**18ECD31**

**Hall Ticket Number:**

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| **IV/IV B.Tech (Regular) DEGREE EXAMINATION** | | | |
| **January, 2022** | **Electronics & Communication Engineering** | | |
| **Seventh Semester** | **Introduction to Nanoscience and Nanotechnology** | | |
| **Time:** Three Hours | | **Maximum: 5**0 Marks | |
| *Answer Question No. 1 Compulsorily.* | | | (1X10 = 10 Marks) |
| *Answer* ***ANY ONE*** *question from each Unit.* | | | (4X10=40 Marks) |

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|  | | | 10X1 = 10 Marks | | | |
| 1. | a) | Define the term Nanoscience | | CO1 | |  |
|  | b) | Why the properties of nano materials are different from that of bulk? | | CO1 | |  |
|  | c) | Give an expression for energy Eigen value of a particle in a box. | | CO1 | |  |
|  | d) | Mention various top-down approaches in the synthesis of nanomaterials | | CO2 | |  |
|  | e) | List out some bottom-up approaches | | CO2 | |  |
|  | f) | What is meant by top-down approach? | | CO2 | |  |
|  | g) | What is meant by scanning tunneling microscopy? | | CO3 | |  |
|  | h) | Give the expression for Bragg’s law. | | CO3 | |  |
|  | i) | What is meant by fullerene? | | CO4 | |  |
|  | j) | What is meant by CFED? | | CO4 | |  |
| **UNIT - I** | | | | | | |
| 2. | a) | Briefly discuss some of the applications of nanotechnology. | | CO1 | **5M** | |
|  | b) | Obtain an expression for Density of states (DOS) in a 1D solid. | | CO1 | **5M** | |
|  |  | **(OR)** | |  |  | |
| 3. | a) | Derive the expression for energy and wave function for a particle in a one-dimensional box. | | CO1 | **7M** | |
|  | b) | Determine the energy of the lowest three levels for an electron in square well of width 4Ao | | CO1 | **3M** | |
| **UNIT - II** | | | | | | |
| 4. | a) | Discuss about chemical vapor deposition technique. | | CO2 | **5M** | |
|  | b) | Discuss about ion beam lithography technique. | | CO2 | **5M** | |
|  |  | **(OR)** | |  |  | |
| 5. | a) | Discuss about sol-gel technique used for the preparation of nanomaterials. | | CO2 | **5M** | |
|  | b) | Discuss in detail about X-ray lithography | | CO2 | **5M** | |
| **UNIT - III** | | | | | | |
| 6. | a) | Discuss about the working of SEM with the help of sketch | | CO3 | **5M** | |
|  | b) | Discuss about the X-ray powder method for the analysis of a sample. | | CO3 | **5M** | |
|  |  | **(OR)** | |  |  | |
| 7. | a) | Discuss in detail about STM technique for the characterization of nanomaterials with the help of neat sketches | | CO3 | **5M** | |
|  | b) | Write a detailed note on UV-Visible spectroscopy | | CO3 | **5M** | |
| **UNIT - IV** | | | | | | |
| 8. | a) | What is a Carbon nanotube? Discuss various types of CNTs | | CO4 | **5M** | |
|  | b) | Briefly discuss about various properties of CNTs | | CO4 | **5M** | |
|  |  | **(OR)** | |  |  | |
| 9. | a) | Discuss about CNFED | | CO4 | **5M** | |
|  | b) | Discuss about CNT based Biological applications | | CO4 | **5M** | |

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