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M.Sc. Chemistry
Semester IV Examination 2025
Paper Code: MCHCOE-407
Paper Title: Chemistry of Nanoscience

Time 2.5 hours

Maximum Marks 60

Abbreviations Used

CLO- Course Outcome, PLO- Program Outcome, BTL- Bloom Taxonomy Level: BT level 1-Remember; BT level 2-Understand; BT level 3-Apply; BT level 4-Analyse; BT level 5-Evaluate, BT level 6-Create

Section A

Very Short Type Questions

(10x1.5=15 Marks)

Q. No	Question	BTL	CLO	PLO
1.	Define Nanotechnology?	1	1	1
2.	Out of Nano & Micro, which particles are more active and why?	2	2	1
3.	What are the limitations of DLS?	2	3	1
4.	What is the working principle of Transmission Electron Microscopy (TEM)?	2	4	1
5.	What is information do we get from SEM analysis?	1	4	1
6.	What are the advantages of optical Tweezers?	2	4	1
7.	What is the application of SPR?	2	2	1
8.	Name analytical techniques to characterise Micelles?	2	3	1
9.	What are bucky balls?	2	3	1
10.	Differentiate between suspension & solution.	2	4	1

Section B

Long Type question (Attempt any two out four)

(10x2=20 Marks)

Q. No	Question	BTL	CLO	PLO
1.	Describe two chemical methods used in bottom-up nanomaterial synthesis.	6	1	3
2.	In what ways are quantum dots being used as nanoparticle tags in biomedical imaging?	5	2	3
3.	How do nanostructured materials improve the performance of biosensors and drug delivery platforms?	5	2	3
4.	Discuss the advantages and limitations of using lipid-based colloidal systems for targeting hydrophobic drugs.	6	3	3

Section C

Short Type questions. (Attempt all questions)

(5x5=25 Marks)

Q.NO	Questions	BTL	CLO	PLO
1.	What are the main components of lipid-based colloidal nanodrug-delivery systems and how do they influence drug encapsulation efficiency? OR How do surface modifications of lipid-based nanoparticles affect their biodistribution and pharmacokinetics?	3	1	2
2.	What physicochemical properties of amphiphilic block copolymers are critical in forming stable polymeric micelles? OR Explain how polymeric micelles enhance the solubility of poorly water-soluble drugs.	4	2	2
3.	What mechanisms are involved in the solubilization of hydrophobic drugs using polymeric micelles? OR How do critical micelle concentration (CMC) and micelle stability influence drug release behavior?	3	3	2
4.	How do polymeric micelles evade uptake by the reticuloendothelial system (RES)? OR What are the emerging strategies for designing multifunctional polymeric micelles for combination therapies?	3	4	2
5.	Differentiate between Nanomedicine & Nanobiotechnology OR Why materials acquire special properties at Nanoscale.	3	2	1