Reg. No.: .....

Name: .....

University of Kerala

Y7674

Fourth Semester FYUGP Degree Examination, May 2026

Discipline Specific Elective

PHYSICS

UK4DSEPHY202 - Synthesis of Nanomaterials

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	List two methods used for synthesis of nanomaterials	RE	1
2	Define lithography in nanotechnology	RE	3
3	Explain why surface effects become dominant in nanoparticles.	UN	1
4	Explain the term quantum size effect.	UN	2
5	Interpret the limitations of lithography	UN	3
6	Explain why e-beam evaporation is preferred for materials with high melting points.	UN	3

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	Explain the physical significance of the ‘Fermi Level’ in the band structure diagram.	UN	1
8	The green synthesis method act as an eco-friendly alternative to traditional chemical routes. Discuss	UN	3
9	Illustrate how reduction in particle size affects the optical properties of nanomaterials.	AP	2
10	Sputtering is often preferred over other deposition techniques for high-quality devices. Identify the reason.	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) Use the concept of the quantum confinement effect to explain why the band gap of a semiconductor increases when its size is reduced to the nanoscale OR B) Using the concept of surface-to-volume ratio, explain the higher chemical reactivity of nanoparticles compared to bulk materials.	AP	2, 2
12	A) Differentiate between physical and chemical methods for the fabrication of nano materials. OR B) Analyse the role of repulsive forces in maintaining the stability of a colloidal suspension. Contrast the mechanisms of coulombic repulsion versus steric repulsion. In your analysis, explain the change in the pH of the medium or an increase in salt concentration that causes a stable colloid to undergo sudden aggregation.	AN	3, 3
13	A) Justify the use of plant extracts over chemical reducing agents. OR B) Evaluate the merits of physical methods of nanosynthesis using the ball milling process.	EV	3, 3
14	A) Design any chemical method to fabricate nanostructured materials. OR B) Design a laboratory procedure for preparing iron oxide nanoparticles	CR	3, 3