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Reg No.:_____ Name:_____

APJ ABDUL KALAM TECHNOLOGICAL UNIVERSITY

B.Tech Degree S8 (S, FE) / S6 (PT) (S, FE) Examination June 2023 (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 Molecular beam epitaxy method of nanomaterial deposition. List its advantages and disadvantages. (10)

b) Explain reduction technique used for the fabrication of particles. (5)

2 a) Show that density of states in a 2D nano structure is independent of energy. (10)

b) List any five properties of graphene. (5)

3 a) Compare & contrast square quantum well, parabolic quantum well & triangular quantum well. (9)

b) Illustrate laser ablation method for nano layer fabrication (6)

PART B

Answer any two full questions, each carries 15 marks.

4 a) Explain the working of an X-Ray diffraction analyzer and illustrate how it can be used to analyze a crystal. (9)

(b) Explain the three modes of operation in an AFM. (6)

5 a) Explain Kronig Penney model of a superlattice. Illustrate the principle of zone folding. (15)

6 a) Explain the two types of modulation doped quantum wells. (4)

b) Mobility of carriers increases in a modulation doped structure. Justify the statement. (4)

c) With the help of neat diagrams, explain Photoluminescence spectroscopy (7)

PART C

Answer any two full questions, each carries 20 marks.

7 a) Explain parallel transport in quantum structures and various scattering mechanisms associated with this transport. (10)

	b)	Explain Coulomb blockade effect and the conditions for observing the effect.	(6)
	c)	Explain (a) velocity overshoot effect (b) real space transfer	(4)
8	a)	Explain integer quantum hall effect.	(7)
	b)	With the aid of energy band diagram, explain why MODFETs are high electron mobility transistors	(6)
	c)	Explain Aharonov – Bohm effect	(7)
9	a)	Illustrate the working of Quantum well optical modulator	(5)
	b)	Explain the device structure and working of a Double Heterojunction Laser	(8)
	c)	Explain the principle of operation of a Resonant Tunneling Transistor, with the help of necessary diagrams	(7)

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