

Reg No.: _____

Name: _____

APJ ABDUL KALAM TECHNOLOGICAL UNIVERSITY

Eighth Semester B.Tech Degree Supplementary Examination October 2022 (2015 Scheme)

**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) Define the density of states in Nano structures. How it varies with dimensionality. (5)
Give the equation for density of states for 0D materials
- b) With suitable examples, explain different approaches for the synthesis of nanomaterials. (5)
- c) Explain the basic properties of two-dimensional semiconductor nanostructure. (5)
- 2 a) Explain four major characteristic lengths in mesoscopic systems. (8)
- b) With necessary diagrams, explain the Sol-Gel process. (7)
- 3 a) Explain the process of pulsed laser deposition with neat sketches. (7)
- b) With suitable equations, explain parabolic quantum well. (4)
- c) Differentiate between wet and dry oxidation methods. (4)

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

- 4 a) Explain the operation of Scanning Tunnelling microscope. (8)
- b) Explain the working of MOSFET structure. (7)
- 5 a) Explain Kronig-Penny model of superlattice. (8)
- b) Explain the principle behind X-Ray Diffraction Spectroscopy. (7)
- 6 a) How Atomic Force microscopy is used to probe nanomaterials? (8)
- b) Explain the working of modulation doped quantum wells. (7)

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

- 7 a) Explain different electron scattering mechanism in parallel transport. (10)
- b) Illustrate the principle of NEMS. (5)
- c) Explain Coulomb blockade effect. (5)

- 8 a) Explain the working of single electron transistor. (10)
- b) Explain Aharonov-Bohm effect. (5)
- c) Illustrate the working of quantum dot LED. (5)
- 9 a) Explain the process of perpendicular transport in nanostructures. (10)
- b) Explain different types of CNT transistors. (5)
- c) With suitable diagrams, explain the working of RTD. (5)
