SRM INSTITUTE OF SCIENCE AND TECHNOLOGY, RAMAPURAM CAMPUS, CHENNAI

DEPARTMENT OF PHYSICS

QUESTION BANK

18PYB103J- SEMICONDUCTOR PHYSICS

UNIT 5

PART A-ONE MARK QUESTIONS

QUESTION NO.	QUESTIONS
1	Nano structures have size in between……. A. 1 and 100 A^0 **B. 1 and 100 nm** C. 100 and 1000 nm D. 100 and 1000A^0
2	The probe of scanning tunneling microscope is as sharp as…… **A. An atom at the tip** B. Many atoms at the tip C. A needle D. Knife
3	Nano particles are special mainly because of their……. **A. Surface area** B. Surface charge C. Volume D. Force
4	The colour of the nano gold particle is…….. A. Yellow B. Orange C. Red **D. Variable**
5	In a quantum wire, the material size is reduced……. A. In three directions **B. In two directions** C. In one directions D. In zero directions
6	Carbon nanotube reactivity is related to……. A. Volume B. Length **C. Diameter**

	D. Area
7	Carbon nano tubes are the…… form of graphite A. Cylinder B. Cube C. Embeded **D. Sheet**
8	In how many methods the CNT can be prepared? A. 1 B. 2 C. 3 **D. 4**
9	In CVD chamber, the precursors are introduced to the reaction chamber in the …….. state A. Liquid B. Solid **C. Gaseous** D. Semi solid
10	X-ray Diffraction methods are not used to identify the physical properties of which of the following? A. Metals **B. Liquids** C. Polymeric materials D. Solids ANSWER: B
11	Which of the following is used in electron microscope? A. Electron beams B. Magnetic fields C. Light waves **D. Electron beams and magnetic fields**
12	Which among the following helps us in getting a 3D picture of the specimen? A. TEM **B. SEM** C. Compound microscope D. Simple microscope
13	The secondary electrons radiated back in scanning microscope is collected by? A. Specimen **B. Anode** C. Vacuum chamber D. Cathode
14	The resolving power of TEM is derived from……. **A. Electrons** B. Specimens C. Power

	D. Ocular system
15	AFM stands for…… A. Auto focusing microscope B. Antenna focusing microscope **C. Atomic force microscope** D. Atomic focusing microscope
16	The physical parameter that is probed in AFM resulting from different interactions is ---------- A. Charge **B. Force** C. Potential D. Field
17	A…… is an interface that occurs between two layers or regions of dissimilar semiconductors **A. Hetero junction** B. Homo junction C. PN junction D. Barrier
18	……. is then example for hetero junction materials. A. Ge B. Ga C. Si **D. GaAlAs**
19	Exciton can move freely in two directions only. **A. Quantum well** B. Quantum wire C. Quantum dot D. Quantum spin
20	Tensile strength of grapheme exceeds…… **A. 1TPa** B. 2TPa C. 5TPa D. 0.5TPa

QUESTION NO.	QUESTIONS
21	Carbon nano tubes are the sheet form of graphite about….. A. 0.1 nm B. 0.2 nm C. 0.3 nm **D. 0.4 nm**
22	To grow single rather than multi walled nanotubes……. A. Require semi metal catalyst B. Require non metal catalyst **C. Require metal catalyst** D. Does not require any catalyst
23	In PVD chamber, the precursors are introduced to the reaction chamber in the …….. state A. Liquid **B. Solid** C. Gaseous D. Semi solid
24	X-Ray diffraction techniques provide ……. information about the compounds present in a solid sample A. Quantitative B. Qualitative **C. Quantitative and Qualitative** D. Either quantitative or qualitative
25	Bands of alternating light and dark lines that are formed by inelastic scattering interactions that are related to atomic spacing in the specimen are called …….. A. Auger bands B. Bragg bands C. Lorentz bands **D. Kakuchi bands**
26.	Electrons are caused by the de-energization of the specimen atom after a secondary electron is produced…….. **A. Auger** B. Bragg

	C. Lorentz D. Kakuchi
27.	The resolving power of a …….. electron microscope derived from the electrons that pass through the specimen. **A. TEM** B. SEM C. AFM D. XRD
28.	AFM tip should have a radius of curvature of…… A. > 20-50 nm **B. < 20-50 nm** C. 100 nm D. 100 mm-150 mm
29.	The properties like dispersibility, conductivity, etc changes on varying the …… A. Size B. Composition **C. Surface properties** D. Electric field
30.	Which of the following is an example of top-down approach for the preparation of nanomaterials? A. Gas phase agglomeration B. Molecular self - assembly **C. Mechanical grinding** D. Molecular beam epitaxy

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31	The four types of artificial nanomaterials are …. A. Carbon – based, non – metallic, composites and ceramics B. Carbon – based, metallic, composites and ceramics C. Carbon – based, non – metallic, composites and dendrimers D. **Carbon – based, metallic, composites and dendrimers**
32.	A nanometer sized conductive island is connected between two contacts via tunnel barriers, in the presence of a third gate electrode. Such a device is often called a single electron transistor, This is because at low bias voltage, A. It can be deliver only a single electron of current/second B. It can deliver an electron flow defined with a precision better than 1 electron **C. The Charge on the islands is defined with a precision better than 1electron** D. The charge on the island is exactly 1 electron
33	The kinetic energy of electrons in monolayer graphene is proportional to….. **A. The value of wavevector, k** B. The square value of wavevector, k2 C. The value of electron effective mass, m* D. The reciprocal value of electron effective mass, 1/m*
34.	CNTs process a very high Young's modulus, due to A. 4 valence electronic bonds of carbon atoms that equally share stress in any directions B. A perfect construction in tubular form **C. Covalent sp2 bonds formed between the individual carbon atoms**

	D. Delocalized π- electrons that travel across several carbon atoms to increase strength ANSWER: C
35.	A plasma assisted CVD process **A. Is made at lower temperature than a CVD process** B. Is made at higher temperature than a CVD process C. Is based on the sputtering of a target D. Is based on the decomposition of gaseous precursors
36.	When Scanning tunneling microscopy reveals periodic structures with atomic dimensions, what is exactly seen? A. The atomic lattice **B. Electronic density of states modulations associated to the atomic lattice** C. Fermi level modulations associated to the atomic lattice D. The electron diffraction pattern associated to the atomic lattice

PART – B

1. Discuss about quantum well, quantum wire and quantum dot.
2. Write the applications of AFM.
3. Write any four Applications of Powder X-ray diffraction method.
4. Write the applications of SEM and TEM.
5. Write a short note on CNT.
6. Write the properties of CNT.
7. Write any four Applications of CNT.

PART -C

1. Explain the working principle of Scanning Electron Microscopy(SEM).

2. Explain the working principle of Transmission Electron Microscopy(TEM).

3. Write the principle of Atomic Force Microscopy (AFM). Explain the basic components and working of AFM. Write the merits, demerits and Applications of AFM.

4. What is Carbon Nano tube (CNT)? Explain the structure, Type, properties, synthesis methods and applications of CNT.

5. Explain the Physical Vapour Deposition (PVD) method of material synthesis.

6. Explain the Chemical Vapour Deposition (CVD) method of material synthesis.

7. What is Nano structured materials (Quantum well, Quantum Dot, and Quantum wire)?

8. Explain the synthesis methods for Nano structured materials. Explain density of state of zero dimension.

9. Explain Powder X-Ray diffraction method and write the applications of Powder XRD?