BE VIII SEMESTER ELECTRONICS & COMMUNICATION ENGG.							
COURSE CONTENTS							
EC-8021	**Neno electronics**	**L**	**T**	**P**	**C**	**Max. Marks**	**Min. Marks**
Duration	3 Hours	3	1	0	4	100	35

Unit-I

Introduction: The 'Top down' and 'Bottom up' approach, Nanotechnology potential. Band structure and density of states at Nanoscale: energy bands, density of states at low dimensional structure.

Electrical transport in Nanostructure: Electrical conduction in metals, insulator/ionic crystals and semiconductors. Conduction mechanism in bulk, thin film and low dimensional system. Introductory quantum mechanics for Nanoscience: size effect in smaller systems, quantum behavior of nanometric world.

Unit-II

Tunnel junction and application of tunneling: Tunneling through a potential barrier, potential energy profiles of material interfaces, applications of tunneling.

Quantum wells, wires and dots: Semiconductor hetrostructure and quantum wells, quantum dots and nanoparticles.

Unit-III

Single electron transistor: Coulomb Blockade, single electron transistor, other SET and FET structures.

Unit-IV

Ballastic and spin transport: Classical and semi-classical transport, ballistic transport, carbon nanotubes and nanowires, transport of spin and spintronics.

The era of new Nanostructures of carbon: Buck minsterfullerence, Nanodiomond, BN Nanotubes, Molecular Machine, Nanobiometrics.

Unit V

Fabrication technology: Top-down vs bottom-up technology.

Lithographic process: Lithography, Nanolithography, split gate technology, self assembly, limitation of lithographic process.

Non-lithographic techniques: Plasma arc discharge, sputtering, evaporation, chemical vapour deposition, pulsed laser deposition, molecular beam epitaxy, sol-gel technique, electrodeposition and other process.

References:

1. G. W. Hanson: Fundamentals of Nano electronics, Pearson Education.
2. K. K. Chattopadhyay and A. N. Banerjee: Introduction to Nanoscience and Nanotechnology, PHI Learning.
3. Vlaadiniz U. Mitin: Introduction to Nanoelectronics, Cambridge University Press.
4. M. Dragman and D. Dragman: Nanoelectronics- Principles and devices, Artech House.
5. Karl Goser: Nanoelectronics and Nanosystems, Springer.
6. Daniel Minoli: Nanotechnology application to telecommunication and networking, Wiley Interscience.
7. John H. Davis: Physics of low dimension semiconductor, Cambridge Press.
8. Carl C. Cosh: Nanostructure materials processing property and applications, Noyes Publications.

Elective - IV

EC - VIII

BE VIII SEMESTER ELECTRONICS & COMMUNICATION ENGG.							
EC8341	COURSE CONTENTS						
EC-8001	Advance Communication System	L	T	P	C	Max. Marks	Min. Marks
Duration	3 Hours	3	1	2	6	100	35

Unit-I

Channel coding: Introduction, Block codes, Convolutional codes, Trellis-coded modulation, Turbo-codes, Low density parity check codes, coding for the fading channels. **Speech coding:** Introduction, the sound of speech, stochastic models for speech, quantization and coding, from speech transmission to acoustic telepresence.

Unit-II

Orthogonal Frequency Division Multiplexing (OFDM) : Introduction, principle of OFDM, implementation of transceivers, frequency-selective channels, channel estimation, peak ro average power ratio, intercarrier interference, adaptive modulation and capacity, multiple access, multicarrier code division multiple access, single carrier modulation with frequency-domain equalization. **Multiantenna system:** smart antennas, multiple input multiple output systems.

Unit-III

Global System for Mobile Communications (GSM) : Historical overview, system overview, the air interface, logical and physical channels, synchronization, coding, equalizer, circuit switched data transmission, establishing a connection and handover, services and billing. **Interim Standard 95 (IS-95) and Code Division Multiple Access (CDMA 2000)** Historical overview, system overview, the air interface, coding, spreading and modulation, logical and physical channels, handover.

Unit-IV

Wideband Code Division Multiple Access (WCDMA) : Historical overview, system overview, the air interface, logical and physical channels, speech coding, multiplexing and channel coding, spreading and modulation, physical-layer procedures. **Statistics of Cellular systems:** Time delay spread, Noise figure, power limited and bandwidth-limited system, mobile and portable coverage, Ray-tracking and building block approach, coding scheme and variable burst-error intervals, antenna down-tilt, Inter-modulation, mobile location, angle spread with antenna height and its application.

Unit V

New Concepts : Channel capacity in a Rayleigh fading environment, real-time running average, link capacities versus call drops between GSM and CDMA, data transmission via cellular systems, multiuser detection for CDMA, spectrum and technology of a WLL system, wavelet representation.

References:

1. A. F. Molisch: Wireless Communications, Wiley India Pvt. Ltd.
2. W. C. Y. Lee: Mobile Communications Engineering- theory and practices, TMH.
3. Upena Dalal: Wireless Communications, Oxford University Press.
4. Kamilo Feher: Wireless Digital Communications, PHI Learning.
5. Mullet: Introduction to Wireless Telecommunication Systems and Networks: Cengage Learning.

List of Experiments:

Practical should be performed using Scilab / Matlab simulation software based on the above contents some may be as follows:

1. Simulation of block codes, convolutional codes, parity check codes etc.
2. Simulation of transreceiver in OFDM and plotting of BER vs SNR graphs for coded and uncoded OFDM .
3. Simulation of transmission through a rayleigh fading channel.

Other practical may include study of:

1. Coding, multiplexing, interleaving, spreading, modulation and demodulation in uplink and downlink for GSM and CDMA.
2. Data transmission via cellular systems.
3. Smart antennas and MIMO systems.

8351 - Fiber Optics Comm

BE VIII SEMESTER ELECTRONICS & COMMUNICATION ENGG.							
COURSE CONTENTS							
EC-8002	Optical Communication	L	T	P	C	Max. Marks	Min. Marks
Duration	3 Hours	3	1	2	6	100	35

Unit-I

Overview of Optical Fiber Communications (OFC): Motivation, optical spectral bands, key elements of optical fiber systems. **Optical fibers**: basic optical laws and definitions, optical fiber modes and configurations, mode theory for circular waveguides, single mode fibers, graded-index fiber structure, fiber materials, photonic crystal fibers, fiber fabrication, fiber optic cables.

Unit-II

Optical sources: Light emitting diodes (LEDs): structures, materials, quantum efficiency, LED power, modulation of an LED. Laser diodes: modes, threshold conditions, laser diode rate equations, external quantum efficiency, resonant frequencies, structure and radiation patterns, single mode lasers, modulation of laser diodes. **Power launching and coupling**: source to fiber power launching, fiber to fiber joints, LED coupling to single mode fibers, fiber splicing, optical fiber connectors.

Unit-III

Photo detectors: pin photo detector, avalanche photodiodes, photo detector noise, detector response time, avalanche multiplication noise. **Signal degradation in optical fibers:** Attenuation: units, absorption, scattering losses, bending losses, core and cladding losses. Signal distortion in fibers: overview of distortion origins, modal delay, factors contributing to delay, group delay, material dispersion, waveguide dispersion, polarization-mode dispersion. Characteristics of single mode fibers: refractive index profiles, cutoff wavelength, dispersion calculations, mode field diameter, bending loss calculation. Specialty fibers.

Unit-IV

Optical receivers: fundamental receiver operation, digital receiver performance, eye diagrams, coherent detection: homodyne and heterodyne, burst mode receiver, analog receivers. **Digital links**: point to point links, link power budget, rise time budget, power penalties. **Analog links**: overview of analog links, carrier to noise ratio, multichannel transmission techniques.

Unit-V

Optical technologies

Wavelength division multiplexing (WDM) concepts: operational principles of WDM, passive optical star coupler, isolators, circulators, Active optical components: MEMS technology, variable optical attenuators, tunable optical filters, dynamic gain equalizers, polarization controller, chromatic dispersion compensators.

Optical amplifiers: basic applications and types of optical amplifiers, Erbium Doped Fiber Amplifiers (EDFA): amplification mechanism, architecture, power conversion efficiency and gain. Amplifier noise, optical SNR, system applications. **Performance Measurement and monitoring**: measurement standards, basic test equipment, optical power measurements, optical fiber characterization, eye diagram tests, optical time-domain reflectometer, optical performance monitoring.

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