

# CBCS SCHEME

USN

BETCK205C/BETCKC205

## Second Semester B.E./B.Tech. Degree Examination, June/July 2024 Introduction to Nano Technology

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 |    |  | M  | L  | C   |
|------------|----|--|----|----|-----|
| Q.1        | a. | Describe the synthesis of nano particle by sol-gel method.   | 08 | L2 | CO1 |
|            | b. | Explain the synthesis ZnO nano particles by solution combustion method.  | 08 | L2 | CO1 |
|            | c. | Define SAVR. Calculate the SAVR for two different size cubic particle<br>(i) $5 \times 10^{-2}$ m (ii) $5 \times 10^{-9}$ m.   | 04 | L2 | CO1 |
| OR         |    |  |    |    |     |
| Q.2        | a. | Explain the sputtering method of synthesis of nano particle with neat diagram.   | 08 | L2 | CO1 |
|            | b. | With neat labelled diagram explain the synthesis of nano particle by Laser Ablation technique.   | 08 | L2 | CO1 |
|            | c. | Explain the steps involved in SILAR method of synthesis of nano film.  | 04 | L2 | CO1 |
| Module – 2 |    |  |    |    |     |
| Q.3        | a. | With the aid of neat sketch explain the principle construction and working of STM and also explain different modes of operation of STM.  | 10 | L2 | CO2 |
|            | b. | Based on the concept of X-ray diffraction for nano materials derive Debay-Scherrer equation.   | 10 | L2 | CO2 |
| OR         |    |  |    |    |     |
| Q.4        | a. | Explain the instrumentation and working of UV-visible spectrometer.  | 08 | L2 | CO2 |
|            | b. | Describe the construction and working of SEM.  | 08 | L2 | CO2 |
|            | c. | Calculate the crystallite size. The diffraction peak observed at an angle ( $\theta$ ) $25^\circ$ with FWHM of $0.72^\circ$ . The wavelength used in the diffraction experiment is $1.54 \text{ \AA}$ and assume Sherrer constant as 0.94. | 04 | L3 | CO2 |
| Module – 3 |    |  |    |    |     |
| Q.5        | a. | Describe the synthesis of CNT by CVD method. Mention any four properties of carbon nanotubes.  | 10 | L2 | CO3 |
|            | b. | With a neat diagram, explain the structure, properties and applications of Fullerene.  | 10 | L2 | CO3 |
| OR         |    |  |    |    |     |
| Q.6        | a. | Explain the structure, synthesis, properties and application of Graphene.  | 10 | L2 | CO3 |
|            | b. | Write a note on : (i) Nano composite (ii) Nano fiber   | 06 | L2 | CO3 |
|            | c. | Write a note on Nano diamonds  | 04 | L2 | CO3 |
| Module – 4 |    |  |    |    |     |
| Q.7        | a. | Explain the construction and working of Quantum dot sensitized solar cell.   | 08 | L2 | CO4 |
|            | b. | Describe the construction and working of Fuel cell.  | 08 | L2 | CO4 |
|            | c. | Mention any four limitations of graphite anodes.   | 04 | L2 | CO4 |
| OR         |    |  |    |    |     |
| Q.8        | a. | Describe the construction and working of Dye-sensitized solar cells.   | 08 | L2 | CO4 |
|            | b. | What is solar cell? Explain in brief 1 <sup>st</sup> , 2 <sup>nd</sup> and 3 <sup>rd</sup> generation solar cell.  | 08 | L2 | CO4 |
|            | c. | Describe the role of nano technology in Hydrogen storage application.  | 04 | L2 | CO4 |

| Module – 5 |    |   |    |    |     |
|------------|----|---|----|----|-----|
| Q.9        | a. | Explain the applications of nano technology in drug delivery and diagnosis.     | 08 | L2 | CO5 |
|            | b. | Explain the applications of nano technology in agriculture and food industries. | 08 | L2 | CO5 |
|            | c. | Write note on Nanoelectronics.  | 04 | L2 | CO5 |
| OR         |    |   |    |    |     |
| Q.10       | a. | Write a note on : (i) Biodegradable electrodes (ii) 3D-printed batteries.       | 08 | L2 | CO5 |
|            | b. | Explain the application of nanotechnology in optics.                            | 08 | L2 | CO5 |
|            | c. | Write a note on Nano fertilizer.  | 04 | L2 | CO5 |

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