

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

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

**APJ ABDUL KALAM TECHNOLOGICAL UNIVERSITY**

Eighth semester B.Tech degree examinations, September 2020

**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 de-Broglie wavelength & Screening length in mesoscopic systems.              | (5)   |
|   | b) Explain parabolic & triangular quantum wells with neat diagrams.                     | (10)  |
| 2 | a) Explain the process of Physical Vapour Deposition in the fabrication of nano-layers. | (7)   |
|   | b) Explain laser ablation.  | (8)   |
| 3 | a) Explain Quantum wells, wires & dots & compare each.                                  | (5)   |
|   | b) Explain the process of grinding with iron balls in the fabrication of nanoparticles. | (5)   |
|   | c) Write short notes on: i) Carbon nanotubes ii) Sol-gel process                        | (5)   |

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

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|---|--|------|
| 4 | a) Differentiate between electron & optical microscope.                        | (4)  |
|   | b) Explain the principle of Scanning Tunnelling Microscope with neat diagrams. | (6)  |
|   | c) Explain X-Ray Diffraction analysis.   | (5)  |
| 5 | a) Write notes on Modulation doped hetero-junctions.                           | (5)  |
|   | b) Explain SEM with suitable diagrams.   | (10) |
| 6 | a) Compare STM and AFM.  | (3)  |
|   | b) Write short notes on PL & UV spectroscopy.                                  | (7)  |
|   | c) Explain the structure & energy band diagram of MOSFET.                      | (5)  |

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

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|---|--|------|
| 7 | a) Explain the resonant tunnelling effect with neat diagrams.  | (6)  |
|   | b) Explain Coulomb blockade in nanostructures.   | (6)  |
|   | c) Derive Landauer formula for Quantum transport in nanostructures.                                  | (8)  |
| 8 | a) Explain the structure of Single electron transistor with neat diagrams.                           | (10) |
|   | b) Write short notes on i) Quantum dot Laser ii) CNT transistors.                                    | (10) |
| 9 | a) Explain the electron Scattering mechanism for parallel transport in semiconductor nanostructures. | (10) |
|   | b) Explain the structure of MODFET.  | (6)  |
|   | c) Write short notes on i) NEMS.   | (4)  |

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