

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.*

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|---|---|-------|
| 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) |
