Seat No.: _____ Enrolment No._____

GUJARAT TECHNOLOGICAL UNIVERSITY

BE - SEMESTER–VII(NEW) • EXAMINATION – WINTER 2016

Subject Code:2170508 Date:25/11/2016

Subject Name:Nano Technology(Department Elective - II)

Time:10.30 AM to 1.00 PM Total Marks: 70

Instructions:

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

Q.1	**(a)**	Enlist various methods of fabrication of nanomaterials using (i)'Top-down' and (ii) 'Bottom-up' approaches and discuss any one from either (i) or (ii) with elaboration.	**07**
	(b)	Briefly compare between 'Top-down' and 'Bottom-up' approaches of fabrication of nanomaterials. Give examples of reduced dimensionality system (1D, 2D and 3D confinements).	**07**
Q.2	**(a)**	Discuss the effect of nanometer length on any two of the following: elastic properties, melting Point, Diffusivity and Solubility	**07**
	(b)	Write a short note on any one (i) Grain Boundary engineering Or Zenner Pinning (ii) Nanocatalysts	**07**
		OR	
	(b)	State the laws of crystallography. If a crystal face cuts the coordinate axes at 2a, b and c/2 (where a, b, c are unit distances along three axes) find out the Miiller index of the crystal. Name different crystal defects which are generally encountered in crystalline materials with rough sketches.	**07**
Q.3	**(a)**	Enlist the general methods of preparation of quantum dots of compounds semiconductors. Illustrate any one in details.	**07**
	(b)	Explain if there are any disadvantages of using nanomaterials, for commercial applications. State briefly with a reaction the principle of synthesis of Pd nanoparticles.	**07**
		OR	
Q.3	**(a)**	Explain the principle of lithographic process with schematic diagram. State the advantages and disadvantages of this process.	**07**
	(b)	Discuss Spray pyroysis method for synthesis of ceramic nano powders.	**03+04**
Q.4	**(a)**	Explain vapor condensation method for production of nanoparticles.	**07**
	(b)	Discuss the potential uses of nanodimensional materials. Explain if there are any disadvantages of using nanomaterials, for commercial applications.	**07**
		OR	
Q.4	**(a)**	Explain the principle of X-ray Diffraction analysis. What kind of information would you expect from the X-ray diffractogram.	**07**
	(b)	State the principle of SEM. Enlist the aspects of crystallite information that can be obtained through SEM analysis.	**07**

Q.5	**(a)**	Briefly explain the principle and objective of AFM. What are the common modes of AFM analysis?	**07**
	(b)	Compare the salient features of AFM with SEM and TEM.	**07**

OR

Q.5	**(a)**	What are the advantages of nanosensors over their micro or macro counterparts? Enlist the type of nanosensors and mention the parameters that can be measured.	**07**
	(b)	Discuss the application of nanotechnology in Food and agricultural industries and effective water management.	**07**

****