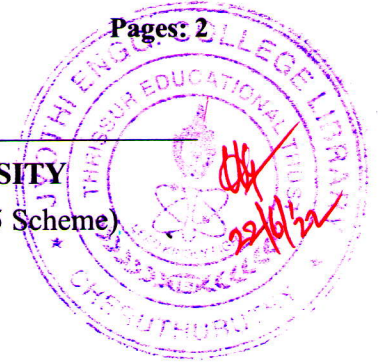


Reg No.: _____

Name: _____

APJ ABDUL KALAM TECHNOLOGICAL UNIVERSITY
Eighth Semester B.Tech Degree Examination June 2022 (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) Show that density of states in a 2D nanostructure is independent of energy. | (10) |
| b) Explain quantum mechanical coherence. | (5) |
| 2 a) Illustrate the process of molecular beam epitaxy for fabricating nano layers. | (10) |
| b) List any five properties of graphene | (5) |
| 3 a) Differentiate between dry and wet oxidation methods for fabricating nano layers. | (5) |
| b) Explain Sol-Gel process for fabricating nano particles | (10) |

PART B

Answer any two full questions, each carries 15 marks.

- | | |
|---|------|
| 4 a) Write notes on Si Ge heterostructures and why it is used for fabricating high frequency transistors. | (10) |
| b) With the aid of diagrams, explain the concept of multiple quantum well and its types. | (5) |
| 5 a) Explain the different interactions taking place between specimen and electron beam in a SEM. | (10) |
| b) Explain the concept of zone folding in superlattice. | (5) |
| 6 a) Illustrate the working principle and modes of operation of Scanning Tunneling Microscope. | (10) |
| b) Explain how band gap can be calculated using UV visible absorption spectroscopy? | (5) |

PART C

Answer any two full questions, each carries 20 marks.

- | | |
|---|------|
| 7 a) Explain Coulomb blockade effect. Draw the schematic and equivalent circuit diagrams and explain the working of single electron transistor. | (10) |
|---|------|

- b) Illustrate the working of quantum dot LED. (5)
- c) With the help of neat schematic diagram, explain MODFETs. (5)
- 8 a) Explain the process of quantum transport in nanostructures, Derive Landauer formula and explain its significance. (10)
- b) Explain the effect of magnetic field in the energy levels and density of states in a 2D system. (5)
- c) Explain (a) velocity overshoot effect (b) real space transfer (5)
- 9 a) Explain CNT transistors and its types. (10)
- b) Explain Aharonov – Bohm effect (5)
- c) Explain perpendicular transport in quantum structures. (5)
