

Reg No.: \_\_\_\_\_

Name: \_\_\_\_\_

**APJ ABDUL KALAM TECHNOLOGICAL UNIVERSITY**  
**EIGHTH SEMESTER B.TECH DEGREE EXAMINATION(S), OCTOBER 2019**

**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 sol-gel process and how you can fabricate a quantum wire using the technique. (10)
- b) Explain quantum mechanical coherence. (5)
- 2 a) Starting from Schrodinger equation, show that the density of states in a 2D nano material is independent of energy. (10)
- b) Explain the precipitation of quantum dots. (5)
- 3 a) Explain the different types of PVD techniques. (10)
- b) Explain any ten properties of graphene. (5)

**PART B**

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

- 4 a) Define the term Photoluminescence. Discuss with neat diagrams PL spectroscopy in detail. (10)
- b) Compare electron and optical microscope. (5)
- 5 a) Illustrate the working of SEM .Explain the different specimen interactions. (10)
- b) Explain how conductivity is increased in 2D electron gas in AlGaAs-GaAs structure. (5)
- 6 a) Compare MQW with superlattice structure. (8)
- b) Explain modulation doping and why mobility of carrier increases in modulation doped structure. (7)

**PART C**

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

- 7 a) Derive Landauer Formula and explain its significance. (9)
- b) Explain Landau levels and its variation with magnetic field. (6)
- c) Explain perpendicular transport in quantum structure. (5)

- 8 a) Explain the Shubnikov-de Hass effect of magnetic fields on the electronic and transport properties of the 2D systems. (10)
- b) Explain Resonant Tunnel Effect and the operation of Resonant Tunnel Diodes. (10)
- 9 a) Illustrate the working of a quantum well optical modulator. (8)
- b) With the help of a neat schematic diagram explain MODFETs. (8)
- c) Explain the concept of hot electrons. (4)

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