SRM VALLIAMMAI ENGINEERING COLLEGE

(An Autonomous Institution)

SRM Nagar, Kattankulathur – 603 203

DEPARTMENT

OF

ELECTRICAL AND ELECTRONICS ENGINEERING

QUESTION BANK

VI SEMESTER

1920001 – FUNDAMENTALS OF NANO SCIENCE

Regulation – 2019

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Prepared by

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SUBJECT : 1920001 - FUNDAMENTALS OF NANO SCIENCE
SEM / YEAR : VI / III

UNIT I - INTRODUCTION			
Nano scale Science and Technology- Implications for Physics, Chemistry, Biology and Engineering-Classifications of nanostructured materials- Nano particles- quantum dots, nanowires-ultra-thin films multi-layered materials. Length Scales involved and effect on properties: Mechanical, Electronic, Optical, Magnetic and Thermal properties. Introduction to properties and motivation for study (qualitative only).			
PART - A			
S.No	**Questions**	**BT Level**	**Competence**
1.	Name any four types of nanostructured materials.	**BTL 1**	**Remember**
2.	What do you mean by NANO?	**BTL 4**	**Analyze**
3.	List the application of quantum dots.	**BTL 1**	**Remember**
4.	Define nanomaterials.	**BTL 1**	**Remember**
5.	What do you mean by nanoparticles?	**BTL 2**	**Understand**
6.	Define Nanoscience and Nanotechnology.	**BTL 1**	**Remember**
7.	What are one dimensional nanomaterial?	**BTL 4**	**Analyze**
8.	Give the applications of nanowires.	**BTL 2**	**Understand**
9.	How does the mechanical property of material vary in nano regime?	**BTL 4**	**Analyze**
10.	What do you mean by nanowires?	**BTL 2**	**Understand**
11.	Define Quantum dots.	**BTL 1**	**Remember**
12.	Why do nano particles exhibit a low melting point when compared to the respective bulk materials?	**BTL 2**	**Understand**
13.	Write any four properties of nanowires.	**BTL 6**	**Create**
14.	Identify any three applications of thin films.	**BTL 3**	**Apply**
15.	Demonstrate any four day to day live commercial applications of nanotechnology.	**BTL 3**	**Apply**
16.	Nano particle of gold is purple in colour. Justify.	**BTL 5**	**Evaluate**
17.	What is meant by multi layered materials?	**BTL 3**	**Apply**
18.	How does the optical property of material vary in nano regime?	**BTL 5**	**Evaluate**
19.	Generalize the effects of length scale of nanomaterials on magnetic properties.	**BTL 6**	**Create**
20.	Why do nano particles exhibit a low melting point when compared to the respective bulk materials?	**BTL 1**	**Remember**
21.	Classify the nano structured materials.	**BTL 2**	**Understand**
22.	Examine about the types of nano wires.	**BTL 3**	**Apply**
23.	Analyze the various conditions involved in synthesis of Nano Wires.	**BTL 4**	**Analyze**
24.	Express 5nm in terms of equivalent μm	**BTL 5**	**Evaluate**
PART B			
1.	Describe about the implications of Nano science in the field of **(i)** Physics **(7)** **(ii)** Chemistry. **(6)**	**BTL 1**	**Remember**

2.	Describe the effects of nanotization on the properties of materials. **(13)**	**BTL 1**	**Remember**
3.	Distinguish the properties and synthesis methods of Nano particles and Quantum dots. **(13)**	**BTL 2**	**Understand**
4.	Describe about the implications of Nano science and technology for **(i)** Biology **(7)** **(ii)** Engineering. **(6)**	**BTL 1**	**Remember**
5.	Discuss in detail about the following properties of Nano particles. **(i)** Mechanical **(7)** **(ii)** Electronics. **(6)**	**BTL 2**	**Understand**
6.	Generalize the effects of length scales involved and effect on properties in nanoparticles. **(13)**	**BTL 6**	**Create**
7.	**(i)** Analyze term Nano phase materials. **(3)** **(ii)**Explain how the physical properties vary with geometry**. (10)**	**BTL 4**	**Analyze**
8.	Discuss in detail about the Optical and Thermal properties of Nano particles **(13)**	**BTL 2**	**Understand**
9.	Explain the properties, synthesis methods and applications of **(i)** Ultra-thin films and **(7)** **(ii)**Multi-layered materials. **(6)**	**BTL 5**	**Evaluate**
10.	Describe the plasma arcing method of producing Nano Particles. **(13)**	**BTL 3**	**Apply**
11.	List applications of Nano materials in various Fields. Also explain the method of producing Nano materials using physical vapour deposition techniques. **(13)**	**BTL 4**	**Analyze**
12.	List the factors responsible for change of properties of nano scale material from that of the bulk material. **(13)**	**BTL 1**	**Remember**
13.	Explain the different ways of classifying nanomaterials with examples. **(13)**	**BTL 3**	**Apply**
14.	Explain with necessary diagrams the synthesis of nanomaterials using Chemical Vapour deposition. **(13)**	**BTL 4**	**Analyze**
15.	Summarize the steps involved in synthesis of nanomaterials using Sol-gel method. **(13)**	**BTL 2**	**Understand**
16.	Discuss about the properties involved in nanoparticles**.(13)**	**BTL 3**	**Apply**
17.	With a neat Sketch, Explain the synthesis of Nano wires**. (13)**	**BTL 4**	**Analyze**
	PART C		
1.	Discuss about nanomaterials in science and engineering fields**. (15)**	**BTL 6**	**Create**
2.	Elaborate present and future applications of nano particles in industry. **(15)**	**BTL 6**	**Create**
3.	Discuss about the classification of nanostructured materials with suitable examples. **(15)**	**BTL 5**	**Evaluate**
4.	Why surface area/volume ratio is very large for nano particles compared to bulk materials? Highlight the effect of surface area increase on mechanical and optical properties. **(15)**	**BTL 5**	**Create**

5.	Does the material change its properties at nano scale compared to their bulk material?.Elaborate it **(15)**	**BTL 5**	**Create**

UNIT II - GENERAL METHODS OF PREPARATION			
Bottom-up Synthesis-Top-down Approach: Co-Precipitation, Ultra sonication, Mechanical Milling, Colloidal routes, Self-assembly, Vapour phase deposition, MOCVD, Sputtering, Evaporation, Molecular Beam Epitaxy, Atomic Layer Epitaxy, MOMBE			
PART - A			
S.No	**Questions**	**BT Level**	**Competence**
1.	Differentiate bottom-up and Top-down approach.	**BTL 2**	**Understand**
2.	Point out the advantages of top-down approach.	**BTL 4**	**Analyze**
3.	Analyse self-assembly of nanostructures.	**BTL 4**	**Analyze**
4.	State the principle of bottom-up approach with an example.	**BTL 1**	**Remember**
5.	Generalize the application of self assembly materials.	**BTL 6**	**Create**
6.	What do you meant by Ultra sonication?	**BTL 2**	**Understand**
7.	List any four day to day live commercial applications of nanotechnology.	**BTL 1**	**Remember**
8.	When does contamination arise in Attritor milling?	**BTL 1**	**Remember**
9.	Identify the category to which sol-gel, MBE, ECAP and laser ablation belong to.	**BTL 5**	**Evaluate**
10.	Classify the vapour phase deposition methods.	**BTL 3**	**Apply**
11.	What do you mean by colloidal routes?	**BTL 2**	**Understand**
12.	Classifying the types of Sputtering.	**BTL 3**	**Apply**
13.	What is the principle of mechanical milling?	**BTL 1**	**Remember**
14.	Why bottom up approaches will be preferred for nano material fabrication?	**BTL 4**	**Analyze**
15.	List the applications of milling.	**BTL 1**	**Remember**
16.	Compare the term MBE and MOMBE.	**BTL 5**	**Evaluate**
17.	Classify the different types of milling.	**BTL 4**	**Analyze**
18.	Illustrate the principle of atomic layer Epitaxy.	**BTL 3**	**Apply**
19.	What is meant by co-precipitation?	**BTL 2**	**Understand**
20.	Define sputtering.	**BTL 1**	**Remember**
21.	Write the advantages and disadvantages of MOCVD.	**BTL 6**	**Create**
22.	Write the advantages of CVD method?	**BTL 2**	**Understand**
23.	Analyze which method of process mostly used for synthesis of nano materials.	**BTL 3**	**Apply**
24.	No safety precautions are needed for MBE process. Justify.	**BTL 5**	**Evaluate**
PART B			
1.	Explain in detail about the working of mechanical milling process and mention its merits and demerits. **(13)**	**BTL 4**	**Analyze**
2.	Discuss the working of molecular beam epitaxy for producing nano materials. **(13)**	**BTL 2**	**Understand**
3.	**(i)**Differentiate PVD and CVD. **(3)** **(ii)**Write notes on Sputtering and mention its advantages and drawbacks. **(10)**	**BTL 4**	**Analyze**
4.	Discuss in detail about Atomic Layer Epitaxy in detail. **(13)**	**BTL 2**	**Understand**
5.	(i) Explain any two methods of chemical synthesis of Nanomaterials. **(8)** (ii) List their advantages and disadvantages**. (5)**	**BTL 1**	**Remember**

6.	Enumerate the different chemical methods of synthesis of nanomaterials and state its advantages and disadvantages. **(13)**	**BTL 1**	**Remember**
7.	Explain the working of MOCVD in detail. **(13)**	**BTL 4**	**Analyze**
8.	Explain the working of e-beam evaporation with neat sketch. **(13)**	**BTL 5**	**Evaluate**
9.	Illustrate the scheme of the formation of agglomerates from colloidal sols and structural model of Nanomer of inorganic & organic Nanocomposite. (**13)**	**BTL 3**	**Apply**
10.	**(i)** Generalize the schematic representation of electron beam deposition system. **(7)** **(ii)**Create the difference between gas condensation process and vapour condensation process employed for synthesis of Nano powders. **(6)**	**BTL 6**	**Create**
11.	Illustrate in detail about Ultrasonication process. **(13)**	**BTL 3**	**Apply**
12.	Define colloidal routes. Describe in detail about fabrication nanoparticles by simple colloidal process.**(13)**	**BTL 1**	**Remember**
13.	Describe about top down approach in synthesis of nano materials. **(13)**	**BTL 1**	**Remember**
14.	Discuss about the following methods with schematic diagram of **(i)** RF sputtering**. (7)** **(ii)** Reactive sputtering **(6)**	**BTL 2**	**Understand**
15.	With a neat schematic explain in detail about chemical vapour deposition technique. Also mention its advantages and disadvantages. **(13)**	**BTL 2**	**Understand**
16.	Describe in detail about strategies involved in the synthesis of self-assembly. **(13)**	**BTL 3**	**Apply**
17.	Describe the MBE growth technique with a sketch. **(13)**	**BTL 4**	**Analyze**
	PART C		
1.	Explain about thermal evaporation in general methods of preparation of nano materials. **(15)**	**BTL 5**	**Evaluate**
2.	Explain the working of MOMBE process with neat sketch. **(15)**	**BTL 6**	**Create**
3.	Discuss the role of bottom up approach in nano technology. **(15)**	**BTL 6**	**Create**
4.	Explain the applications of nano powders in industry.**(15)**	**BTL 5**	**Evaluate**
5.	Explain the bottom –up approach towards synthesis of Nano structured materials. Discuss in detail about any two methods. **(15)**	**BTL 5**	**Evaluate**

UNIT III - NANOMATERIALS
Nanoforms of Carbon - Buckminster fullerene- graphene and carbon nanotube, Single wall carbon Nanotubes (SWCNT) and Multi wall carbon nanotubes (MWCNT)- methods of synthesis(arc-growth, laser ablation, CVD routes, Plasma CVD), structure-property Relationships applications- Nano metal oxides-ZnO, TiO2,MgO, ZrO2, NiO, nanoalumina, CaO, AgTiO2, Ferrites, Nanoclays functionalization and applications-Quantum wires, Quantum dots-preparation, properties and applications.

PART – A			
S.No	**Questions**	**BT Level**	**Competence**
1.	Define fullerene.	**BTL 1**	**Remember**
2.	How are carbon nanotubes classified?	**BTL 4**	**Analyze**
3.	What are the methods adopted for producing nano materials?	**BTL 4**	**Analyze**
4.	List any four properties of Carbon nanotubes.	**BTL 1**	**Remember**
5.	Define graphene.	**BTL 1**	**Remember**
6.	Differentiate single wall and multi wall carbon nanotubes.	**BTL 4**	**Analyze**
7.	Differentiate carbon nanotubes from bucky balls.	**BTL 4**	**Analyze**
8.	Give the features of Nano metal oxides.	**BTL 2**	**Understand**
9.	Illustrate the principle of plasma CVD involved in Nano materials.	**BTL 3**	**Apply**
10.	What do you mean by CVD routes in nanotubes?	**BTL 5**	**Evaluate**
11.	Which methods involved producing Tio2 nanoparticles?	**BTL 1**	**Remember**
12.	Give a brief note on the applications of laser ablation.	**BTL 5**	**Evaluate**
13.	Illustrate the features of CaO Nano materials	**BTL 3**	**Apply**
14.	Define ferrites.	**BTL 1**	**Remember**
15.	State the applications of ferrites.	**BTL 1**	**Remember**
16.	It is desired to synthesize titania nanoparticles of about 2-3 nm in size. Which technique would you choose and also give reason for it.	**BTL 6**	**Create**
17.	What do you mean by nanoalumina metal oxides?	**BTL 2**	**Understand**
18.	Nano-gold no longer glitters with a golden yellow metallic luster. Why?	**BTL 3**	**Apply**
19.	Give a brief note on applications of nanoclays.	**BTL 6**	**Create**
20.	Distinguish between Quantum wires and Quantum dots.	**BTL 2**	**Understand**
21.	Give a brief note on Carbon nanotube.	**BTL 2**	**Understand**
22.	Draw the schematic of Carbon Arc method.	**BTL 3**	**Apply**
23.	What do you understand by Nanoclays?	**BTL 4**	**Analyze**
24.	Write a note on Buckminster fullerenes.	**BTL 5**	**Evaluate**
PART – B			
1.	Explain three different structure of SWCNT and different types of defect in it. **(13)**	**BTL 4**	**Analyze**
2.	Discuss in detail about quantum wires - its preparation, properties and applications. **(13)**	**BTL 6**	**Create**
3.	**(i)** Discuss about the synthesis of CaO in brief. **(7)** **(ii)** Write short note on Buckminster fullerene. **(6)**	**BTL 2**	**Understand**
4.	Describe the principle and different methods of synthesis in nanoparticles. **(13)**	**BTL 1**	**Remember**
5.	Explain the synthesis of the following in brief: **a)** NiO. **(7)** **b)** $AgTiO_2$. **(6)**	**BTL 2**	**Understand**
6.	Explain in detail about Arc growth method. (13)	**BTL 5**	**Evaluate**
7.	Give a detailed account of the nano forms of Carbon. **(13)**	**BTL 3**	**Apply**
8.	Discuss about the synthesis of ZrO_2 in brief. **(13)**	**BTL 2**	**Understand**
9.	Discuss in detail about quantum dots - its preparation, properties and applications. **(13)**	**BTL 1**	**Remember**
10.	Explain the structure-property relationship of nanometal oxides with an example. **(13)**	**BTL 4**	**Analyze**

11.	Describe the different types of ferrite structure with suitable diagrams. **(13)**	**BTL 1**	**Remember**
12.	Illustrate the structure-property relationship of nanoalumina with an example**.** **(13)**	**BTL 3**	**Apply**
13.	Describe preparation, properties and applications of nanoclays. **(13)**	**BTL 1**	**Remember**
14.	Explain about **a)** CVD routes. **(7)** **b)** Plasma CVD. **(6)**	**BTL 4**	**Analyze**
15.	Discuss about the synthesis of MnO in brief. **(13)**	**BTL 2**	**Understand**
16.	Illustrate about Carbon Nanotube fabrication using Laser ablation technique. **(13)**	**BTL 3**	**Apply**
17.	Explain in detail any two methods of Nano metal oxides. **(13)**	**BTL 4**	**Analyze**
	PART C		
1.	Explain the purification of Indian clay in detail. **(15)**	**BTL 5**	**Evaluate**
2.	Discuss about the synthesis of ZnO in brief. **(15)**	**BTL 6**	**Create**
3.	Discuss about the synthesis of TiO_2 with a block diagram. **(15)**	**BTL 6**	**Create**
4.	Explain different fabrication methods for carbon nanotubes. **(15)**	**BTL 5**	**Evaluate**
5.	In detail discuss the structure-property relationship of nanometal oxides with an example**.** **(15)**	**BTL 5**	**Evaluate**

UNIT IV- CHARACTERIZATION TECHNIQUES			
X-ray diffraction technique, Scanning Electron Microscopy - environmental techniques, Transmission Electron Microscopy including high-resolution imaging, Surface Analysis techniques- AFM, SPM,STM, SNOM, ESCA, SIMS-Nano indentation			
PART – A			
S.No	**Questions**	**BT Level**	**Competence**
1.	Assess the merits of X-Ray diffraction technique.	**BTL 5**	**Evaluate**
2.	What do you mean by primary, secondary, backscattered electrons in relation with SEM?	**BTL 3**	**Apply**
3.	What is the principle of SEM?	**BTL 1**	**Remember**
4.	Evaluate magnifying power.	**BTL 5**	**Evaluate**
5.	Mention the application of atomic force microscope.	**BTL 4**	**Analyze**
6.	What is x-ray diffraction?	**BTL 1**	**Remember**
7.	List the modes of SPM.	**BTL 1**	**Remember**
8.	Which mode of AFM is preferred to characterize delicate Nano surfaces? Why?	**BTL 4**	**Analyze**
9.	Differentiate SEM from TEM.	**BTL 2**	**Understand**
10.	Write the principle of Scanning Tunneling Microscopy.	**BTL 2**	**Understand**
11.	Write the principle of Scanning Probe Microscopy.	**BTL 2**	**Understand**
12.	Illustrate the importance of high resolution imaging in nanomaterial characterization.	**BTL 3**	**Apply**
13.	What do you mean by elastic and inelastic scattering of electrons?	**BTL 4**	**Analyze**
14.	List the applications of SNOM.	**BTL 1**	**Remember**
15.	What is the difference between STM and AFM?	**BTL 2**	**Understand**
16.	Draw the schematic diagram of SIM instrumentation.	**BTL 6**	**Create**
17.	Illustrate the use of Electron Microscopy.	**BTL 3**	**Apply**

18.	Define the term 'Nanoindentation'.	**BTL 1**	**Remember**
19.	Define the term SNOM and also list their modes.	**BTL 1**	**Remember**
20.	Write the principle and application of ESCA.	**BTL 6**	**Create**
21.	What is Nano indentation?	**BTL 2**	**Understand**
22.	Draw the photo emission Spectra of ESCA.	**BTL 3**	**Apply**
23.	Mention the advantages of SEM.	**BTL 4**	**Analyze**
24.	Write the formula for magnifying power.	**BTL 5**	**Evaluate**
	PART B		
1.	Explain the working of Scanning Electron Microscopy (SEM) with a neat sketch. **(13)**	**BTL 4**	**Analyze**
2.	How do you characterize a material with Transmission Electron Microscope (TEM) with a neat sketch? **(13)**	**BTL 6**	**Create**
3.	Discuss in detail the principle and working of SEM with a neat sketch. **(13)**	**BTL 2**	**Understand**
4.	Explain the working of Scanning Tunnelling Microscopy with a neat sketch. **(13)**	**BTL 4**	**Analyze**
5.	Examine TEM including high resolution imaging. **(13)**	**BTL 3**	**Apply**
6.	Explain the principle, working and application of XRD with a neat diagram. **(13)**	**BTL 4**	**Analyze**
7.	**(i)** Compare and contrast AFM and SPM . **(10)** **(ii)**Predict the environmental techniques for nano material **c**haracterization. **(3)**	**BTL 2**	**Understand**
8.	Explain the working of ESCA with neat sketch. **(13)**	**BTL 1**	**Remember**
9.	Discuss the principle, working and applications of nanoindentation with a neat diagram. **(13)**	**BTL 1**	**Remember**
10.	Explain the working of SIMS with neat sketch. **(13)**	**BTL 2**	**Understand**
11.	Describe the principle and working of AFM with a sketch. **(13)**	**BTL 1**	**Remember**
12.	Describe the construction and working of Scanning Probe Microscopy (SPM) with a neat sketch. **(13)**	**BTL 1**	**Remember**
13.	Demonstrate the operation of Nano indentation using AFM and enumerate its applications. **(13)**	**BTL 3**	**Apply**
14.	**(i)** Discuss the basic principle, instrumentation and working of SNOM. **(10)** **(ii)**Discriminate merits and demerits of SNOM from other techniques. **(3)**	**BTL 5**	**Evaluate**
15.	Brief about any two surface analysis technique. **(13)**	**BTL 2**	**Understand**
16.	Illustrate and explain about the structure of Typical powder Diffractometer. **(13)**	**BTL 3**	**Apply**
17.	Explain about the electron tunnelling phenomenon used for surface analysis. **(13)**	**BTL 4**	**Analyze**
	PART C		
1.	Explain the same preparation and the use of TEM in the characterization of nanomaterials. **(15)**	**BTL 5**	**Evaluate**
2.	Explain high resolution of transmission electron microscopy with schematic diagram. **(15)**	**BTL 5**	**Evaluate**
3.	Explain an application which uses surface analysis techniques. **(15)**	**BTL 6**	**Create**
4.	Discuss the importance of electron microscopy in characterization of nano materials in brief. **(15)**	**BTL 6**	**Create**
5.	Brief about Nano indentation and explain its application in any one field. **(15)**		

UNIT V- APPLICATIONS			
Nano InfoTech: Information storage- Nano computer, molecular switch, super chip, Nano crystal, Nano biotechnology: Nano probes in medical diagnostics and biotechnology, Nano medicines, Targeted drug delivery, Bio imaging - Micro Electro Mechanical Systems (MEMS), Nano Electro Mechanical Systems (NEMS)- Nanosensors, nano crystalline silver for bacterial inhibition, Nanoparticles for sun barrier products - In Photostat, printing, solar cell, battery			
PART – A			
S.No	**Questions**	**BT Level**	**Competence**
1.	How Nano science is used for information storage?	**BTL 3**	**Apply**
2.	What is Nano computer?	**BTL 3**	**Apply**
3.	Analyze the role of nanotechnology in targeted drug delivery.	**BTL 4**	**Analyze**
4.	What is super chip?	**BTL 3**	**Apply**
5.	Define nano crystal.	**BTL 1**	**Remember**
6.	Analyze the role of nanoparticles in bio imaging.	**BTL 4**	**Analyze**
7.	Summarize the advantages of nanoprobes in medical field.	**BTL 6**	**Create**
8.	What do you mean by targeted drug delivery?	**BTL 3**	**Apply**
9.	Define NEMS.	**BTL 1**	**Remember**
10.	Differentiate between MEMS and NEMS.	**BTL 4**	**Analyze**
11.	How Nano silver inhibits the bacterial action?	**BTL 5**	**Evaluate**
12.	List nano based drug delivery vehicles.	**BTL 1**	**Remember**
13.	List the applications of NEMS.	**BTL 1**	**Remember**
14.	What is the role of Nano science in Solar cell?	**BTL 1**	**Remember**
15.	Write the fabrication methods of MEMS.	**BTL 6**	**Create**
16.	Give any two applications of solar cell.	**BTL 2**	**Understand**
17.	What is solar cell?	**BTL 1**	**Remember**
18.	Compare molecular crystal memory and molecular switch.	**BTL 2**	**Understand**
19.	Define Nano computers.	**BTL 2**	**Understand**
20.	What are nanosensors? Give example.	**BTL 2**	**Understand**
21.	Write the principle of solar cell.	**BTL 2**	**Understand**
22.	Mentions the applications of nano probe.	**BTL 3**	**Apply**
23.	Summarize the need for data storage device.	**BTL 4**	**Analyze**
24.	Write about molecular switch.	**BTL 5**	**Evaluate**
PART B			
1.	What is Nano InfoTech and explain in brief with neat sketch. **(13)**	**BTL 2**	**Understand**
2.	Explain the following terms with neat sketch: **(i)**Nano crystal memory **(7)** **(ii)**Molecular switch **(6)**	**BTL 3**	**Apply**
3.	Give detail about Bio imaging using nano particles with neat sketch. **(13)**	**BTL 6**	**Create**
4.	Discuss various applications of nanosensors in biotechnology. **(13)**	**BTL 1**	**Remember**
5.	Explain the role of nanoparticles in medical field. **(13)**	**BTL 3**	**Apply**
6.	Discuss the role of nanotechnology in the fabrication of sun barrier products and antibacterial products. **(13)**	**BTL 4**	**Analyze**
7.	Discuss in detail about MEMS and NEMS and compare it. **(13)**	**BTL 2**	**Understand**

8.	Explain about the term **(i)** Nano computer. **(7)** **(ii)** Superchip. **(6)**	**BTL 4**	**Analyze**
9.	Explain the significance of nanobiotechnology? Discuss briefly the use of nanoprobes in medical diagnostics. **(13)**	**BTL 1**	**Remember**
10.	Explain Nano science in **(i)**Photostat. **(7)** **(ii)**Printing. **(6)**	**BTL 4**	**Analyze**
11.	**(i)** How information is stored using Nano techniques. **(10)** **(ii)**Why Nanoparticles are selected for Nano medicines.**(3)**	**BTL 3**	**Apply**
12.	Explain the designing and uses of nanosensors with suitable examples. **(13)**	**BTL 1**	**Remember**
13.	Discuss the application of nano technology in the field of Solar cells. **(13)**	**BTL 5**	**Evaluate**
14.	Explain targeted drug delivery with neat sketch. **(13)**	**BTL 2**	**Understand**
15.	Brief about the Nano medicines and Targeted drug delivery**.** **(13)**	**BTL 2**	**Understand**
16.	Discuss the use of nanoprobes in diagnostic of cancer. **(13)**	**BTL 3**	**Apply**
17.	Elaborate the significance of MEMS with any applications. **(13)**	**BTL 4**	**Analyze**
	PART C		
1.	Give the role of Nano probes in Nano biotechnology. (**15)**	**BTL 6**	**Create**
2.	Explain how Nano silver crystalline used for Bacterial inhibition. **(15)**	**BTL 6**	**Create**
3.	Discuss the recent developments in the usage of quantum dots in drug delivery and sensor applications. **(15)**	**BTL 6**	**Create**
4.	Discuss the applications of nano technology in the field of Sensor. **(15)**	**BTL 6**	**Create**
5.	Discuss the application of Micro Electro Mechanical Systems (MEMS) of your choice. **(15)**	**BTL 6**	**Create**