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Reg No.:_____ Name:_____

APJ ABDUL KALAM TECHNOLOGICAL UNIVERSITY

Eighth Semester B.Tech Degree (S, FE) Examination January 2024 (2015 Scheme)

Course Code: EC402

Course Name: NANOELECTRONICS

Max. Marks: 100 Duration: 3 Hours

PART A

Answer any two full questions, each carries 15 marks. Marks

1 a) Explain the fabrication of nanoparticles using sol-gel process (9)

b) Explain the fabrication of nanolayers using ion implantation process. (6)

2 a) Show that the density of states in a 1D semiconductor is inversely proportional to square root of energy. (12)

b) Differentiate between dry and wet oxidation. (3)

3 a) Explain any four characteristic lengths in mesoscopic systems (10)

b) DC sputtering cannot be used for coating non conducting materials. Justify (5)

PART B

Answer any two full questions, each carries 15 marks.

4 a) Explain the various specimen interactions of an electron beam and illustrate the working of a Scanning Electron Microscope. (15)

5 a) Differentiate between multiple quantum well and superlattice. (4)

b) Explain modulation doping with an example. (7)

c) Explain the behaviour of a MOS structure when a positive bias is applied to the gate (4)

6 a) Write short note on hetrojunctions (4)

b) Explain the concept of zone folding in superlattice. (4)

c) Illustrate the working principle of Atomic Force Microscope (7)

PART C

Answer any two full questions, each carries 20 marks.

7 a) Explain the operation of resonant tunnel diode and its VI characteristics. (10)

b) Explain the working of a quantum dot laser (5)

c) Heterojunction BJTs exhibit better performance compared to BJTs. Justify the statement (5)

8	a)	Explain Coulomb blockade effect. Draw the schematic and equivalent circuit diagrams and explain the working of single electron transistor.	(10)
	b)	Explain the formation of Landau levels and degeneracy associated with these levels	(5)
	c)	Explain the concept of hot electrons.	(5)
9	a)	Explain the working of (i) Quantum dot LED (ii) Resonant Tunnelling Diode	(10)
	b)	Explain the Shubnikov- de Hass effect of magnetic fields on electronic and transport properties of a 2D system	(10)

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