

**SARDAR PATEL UNIVERSITY**  
**Programme & Subject: M.Sc (Electronics)**  
**Semester: IV**  
**Syllabus with Effect from: June - 2014**

<b>Paper Code: PS04EELE03</b>	<b>Total Credit: 4</b>
<b>Title Of Paper: Principles of Nano Electronics</b>	

Unit	Description in detail	Weightage (%)
I	Dimensionality and ideal semiconductor nanostructure, density of states, Quantum size effects and density of states for two dimensional systems, Superlattices, Electron states in quantum wells, wires and dots, Gate oxide tunneling in Mosfets, Fowler-Nordheim Tunneling.	25%
II	Double barrier tunneling and resonant tunneling diode, Resonant tunneling transistor, Coulomb blockade in a Nano capacitor, Tunnel junction and its excitation by current source, Coulomb blockade in a quantum dot circuit, Coulomb staircase.	25%
III	Semiconductor quantum hetero and Nano structures, Modulation doping, Energy band transitions in quantum wells, quantum wires and nano wires, Quantum dots and Nano particles, Ballistic transport, Transport model, Quantum resistance and conductance.	25%
IV	Carbon Nano tubes and carbon Nano wires, Nano scale wire radius, Transport of spin and Spintronics, Single electron transistor, Carbon nano tube transistor, Nano tube hetero junction, Nano tube field effect transistor, Graphene in Nano electronic systems.	25%

**Basic Text & Reference Books:-**

- **Fundamentals of Nanoelectronics**  
George W. Hanson, Pearson Education, New Delhi, INDIA
- **Nanoelectronics**  
A.S. Bhatia, NuTech Books, New Delhi, INDIA
- **Low Dimensional Semiconductors: Materials, Physics, Technology & Devices**  
M.J.Kelly, Clarendon Press Oxford, N.Y., USA
- **Nanoelectronics: Principles and Devices**  
Mircea Dragoman and Daniele, Artech House Publication, N.Y. USA
- **Semiconductor Heterojunctions and Nanostructures**  
Omar Manasreh, McGraw Hill, N.Y., USA
- **Quantum Wells, Wires and Dots**  
P.Harrison, Wiley, N.Y., USA
- **Silicon Nanoelectronics**  
Shunri Oda and David Ferry, Taylor & Francis, N.Y., USA

