Reg No.:_____ Name:_____

APJ ABDUL KALAM TECHNOLOGICAL UNIVERSITY

B.Tech Degree S2 (S) / S1 (Challenge Course) Examination December 2025 / January 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 is green hydrogen? Give any two characteristics of it.	CO 1	(3)
2	What are the differences in the structure of graphene, carbon nanotube, and fullerene?	CO 1	(3)
3	A Zn rod is dipped in H_2SO_4 and $CuSO_4$ solutions in two separate beakers. In which of these beakers displacement reaction will occur? Justify. Given $E^0_{H+/H2} = +0.0$ V, $E^0_{Cu+/Cu} = +0.34$ V, and $E^0_{Zn2+/Zn} = -0.76$ V	CO 2	(3)
4	What is Galvanic Series? How is it useful in predicting the corrosion behavior of metals and alloys?	CO 2	(3)
5	A 0.05 M dye solution shows a transmittance of 0.4 at 570 nm; while a test solution of the same dye shows a transmittance of 0.6 under the same conditions. Find the concentration of the test solution.	CO 3	(3)
6	What are the various vibrational modes possible for CO_2? Which of them are IR active?	CO 3	(3)
7	What is temporary hardness of water? How this can be removed? Explain the chemistry behind it.	CO 4	(3)
8	What is ozone depletion? How oxides of nitrogen causes ozone depletion?	CO 4	(3)

PART B

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

Module -1

9	a)	Define (i) Flash point, (ii) cloud point, (iii) viscosity index, and (iii) Aniline point. Give the significance of these properties.	CO 1	(6)

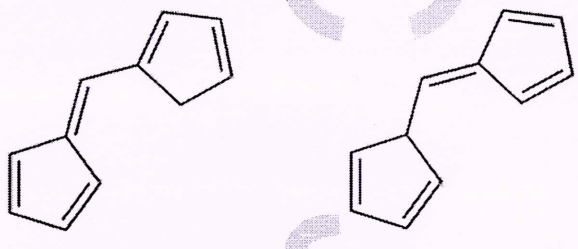
	b)	Explain chemical reduction method for the synthesis of nanomaterial with a suitable example?	CO 1	(3)
10	a)	Differentiate between high calorific value and low calorific value. Calculate the HCV and LCV of Pentane (C_5H_{12}).	CO 1	(6)
	b)	What are the differences between conducting polymers with conjugation and doped conducting polymer?	CO 1	(3)

Module -2

11	a)	What are the differences between primary and secondary reference electrodes? Explain with suitable examples.	CO 2	(6)
	b)	What is standard electrode potential? Explain its significance in electrochemistry.	CO 2	(3)
12	a)	Describe the construction and working of a lithium-ion battery. Give any two advantages of it?	CO 2	(6)
	b)	Explain the mechanism of hydrogen evolution corrosion in alkaline medium.	CO 2	(3)

Module -3

13	a)	What are the differences in the working principle of Thermogravimetric analysis (TGA) and differential thermal analysis (DTA)? Draw the TGA and DTA of calcium oxalate monohydrate in inert atmosphere.	CO 3	(6)
	b)	How is ortho-hydroxy benzaldehyde and para-hydroxy benzaldehyde distinguished using IR spectroscopy?	CO 3	(3)
14	a)	Which of the following molecules absorb at higher wavelength in the UV – visible spectrum? Explain.	CO 3	(3)



A B

	b)	What is the role of carrier gas in gas chromatography? Give two examples of commonly used carrier gases.	CO 3	(3)

	c)	What is the working principle of scanning electron microscopy (SEM)? Give any two applications of it.	CO 3	(3)

Module -4

15	a)	What is reverse osmosis (RO)? State and explain the principle behind it.	CO 4	(3)
	b)	Define Chemical Oxygen Demand (COD). How does it differ from BOD?	CO 4	(3)
	c)	What is disinfection? Explain disinfection by chlorination.	CO 4	(3)
16	a)	A hard water sample contains Ca^{2+}= 45 ppm, Mg^{2+}= 28 ppm, Na^{+}= 54 ppm, and HCO_3^-=148 ppm. Calculate the temporary, permanent and total hardness of this sample.	CO 4	(3)
	b)	How does segregation at source improve the efficiency of waste management systems?	CO 4	(3)
	c)	Describe the UASB (Upflow Anaerobic Sludge Blanket) process.	CO 4	(3)

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