

CBCS SCHEME

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BETCK105C

First Semester B.E./B.Tech. Degree Examination, Dec.2025/Jan.2026

Introduction to Nanotechnology

Time: 3 hrs.

Max. Marks: 100

*Note: 1. Answer any FIVE full questions, choosing ONE full question from each module.
2. M : Marks , L: Bloom's level , C: Course outcomes.*

| Module – 1 | | | | | |
|------------|----|---|----|----|-----|
| Q.1 | a. | Explain the synthesis of ZnO nano particles using solution combustion method. | 8 | L2 | CO1 |
| | b. | Explain the synthesis of SiO ₂ (Silica) nano particle using Sol – gel method. | 8 | L2 | CO1 |
| | c. | Explain the electron confinement in 3D , 2D , 1D and 0D materials. | 4 | L2 | CO1 |
| OR | | | | | |
| Q.2 | a. | Explain the synthesis of nano materials using Ball Milling Technique. | 8 | L2 | CO1 |
| | b. | Explain the synthesis of Cds film using chemical bath deposition and SILAR Technique. | 8 | L2 | CO1 |
| | c. | With a neat diagram, explain the formation of thin film by Sputtering method. | 4 | L2 | CO1 |
| Module – 2 | | | | | |
| Q.3 | a. | Explain the principle , construction and working of STM. | 8 | L2 | CO2 |
| | b. | Explain the principle , construction and working of SEM. | 8 | L2 | CO2 |
| | c. | In X – Ray diffraction experiment , Full width at half maxima is 0.7° and the corresponding Bragg's angle is 24°. Calculate the crystallite size using Scherer's formula. Given that X – ray wavelength used for the experiment is 1.54 Å and K = 0.94. | 4 | L3 | CO2 |
| OR | | | | | |
| Q.4 | a. | Explain the principle, construction and working of AFM. | 8 | L2 | CO2 |
| | b. | Explain the construction and working of UV – Visible spectrometer. | 8 | L2 | CO2 |
| | c. | Derive Scherer's Equation. | 4 | L3 | CO2 |
| Module – 3 | | | | | |
| Q.5 | a. | Explain the synthesis , properties and applications of graphenc. | 10 | L2 | CO3 |
| | b. | Write a brief note on : i) Carbon nano fiber and ii) Carbon nano disc. | 10 | L2 | CO3 |
| OR | | | | | |

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|-------------------|----|---|---|----|-----|
| Q.6 | a. | Explain the synthesis of Carbon Nano Tube (CNT) using Chemical Vapour Deposition (CVD) method. | 8 | L2 | CO3 |
| | b. | Explain the synthesis and applications of fullerene. Mention any two properties of fullerene. | 8 | L2 | CO3 |
| | c. | What is Carbon Nano Diamond? Write a brief note on Carbon Nano diamond. | 4 | L2 | CO3 |
| Module – 4 | | | | | |
| Q.7 | a. | Explain the construction and working of Lithium ion battery. | 8 | L2 | CO4 |
| | b. | Explain the construction and working of Dye sensitized solar cell. | 8 | L2 | CO4 |
| | c. | What are the disadvantages of graphite as Anode in Lithium ion battery? | 4 | L2 | CO4 |
| OR | | | | | |
| Q.8 | a. | Define Solar Cell. Explain briefly different generation of solar cell with example. | 8 | L2 | CO4 |
| | b. | Discuss the construction and working of Quantum dot sensitized solar cell. | 8 | L2 | CO4 |
| | c. | Explain the construction and working of Fuel Cell. | 4 | L2 | CO4 |
| Module – 5 | | | | | |
| Q.9 | a. | Explain the application of nano technology in Agriculture and Food Industry. | 8 | L2 | CO5 |
| | b. | Explain the application of nano materials in drug delivery and diagnostics. | 8 | L2 | CO5 |
| | c. | Write a note on the application of nano materials in chemistry. | 4 | L2 | CO5 |
| OR | | | | | |
| Q.10 | a. | What is Nano Electronics? Explain the application of nano technology in the field of electronics. | 8 | L2 | CO5 |
| | b. | Explain the application of nano technology in : i) Photonics ii) Biosensing | 8 | L2 | CO5 |
| | c. | Explain the applications of nano technology in Energy Sector. | 4 | L2 | CO5 |
