

2021
B.E. (Electronics and Communication Engineering)
Seventh Semester
EC-703: Nano Technology

Time allowed: 3 Hours

Max. Marks: 50

NOTE: Attempt five questions in all, including Question No. 1 which is compulsory and selecting two questions from each Unit.

x-x-x

- I. Attempt the following:-
- Explain why the mass of an electron and a hole in a semiconductor are different?
 - Differentiate between a nanowire and a nanotube. What are their applications?
 - Write a note on transmission electron microscopy.
 - What are resonant tunneling transistors? What are their applications?
 - Explain why the performance of a MOSFET changes as its size is reduced? (5x2)

UNIT – I

- II. Differentiate between phonons and photons. How the effective mass influences the carrier mobility? What is Matthiessen's rule of carrier mobility? Compare carrier mobility of silicon, germanium and strained silicon. (10)
- III. a) Compare a crystalline, a polycrystalline and a non crystalline material. What is strained silicon semiconductor?
- b) What is bandgap? What is the role of bandgap in semiconductor devices operating at nanometer scale? Explain. (5,5)
- IV. Write notes on:-
- Traps in semiconductors
 - Single walled and multiwalled carbon nanotubes

UNIT – II

- V. Explain how an electron interacts with a rectangular well of nanometer thickness. Explain WKB theory for quantum tunneling? Why tunneling is harmful for the device and circuits at nanoscale? (10)

P.T.O.

(2)

- VI. a) What is coulomb blockade in a single electron transistor? Compare single electron transistor and a resonant tunneling transistor.
- b) What are molecular materials? How are they different to a silicon semiconductor? Compare a molecular diode and a silicon diode. (5,5)
- VII. Write notes on:-
- a) Nano-electro mechanical systems
- b) Raman Spectroscopy and its uses (5,5)

x-x-x