Lecture Plan
Nano Electronics (EC-707)

Units	Lecture	Topics Covered
Unit 1		
	Lecture 1	The development of microelectronics, region of nanostructures,
	Lecture 2	Challenge initiated by nanoelectronics, band diagram of semiconductors
	Lecture 3	Technological process of microminiaturization, Integrated optoelectronics.
	Lecture 4	Basis of Nano electronics: Electromagnetic Fields and photons
	Lecture 5	Quantization of action, charge and flux, Schrodinger Equation,
	Lecture 6	Electrons in potential wells, photons interacting with electrons in solids, diffusion process,
	Lecture 7	Data and bits, data processing
Unit 2		
	Lecture 1	Biochemical and quantum-mechanical computers, DNA computers,
	Lecture 2	Parallel processing, quantum computers, Parallel architectures for nanosystems
	Lecture 3	Mono and multiprocessor systems, Architecture of parallel processing in Nanosystems,
	Lecture 4	Processors with large Memories, SIMD and PUP Architecture
	Lecture 5	Soft Computing and Nanoelectronics, Fuzzy systems,
	Lecture 6	Evolutionary Algorithms, Computational intelligence systems,
	Lecture 7	Neural Network in Nanoelectronics, Local Processing.
Unit 3		
	Lecture 1	Integrated switches and basic circuits: Ideal and Real switches, Threshold Gates,
	Lecture 2	Fredkin Gates, Quantum Electronic Devices, short channel MOSTransistors
	Lecture 3	Split Gate Transistors, Quantum cellular automata, Quantum DoArray, Switches based on fullerenes and nanotubes
	Lecture 4	Polymer electrons, optical molecular memories, tunneling diode, RTD
	Lecture 5	Digital circuits based on RTBT, RTBT mobile, RTBT threshold gate, RTBT Multiplexer
	Lecture 6	SET(Single electron transistor): Performance, logic and memory ckts.
	Lecture 7	SET Adder, Comparison b/w FET and SET.
Unit 4		
	Lecture 1	Nanoelectronics with super conducting devices, The Macroscopic model, Cryotron,
	Lecture 2	Josephson Tunneling Device, Memory cell, super conducting quantum interferometer device
	Lecture 3	Flux quantum device: LC Gate, single flux quantum device.
	Lecture 4	Limits of integrated electronics: Energy supply and heat dissipation,
	Lecture 5	The limits due to thermal particle motion, thermal noise,
	Lecture 6	Reliability s limiting factor, physical limits, equal failure rates by tunneling and thermal noise.
	Lecture 7	Uncertainties in development of nano electronics.

References:

1. **Karl Goser "Nanoelectronics and Nanosystems", Springer International Editors**

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