***SREE NARAYANA COLLEGE, KOLLAM***

***DEPARTMENT OF PHYSICS***

***6th SEMESTER BSc/BCA Model EXAMINATION***

***Nanomaterial Science***

Time 3 hours Total weightage: 30

**SECTION A**

**[This section contains 4 branches each of 4 questions. Answer All Questions. Each bunch carries a weightage of ONE]**

I. 1.What is a Cluster?

 2. Explain one Dimensional confinement?

 3. Phonon is a quantum of

 a) Elastic wave b) electromagnetic wave c) polarization wave d) magnetization wave.

 4. Carbon nanotubes are characterized by

 a) high thermal conductivity b) diameter of the order of nanometers

 c) high mechanical strength d) all the above

II. 5. UV-Visible absorption spectroscopy can be used to estimate the

 a) Band gap b) conductivity c) crystal structure d) none of these

 6. For a nanomaterials surface to volume ratio is

 a)0 b)large c)small d)unity

 7. No of atoms contained in a primitive cell is

 a) 1 b) 2 c)3 d)4

 8. Basic principle behind x-ray diffraction is

 a) Bragg’s law b)Mosely’s law c)Charles law d)none of these.

II. 9. TEM means ------

 10. ------ method is a bottom up technique.

 11. ……. is a technique for estimation of grain size.

 12. Vibrational analysis of a material can be done by ….. Technique.

III State True or False

 13. As grain size decreases band gap energy of a semiconductor decreases.

 14. Quantum dots can’t be fabricated from a metal.

 15. Ball milling is a bottom up approach.

 16. Effective mass of an electron can be positive and negative.

**SECTION B**

**[Answer any EIGHT questions. Each question carries a weightage of ONE]**

 17. What do you mean by magic number?

 18. What is an exciton Bohr Radius?

 19. Explain ball milling technique.

 20. Explain quatum confinement.

 21. What is the importance of carbon atom in nanotechnology?

 22. Differentiate between nanotube and megatube.

 23. Write a short note on etching method.

 24. What do you mean by density of states?

 25. Write down the concept of blue shift.

 26. What are the important features of nonmaterial?

 27. Explain sol gel method

 28. Draw a schematic diagram of molecular beam epitaxy.

**SECTION C**

**[Answer any FIVE questions. Each question carries a weightage of TWO]**

 29. Write down the applications of carbon nanotube

 30. Briefly describe the history of nanomaterials.

 31. Write two compositional analysis techniques.

 32. Write down the concept of reciprocal lattice and Brillouin zones.

 33. How nanomaterials are classified.

 34. Write about two types of clusters

 35. Write short note on various optical characterization techniques.

 36. What do you mean by effective mass?

**SECTION D**

**[Answer any TWO questions. Each question carries a weightage of FOUR]**

 37. Write a short note on carbon nanotubes. Describe its applications.

38. Describe various synthesis techniques for the preparation of nanomaterials.

39. Describe various characterization techniques used in nanomaterial science.