

Reg. No.:



Name:

University of Kerala

Y7610

Fourth Semester FYUGP Degree Examination, May 2026

Discipline Specific Elective

CHEMISTRY

UK4DSECHE201 - CHEMISTRY FOR RENEWABLE & CLEAN ENERGY - II

Academic Level: 200-299

2024 Admission

Time: 1 Hour 30 Minutes(90 Mins.)

Max. Marks: 42

**Part A. 6 Marks.Time:6 Minutes.(Cognitive Level:Remember(RE)/Understand(UN)) Objective Type. 1 Mark
Each.Answer all questions**

Qn No.	Question	CL	CO
1	Material with controllable conductivity is called _____.	RE	2
2	Give one example of a standalone PV application.	RE	3
3	What is free electron theory?	UN	1
4	Why do quantum dots show different colors with size variation?	UN	4
5	Why are batteries important in solar energy systems	UN	3
6	Why do electrons in the conduction band contribute to electrical conductivity?	UN	1

Part B. 8 Marks.Time:24 Minutes.(Cognitive Level:Understand(UN)/Apply(AP))Short Answer. 2 marks each.Answer all questions

Qn No.	Question	CL	CO
7	How does the generation of electron-hole pairs lead to current in a solar cell?	UN	2
8	Describe the basic working principle of an organic photovoltaic(OPV) solar cell.	UN	4
9	In a p–n junction diode, what happens when it is connected in reverse bias? State the effect on current flow.	AP	1
10	How does MPPT contribute to reduce overall solar system cost over time?	AP	3

Part C. 28 Marks.Time:60 Minutes (Cognitive Level:Apply(AP)/Analyse(AN)/Evaluate(EV)/Create(CR)) Long Answer.7 marks each.Answer all 4 Questions choosing among options * within each question

Qn No.	Question	CL	CO
11	A)	AP	1, 1

Qn No.	Question	CL	CO
	Explain the working principle of a Zener diode and show how it is used as a voltage regulator in a circuit. OR B) Explain the process of generation and recombination of charge carriers in semiconductors and discuss its significance in electronic devices.		
12	A) Compare the electrical behaviour of series and parallel connections in solar modules. OR B) Examine the mechanism of light absorption in semiconductors, analysing the factors influencing the photogeneration efficiency in a solar cell.	AN	2, 2
13	A) A coastal telecommunication tower operates off-grid and requires uninterrupted 24-hour solar power. Describe how environmental conditions, load estimation, PV panel sizing, battery bank design, and MPPT should be integrated for dependable service. OR B) Evaluate rooftop solar systems and solar pumping systems by comparing their applications, benefits, efficiency, and contribution to sustainable energy use.	EV	3, 3
14	A) Critically evaluate the role of net metering in promoting rooftop solar adoption. OR B) Design a decentralized renewable energy system for a cluster of villages with varying energy needs.	CR	4, 4