: 2 hours 30 minutes

PART A

(Answer all questions. Each question carries 3 marks)

		CO	Marks
1	What are solid lubricants? Give two examples. Write one advantage of it over liquid lubricants.	CO 1	3
2	What is green hydrogen? Give any two characteristics of it.	CO 1	3
3	What is cathodic protection? How impressed current cathodic protection method is used to prevent corrosion.	CO 2	3
4	Calculate the equilibrium constant of the reaction: $2\text{Cu}^+_{(\text{aq})} \rightarrow \text{Cu}_{(\text{s})} + \text{Cu}^{2+}_{(\text{aq})}$ at 298 K. Given that $E^0_{\text{Cu}^+/\text{Cu}} = +0.50 \text{ V}$ and $E^0_{\text{Cu}^{2+}/\text{Cu}^+} = +0.14 \text{ V}$.	CO 2	3
5	What are the differences in the working principle of TGA and DTA?	CO 3	3
6	Which of the following molecules are IR active? Give reason. (i) CO, (ii) F ₂ , (iii) CHCl ₃ , and (iv) H ₂ O	CO 3	3
7	Greenhouse effect is one of the major causes for global warming; Explain.	CO 4	3
8	Distinguish between temporary and permanent hardness.	CO 4	3

PART B

(Answer any one full question from each module, each question carries 9 marks)

Module -1

- 9 a) Explain the setting of Cement and the chemistry involved in the process of setting and hardening. CO 1 4
- b) When 0.75 g of a solid fuel is burned in a bomb calorimeter, the temperature of 3000 g of water rises from 25.5°C to 28.2°C. The water equivalent of the calorimeter is 360 g, and the latent heat of steam is 587 cal/g. If the fuel contains 0.6% hydrogen, calculate its Gross Calorific Value (GCV) and Net

Calorific Value (NCV).

- c) List two advantages of biofuels over fossil fuel. CO 1 2
- 10 a) Explain the classification of nanomaterials based on dimensions with suitable examples. CO 1 6
- b) Suggest a polymer used in military and space applications. Explain its synthesis with structure. CO 1 3

Module -2

- 11 a) Explain the construction of Lithium-ion battery. Describe the charging of Li-ion battery with suitable chemical equations. Give any two advantages of it. CO 2 6
- b) In the determination of pH of a solution using a Glass electrode coupled with a saturated calomel electrode; an emf of 0.15 V was obtained. Find out the p^H of this solution. Given $E_G^0 = 0.457V$ and $E_{SCE} = 0.2422V$. CO 2 3
- 12 a) Explain the mechanism of oxygen absorption corrosion of iron in both acidic and alkaline media. Why iron materials are not susceptible to hydrogen evolution corrosion in an alkaline medium? CO 2 6
- b) A solution with a concentration of 0.125 M exhibits a resistance of 24 Ω . Calculate the specific conductance of the solution if the cell constant is 0.5 cm^{-1} . CO 2 3

Module -3

- 13 a) What are the possible electronic transitions observed in water, aniline, and 1,3,5,7-octatetraene? How do they originate? CO 3 6
- b) How Beer-Lambert Law can be applied in UV-visible spectroscopy to determine the concentration of an unknown solution? CO 3 3
- 14 a) Explain the principle and instrumentation of Gas Chromatography with a labeled diagram. CO 3 7
- b) Why scanning electron microscopy analysis is performed under high vacuum? CO 3 2

Module -4

- 15 a) Explain the ion exchange process used for water softening with the help of relevant exchange reactions. What happens when water is first passed through CO 4 6

the anion exchange resin?

- b) Explain the UASB process in sewage water treatment. CO 4 3
- 16 a) Distinguish between BOD and COD. CO 4 3
- b) What is incineration in solid waste management? Give any two advantages. CO 4 3
- c) Explain the chlorination method using bleaching powder. Give one CO 4 3
disadvantage of this method.
