Reg.No. \_\_\_\_\_\_\_\_\_\_\_\_



**UNIVERSITY**

(Karunya Institute of Technology & Sciences)

(Declared as Deemed-to-be University under Sec.3 of the UGC Act, 1956)

**End Semester Examination – April / May – 2017**

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| **Code :** | **16NT2003** | **Duration :** | **3hrs** |
| **Sub. Name :** | **PROPERTIES OF NANOMATERIALS** | **Max. marks :** | **100** |

**ANSWER ALL QUESTIONS (5 x 20 = 100 Marks)**

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| Q. No. | Sub Div. | Questions | Course  Outcome | Marks |
| 1. | a. | Define Quantum wire and quantum well. | CO1 | 8 |
| b. | Distinguish the the electron movement in bulk materials and in 1D, 2D and 3D size reduced materials. | CO1 | 12 |
| (OR) | | | | |
| 2. | a. | Distinguish the density of states of bulk, quantum states with suitable diagrams. | CO1 | 10 |
| b. | Explain the band splitting and discrete energy levels in quantum states. | CO1 | 10 |
| 3. | a. | Enumerate the different physical properties of nanomaterials that change with size. | CO2 | 10 |
|  | b. | What happens to melting point when the surface energy increases? | CO2 | 10 |
| (OR) | | | | |
| 4. | a. | Demonstrate the change in mechanical properties of materials upon size reduction. | CO2 | 8 |
|  | b. | Write the Gibs equation to substantiate the melting point changes with the nanoscale. | CO2 | 12 |
| 5. | a. | How the diffenent carbon nanotubes are made based on the folding on the T vector? | CO2 | 7 |
|  | b. | Demonstrate the electrical conductivity in an ideal hexagonal array of single crystal gold clusters. | CO2 | 13 |
| (OR) | | | | |
| 6. | a. | What happens with the size of a material is reduced from bulk to nano in terms of band gap? | CO2 | 6 |
|  | b. | Demonstrate the electrical properties of CNT’s through the Van hove singularities and step potential. | CO2 | 14 |
| 7. | a. | Describe the terms i)Blue shift ii) absorption edge in uv-visspectro graph. | CO1 | 8 |
|  | b. | Using the Uv-Vis absorbance spectrum how will you interpret the presence of discrete band gap.explain with suitable graphical representations. | CO2 | 12 |
| (OR) | | | | |
| 8. |  | Describe the surface Plasmon resonance phenomena and explain how it is more pronounced in nanomaterials. | CO2 | 20 |
|  | | **Compulsory:** |  |  |
| 9. | a. | Demonstrate the B-H characteristicand explain the terms Magnetic saturation, coercivity and remanance. | CO2 | 10 |
|  | b. | Apply myltilayer technique to demonstrate the colasal and giant magneto resistance. | CO2 | 10 |