Code No: **RT41036** **R13** **Set No. 1**

IV B.Tech I Semester Regular/Supplementary Examinations, Oct/Nov - 2018

NANO TECHNOLOGY

(Common to Aeronautical Engineering, Electrical and Electronics Engineering and Mechanical Engineering)

Time: 3 hours **Max. Marks: 70**

Question paper consists of Part-A and Part-B
Answer ALL sub questions from Part-A
Answer any THREE questions from Part-B
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PART–A *(22 Marks)*

1. a) Comment on the effect of nano scale dimension of vibration. [3]
   b) Give a brief note on the electronic structure of nano materials. [3]
   c) List the major steps involved in LIGA process. [4]
   d) What is the capability of STM in characterization of nano structures? [4]
   e) What is nano crystalling diamond film? [4]
   f) List out challenges faced by Nano technology. [4]

PART–B *(3x16 = 48 Marks)*

2. a) What are reciprocal lattice vectors? Explain the concept of band gap. [8]
   b) Give a note on crystal planes. [8]

3. a) Discuss the physical and chemical properties of nano materials. [8]
   b) Describe in detail the role of nano scale dimension on the structural and optical properties of materials. [8]

4. a) Explain in detail the synthesis procedure of nano materials by Sol-Gel on high energy ball milling process with appropriate examples. [8]
   b) Describe CVD with a neat sketch. [8]

5. a) Explain the applications of TEM, AFM and SEM in the characterization of materials. [8]
   b) Explain in detail the principle, working and application of Raman Spectroscopy for the evaluation of properties of nano materials and nano structures. [8]

6. a) Describe in detail the synthesis procedure of carbon nano tubes. [8]
   b) Discuss the properties of CNT. Also give the applications of CNTs. [8]

7. Make short note on :
   a) Nano medicines
   b) Nano biotechnology [16]

Code No: **RT41036** **R13** **Set No. 2**

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NANO TECHNOLOGY

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Time: 3 hours **Max. Marks: 70**

Question paper consists of Part-A and Part-B
Answer ALL sub questions from Part-A
Answer any THREE questions from Part-B
*****

PART–A *(22 Marks)*

1. a) How are nano structures classified? [3]
   b) What is energy band structure of nano materials? [3]
   c) Write a brief note on high energy ball milling process. [4]
   d) On which concept the Raman spectroscopy is working? [4]
   e) What is the significance of graphene in CNT? [4]
   f) List out the applications of Nano technology in surface engineering. [4]

PART–B *(3x16 = 48 Marks)*

2. a) What is Nano technology? Enumerate the challenges of Nano technology. [8]
   b) Give a note on crystal structures. [8]

3. a) Describe the effects of nano scale dimensions on various properties of nano structures. [8]
   b) Explain in detail opto electonic properties of nano structured materials. [8]

4. a) With a suitable sketch, explain the photo lithography process. [8]
   b) Justify silicon as substrate material and mention its mechanical properties. [8]

5. a) Explain the principle of functioning of scanning electron microscopy. [8]
   b) Narrate the working of scanning tunneling microscope and mention its uses. [8]

6. a) Describe the mechanical, electrical and optical properties of CNTs. [8]
   b) Explain the filling of nano tube and also the mechanism of growth of carbon nano tubes. [8]

7. a) List out applications of Nano materials and neatly explain them**.** [8]
   b) Briefly explain about quantum dot. [8]

Code No: **RT41036** **R13** **Set No. 3**

IV B.Tech I Semester Regular/Supplementary Examinations, Oct/Nov - 2018

NANO TECHNOLOGY

(Common to Aeronautical Engineering, Electrical and Electronics Engineering and Mechanical Engineering)

Time: 3 hours **Max. Marks: 70**

Question paper consists of Part-A and Part-B
Answer ALL sub questions from Part-A
Answer any THREE questions from Part-B
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PART–A *(22 Marks)*

1. a) Write different modes of classification of Nano materials. [3]
   b) Name any two parameters considered to characterize nano materials. [3]
   c) What is scanning tunneling microscopy? [4]
   d) What are the different types of nano material synthesis process? [4]
   e) List out any four advantages of solid carbon source based production technique. [4]
   f) List out the Applications of Nanotechnology in electronics. [4]

PART–B *(3x16 = 48 Marks)*

2. a) Define energy bands. Explain the energy band structure in metals, semi conductors and insulators. [8]
   b) Give a note on crystal dimensions. [8]

3. a) What are the effects of nano scale dimension on Mechanical properties? Discuss briefly. [8]
   b) Discuss the electrical and optical properties of nano materials. [8]

4. a) Explain the various steps in plasma synthesis of nano materials. [8]
   b) What are the significance of top down and bottom up approaches? Give examples for each process. [8]

5. a) Explain the features and working of confocal LASER scanning microscope. [8]
   b) Briefly discuss about angle resolved photoemission spectroscopy. [8]

6. a) Explain the synthesis and purification methods of CNTs. [8]
   b) Give the applications of CNTs. [8]

7. a) Discuss the applications of Nano technology in energy and environment. [8]
   b) Discuss the applications of Nano structured thin films. [8]

Code No: **RT41036** **R13** **Set No. 4**

IV B.Tech I Semester Regular/Supplementary Examinations, Oct/Nov - 2018

NANO TECHNOLOGY

(Common to Aeronautical Engineering, Electrical and Electronics Engineering and Mechanical Engineering)

Time: 3 hours **Max. Marks: 70**

Question paper consists of Part-A and Part-B
Answer ALL sub questions from Part-A
Answer any THREE questions from Part-B
*****

PART–A *(22 Marks)*

1.	a)	Define Nano technology.	[3]
	b)	What is size effect on nano materials and their properties?	[3]
	c)	Mention the concept used in top down process and bottom up process.	[4]
	d)	Write a brief note on the application of Raman spectroscopy for the characterization of nano structures.	[4]
	e)	Explain the following: (i) Carbon fullerenes (ii) Carbon Nano tubes	[4]
	f)	Write short note on Nano medicines.	[4]

PART–B *(3x16 = 48 Marks)*

2.	a)	Discuss the classification of nano materials.	[8]
	b)	Explain molecular nano technology in brief.	[8]
3.	a)	Describe in detail, the role of nano scale dimension on the magnetic and electron ic properties of materials.	[8]
	b)	Explain how the thermal properties of nano materials can be evaluated using a suitable characterization process.	[8]
4.	a)	Describe PVD with a neat sketch.	[8]
	b)	Briefly discuss about hydro thermal growth.	[8]
5.	a)	Explain in detail, how TEM can be used to characterize the nano materials and nano structures.	[8]
	b)	Describe the principle and different working modes of AFM and its advantages.	[8]
6.	a)	Discuss any one Characterization of carbon allotropes.	[8]
	b)	Explain the synthesis of diamond.	[8]
7.	a)	Explain the targeted drug delivery system using nano particles.	[8]
	b)	Discuss the applications of Nano technology in material science.	[8]