

Reg No.: _____

Name: _____

APJ ABDUL KALAM TECHNOLOGICAL UNIVERSITY

Eighth Semester B.Tech Degree Supplementary Examination August 2021

Course Code: EC402**Course Name: NANO ELECTRONICS**

Max. Marks: 100

Duration: 3 Hours

PART A*Answer any two full questions, each carries 15 marks.*

Marks

- 1 a) Explain ion implantation method of nanomaterial deposition. (10)
- b) DC sputtering cannot be used for fabricating non conducting layers. Justify the statement. (5)
- 2 a) Explain laser ablation technique used for the fabrication of nanolayers. (5)
- b) Explain the features of triangular and parabolic quantum wells. (10)
- 3 a) Explain any two characteristic lengths associated with mesoscopic systems. (5)
- b) Derive the expression for density of states in a 1D nano structure. (10)

PART B*Answer any two full questions, each carries 15 marks.*

- 4 a) Explain the working principle of Atomic Force Microscope. (10)
- b) Explain modulation doping and band formation in modulation doped heterojunction. (5)
- 5 a) Differentiate between multiple quantum well and superlattice. (5)
- b) Explain Kronig Penney model of superlattice and the concept of zone folding. (10)
- 6 a) Explain the working principle of Transmission Electron Microscopy. (10)
- b) Compare electron and optical microscopes. (5)

PART C*Answer any two full questions, each carries 20 marks.*

- 7 a) Explain resonant tunnel effect and the operation of resonant tunnel diode. (10)
- b) With the aid of energy band diagram, explain why MODFETs are high electron mobility transistors (6)
- c) Explain the principle of NEMS. (4)
- 8 a) Explain parallel transport in quantum structures and various scattering mechanisms associated with this transport. (10)

- b) Explain the formation of Landau levels and degeneracy associated with these levels. (4)
- c) Explain Integer Quantum Hall effect. (6)
- 9 a) Explain Coulomb blockade effect and the two conditions to be satisfied in order to observe Coulomb blockade effect. (10)
- b) Explain the principle of quantum well subband photodetector. (6)
- c) Explain the concept of hot electrons. (4)
