# VIT AP

**VIT -AP Amaravati**

**Introduction to Nanotechnology [PHY2005 - 074]**

**Marks: 50** **Duration: 90 mins.**

**SECTION I**

**Answer all the questions.**

| | | |
|---|---|---|
| 1) | A PhD research scholar wants to obtain 2D as well as 3D images of his samples along with the surface /roughness profiles. Which electron microscopy technique do you think will be best suited for the characterization of his nanomaterial samples? Draw a neat schematic and explain the working mechanism of the same technique. Also state its advantages and disadvantages. | (10) |
| 2) | (a) Can a (10, 0) carbon nanotube be fitted in a (19, 0) or a (18,0) nanotube? Justify your answer by using appropriate equations and calculations. (b) Illustrate any five types of nanomaterials with their key benefits which are utilized for improving the biosensor technology. | (10) |
| 3) | Identify and explain in detail which single sensor device can be adopted to investigate the electrical impedance, conductivity, current sweep, voltage sweep etc. for a given semiconductor material. List some of the applications of the same device. | (10) |
| 4) | Discuss the significance of CNTs in Nanosensor. Also mention the type of biosensor which is useful for monitoring the disease like diabetes and explain its working mechanism. | (10) |
| 5) | Suppose you are provided with a Cu doped ZnO sample. Based on your knowledge on electron microscopy, suggest a microscopy technique which can be employed to study not only the surface structure of the given semiconductor but also the elemental composition of Zn, O and Cu present in the sample. Discuss the principle and working of this technique. | (10) |

-----End-----