

Roll No .....

**CM-8003 (2) (CBGS)**

**B.E. VIII Semester Examination, June 2020**

**Choice Based Grading System (CBGS)**

**Nano Technology**

*Time : Three Hours*

**Maximum Marks : 70**

- Note:** i) Attempt any five questions.  
ii) All questions carry equal marks.

1. a) What is the difference between atom, molecule and supermolecule? 7  
b) Describe the different type of crystal bonding. What is difference between the inter-molecular and intra-molecular forces. 7
2. a) Brief note on the CNT, quantum dots, nanoparticle with examples. Also explain the quantum confinement effect in nanomaterial. 7  
b) Calculate the de-Broglie wavelength of an electron travelling at 7% of the speed of light. Where electron mass is  $9.11 \times 10^{-31}$  kg. 7
3. a) An infinite potential well has width of 17 nm. Inside the potential well, an electron has an effective mass  $m^* = 0.067 m_0$ . Calculate the lowest three allowable energy level. 7  
b) Explain the micro-nano regime. Write down expression of the electron trapped in 3D Nanodot. 7
4. a) What is the top down and bottom up technique? 5  
b) What are the lithography process and its limitation? Explain the photolithography with schematic diagram. 5  
c) What are non-lithographic techniques? Explain the molecular beam epitaxy technique. 4
5. a) Explain the electro-deposition method with diagram? How to prepare the anodic alumina template? 7  
b) Explain the bioinspired nanostructure with examples. 7
6. a) What is sol-gel technique? Explain with example. 5  
b) What is sputtering process and explain with diagram? 5  
c) Explain the Chemical vapour deposition process with diagram. Also explain the different type of CVD. 4

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7. a) What is the electron microscopy? And explain the type of it with setup image. 5  
b) Describe the various emission and interaction process between electron beam and the sample. 5  
c) Describe the working principle of HRTEM. 4
8. a) What are the basic principle of SPM techniques? What are the type of it? Explain with setup figure. 5  
b) Explain the AFM cantilever and laser beam deflection. 5  
c) What is the application of STM? And also explain force curve. 4

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