Roll No .....

MNT - 201

M.E./M.Tech., II Semester

Examination, December 2015

Properties of Nanostructure

Time : Three Hours

Maximum Marks : 70

Note : i) This question paper contains total Eight questions.
ii) Attempt any five questions. All questions carry equal marks.

1. What is a Coulomb blockade? Explain it in light of nano-capacitor and tunneling junction. Discuss the flow of tunneling current through the nano-capacitor.

2. What are phonons? Differentiate between Electrons, Photons and Phonons on the basis of their:
   a) Origin Source
   b) Energy
   c) Role and
   d) Conduction

3. Explain the rise of a liquid in small narrow tube and Bernoulli's condition for any two points in a fluid.

4. Explain Tight bonding theory and effective mass approximation for crystal structure.

5. What are Metamaterials? Explain LH artificial medium using Veselago's diagram.

6. Give mathematical treatment of type 1 superconductivity by applying thermodynamics of transition between normal and superconducting states.

7. Derive and explain DOS expressions in case of Q-dot, well and wire.

8. Write a short note on any two of the following topics:
   a) Quantum Point Contacts (QPC)
   b) Kondo effect
   c) Poynting theorem and Poynting vector
   d) Single Electron Tunnelling Transistor (SET)
   e) Metal Split Ring Resonator (SRR)

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