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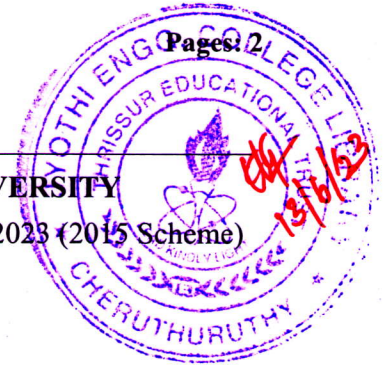
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Reg No.: _____

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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: NANO ELECTRONICS

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)
