



PRESIDENCY UNIVERSITY

BENGALURU

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Mid - Term Examinations - March 2026

Date: 12- 03- 2026

Time: 09:30am - 11.00am

School: SOCSE	Program: B. Tech.		
Course Code: CHE3003	Course Name: Introduction to Nanotechnology and Applications		
Semester: VI	Max Marks: 50	Weightage: 25%	

CO - Levels	CO1	CO2	CO3	CO4	CO5
Marks	14	26	10		

Instructions:

- (i) Read all questions carefully and answer accordingly.
- (ii) Do not write anything on the question paper other than roll number.

Part A

Answer ALL the Questions. Each question carries 2marks.

5Q x 2M=10M

1	What are nanomaterials and why are they important?	2 Marks	L2	CO1
2	List any four properties of nanomaterials that depend on nanomaterials size.	2 Marks	L1	CO1
3	Why quantum dots show size-dependent color?	2 Marks	L2	CO2
4	Explain core-shell nanoparticles.	2 Marks	L1	CO2
5	Explain the concept of a quantum wire in nanomaterials.	2 Marks	L1	CO2

Part B

Answer the Questions.

Total Marks 40M

6.	a.	(i) Calculate the surface-to-volume ratio of a cubical nanomaterial with a side length of 30 nm. (ii) Calculate the surface-to-volume ratio of a spherical nanomaterial having a radius of 10 nm.	10 Marks	L3	CO1
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Or					
7.	a.	Describe the two major synthetic approaches—top-down and bottom-up—employed in the fabrication of nanomaterials, giving suitable examples. State any two challenges involved in the manufacturing of nanomaterials.	10 Marks	L2	CO1

8.	a.	Calculate the ground state energy of an electron confined in a quantum dot of radius 5 nm.	10 Marks	L3	CO2
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Or					
9.	a.	Define nanocomposites. Classify them based on the nature of the matrix and the type of reinforcement, and discuss the key properties of nanocomposites.	10 Marks	L2	CO2

10.	a.	Describe the classification of nanomaterials on the basis of dimensionality with relevant examples.	10 Marks	L2	CO2
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Or					
11.	a.	(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 Marks	L3	CO2

12.	a.	Discuss the structure and properties of fullerene with a neat diagram.	10 Marks	L2	CO3
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Or					
13.	a.	Explain the molecular structure of graphene and describe its important properties using a suitable diagram.	10 Marks	L2	CO3