Roll No: | | | | | | | | | | | |

GAIN MORE KNOWLEDGE
REACH GREATER HEIGHTS

PRESIDENCY UNIVERSITY

Presidency University Act, 2013 of the Karnataka Act No. 41 of 2013 | Established under Section 2(f) of UGC Act, 1956
Approved by AICTE, New Delhi | Approved By BCI
Bengaluru

Mid Term Examinations - October 2026

Date: 06/10/2026 **Time:** 09:30 AM - 11:00 AM

Course Code: CHE3003 **Course Name:** Introduction to Nanotechnology and Applications

Semester: Seventh Semester **Max. Marks:** 50 **Weightage:** 50%

CO - Levels	CO1	CO2	CO3
Marks	24	46	20

PART A: Answer Following Questions. 10 M

Q.N.	Questions	M	CO	BT
1	A material has one dimension of 50 nm and the other two dimensions above 100 nm. Would you classify it as a nanomaterial? Give a reason.	2	CO1	BT3
2	State any two challenges involved in the manufacturing of nanomaterials.	2	CO1	BT1
3	Smaller size → higher energy → blue shift is it a correct sequence in quantum dots?	2	CO2	BT2
4	What are Nano clusters?	2	CO2	BT1
5	Explain core–shell nanoparticles.	2	CO2	BT1

PART B : Answer Any 1 Following Questions. 10 M

Q.N.	Questions	M	CO	BT
6	Calculate the surface-to-volume ratio of (i) a cubical nanomaterial of side 10 nm and (ii) a spherical nanoparticle of radius 10 nm. Compare the results and comment on the effect of size on surface-to-volume ratio.	10	CO1	BT3
7	Employ the top-down and bottom-up approaches in detail for the synthesis of nanomaterials with neat diagrams and suitable examples.	10	CO1	BT3

PART C: Answer Any 1 Following Questions. 10 M

Q.N.	Questions	M	CO	BT
8	Apply the concept of nanocomposites to classify them based on the nature of the matrix and the type of reinforcement, and discuss the key properties of nanocomposites.	10	CO2	BT3
9	Calculate the ground state energy of an electron confined in a quantum dot of radius 5 nm also indicate each term utilized in the formula.	10	CO2	BT3

PART D: Answer Any 1 Following Questions. 10 M

Q.N.	Questions	M	CO	BT
10	Employ the concept of nanomaterials to show that the wavelength of the emission is related to the size and color of the Quantum Dot.	10	CO2	BT3

11	(i)The band gap of bulk ZnO is 3.30 eV. When ZnO is synthesized in the form of quantum dots, the measured band gap becomes 3.85 eV. Calculate the band gap shift due to quantum confinement. (ii) If the radius of a quantum dot is reduced from 8 nm to 4 nm, how does the confinement energy change?	10	CO2	BT3

PART E: Answer Any 1 Following Questions. 10 M				
Q.N.	**Questions**	**M**	**CO**	**BT**
12	Explain Buckminsterfullerene (C_{60}) in detail, including its structure, bonding, and properties.	10	CO3	BT2
13	Explain the structure, bonding and important properties in graphene	10	CO3	BT2