Seat No.: _____ Enrolment No._____

# GUJARAT TECHNOLOGICAL UNIVERSITY

**BE - SEMESTER–VIII • EXAMINATION – SUMMER 2013**

**Subject Code: 182104 Date: 09/05/2013**

**Subject Name: Nano-materials & Technology (Departmental Elective-II)**

**Time: 10:30 am TO 01:00 pm Total Marks: 70**

**Instructions:**

1. **Attempt all questions.**
2. **Make suitable assumptions wherever necessary.**
3. **Figures to the right indicate full marks.**

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|---|---|---|---|
| **Q.1** | **(a)** | What are nano-materials? Explain the effect of grain size on mechanical properties of nano structured materials. | **07** |
| | **(b)** | Describe the classification of nano-materials. Give their examples. Enlist applications of Nano materials. | **07** |
| **Q.2** | **(a)** | Explain the chemical vapour deposition technique for nano-material production. Give the advantages of this method. | **07** |
| | **(b)** | Define Nano technology and discuss its applicability. Explain that why materials behave so differently at nanoscale? | **07** |
| | | **OR** | |
| | **(b)** | Discuss about size dependence of material at nano scale. Compare the bulk and nano properties of materials. | **07** |
| **Q.3** | **(a)** | Write a note on nanoporous materials. | **07** |
| | **(b)** | Explain the sol-gel technique for nano-material production. Draw the necessary diagram. | **07** |
| | | **OR** | |
| **Q.3** | **(a)** | What is carbon nanotube? Describe manufacturing of Nano Carbon Tube. | **07** |
| | **(b)** | What do you mean by nanocomposites? Discuss their properties and applications. | **07** |
| **Q.4** | **(a)** | Explain the mechanism of mechanical alloying technique for nano-material production. Give the factors affecting mechanical alloying. | **07** |
| | **(b)** | Describe the hot isostatic pressing method for nanopowders consolidation. | **07** |
| | | **OR** | |
| **Q.4** | **(a)** | ñBottom-up technique is more convenient for nano fabricationò- explain and justify. | **07** |
| **Q.4** | **(b)** | Explain the following terms: 1.nanocrystals 2.nanocapsules 3.fullerenes. | **07** |
| **Q.5** | **(a)** | Critically compare the Conventional and Microwave sintering process for nanopowders consolidation. | **07** |
| | **(b)** | Describe the working of scanning tunneling microscopy (STM) and discuss some nanotechnological applications of STM. | **07** |
| | | **OR** | |
| **Q.5** | **(a)** | Explain the working and applications of scanning probe microscopy in nano-materials characterization. | **07** |
| | **(b)** | What is transmission electron microscopy (TEM)? Explain the dark field and bright field images. Describe the information one can yield using TEM. | **07** |

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