**7th semester**

**OPTICAL COMMUNICATION EC 1701**

**Optical**

Principles of optical wave guiding, single mode and multimode fibers and their transmission characteristics, Dispersion & attenuation properties

Light Emitting Diode, Semiconductor Lasers, Fiber Lasers, Semiconductor Optical Amplifiers, Si, Ge, GaAs, Detection characteristics: Avalanche Photodiode, PIN Photo Diode.

Internal & External Modulation, Electro-Optic Effect, Acoustic-Optic Effect, PCM, PCM/PL, Digital PPM, PRM, PFM, Direct Detection, Integrated & Trans-Impedance Amplifier; Covalent Receiver- Homodyne & Heterodyne, PLL.

Phase Noise, Polarization, AM Noise, Shot noise In Photo Diode, Thermal Noise, ASE Noise

Optical WDM, CDM, SDH/SONET, Optical ATM

**DIGITAL SIGNAL PROCESSING**

**EC 1702**

**Introduction** : limitation of analog signal processing and advantages of digital signal processing

**Discrete time characterization of signal and system:**

Some elementary discrete time sequence and system, concept of stability, causality, linearity, time variance and their properties. linear constant difference equation

**Frequency domain representation of discrete time Signals and system:**

Complex function as eigen functions of LTI system

Fourier transform of sequences

Fourier transform theorem and symmetry properties of Fourier transform

**Sampling of the continuous time signal:**

Frequency domain representation of uniform sampling , reconstruction of continuous time signal from its sample

Discrete time processing of continuous time signal and vice versa, Decimation and interpolation, Changing the sampling rate by integer and by non integer factors using discrete time processing, Limitation of the Fourier transform .

**Z-TRANSFORM**

Z transform ROC Properties of the z transform

Inverse transform using contour integration Complex convolution theorem. Parsevals relation Unilateral z transform and its application to difference equation

**Discrete Fourier transform**

DFT and its properties, Linear periodic and circular convolution, Linear filtering method based on DFT

**Transform analysis of LTI systems:**

Filtering of long data sequence, FFT algorithm using decimation in time and decimation in frequency

Linear filtering approaches to computation of DFT

Frequency response of LTI system, System function for system characterized by linear constant coefficient difference equation, Relationship between magnitude and phase, All pass systems, minimum phase system

**Design of digital Filter**

Linear Phase FIR filter, FIR Differentiator and Hilbert Transformers, IIR filter Design by Impulse invariance method, Bilinear Transformation, Matched Z- transformation,Frequency Transformation in analog and digital domain

**Finite precision effects**

Fixed point and floating point representations

Effect of coefficient quantization

Effect of roundoff noise in digital filter

**Digital signal processor**

Architecture and various features of TMS/ADSP series of digital signal processor

Instruction set and few application of TMS320CXX

**MICRO ELECTRONIC DEVICES AND VLSI TECHNOLOGY**

 **EC 1703**

**Basic Device Technology**

Single Crystal Growth and Purification, Epitaxy, Oxidation, Diffusion, Ion Implantation and PN Junction Formation, Semiconductor Measurements

**Integrated circuit fabrication Process**

Monolithic, Hybrid, Thin Film and Thick Film Technology; Pattern Generation and Photo Mask Fabrication, Photolithography, Isolation Techniques, Metallization, Interconnection; Encapsulation and Testing.

**Monolithic circuit components**

Epitaxial Diffused System, Diffused Collector Process, Triple Diffused Process, Bipolar Transistor Formation, Diode Formation, Basic Diode Connection Of Transistors, Diode as Capacitor, Thin Film Capacitor, Sheet Resistance, Diffused Resistor , Thin Film Resistor, Parasites in Integrated Circuits ; Layout Considerations.

**MOS Technology**

MOSFET As Basic IC Component , Comparison Of MOSET With BJT as IC Component, MOS Isolation Techniques, Poly-Silicon Gate Technology, Self Aligned Gate Technology, NMOS Process Sequence, NMOS Inverter, Pass Transistor and Gates; N- Tub, P-Tub and Twin- Tub CMOS Structure; CMOS- Process Sequence

**VLSI Technology diagram ,**

Scaling Theory And Device Miniaturization, E Beam Masks, Plasma Etching , Choice of Photo Resists ; Stick, Sticks Diagram, VLSI Design Rules and Layout Diagrams, Computer Aids.

**VLSI Circuit Concept**

InverterDelays, Driving Large Capacitive Loads, Propagation Delays And Effects of Wiring Capacitances; Pull Up and Down Ration of NMOS and CMOS Inverter , Alternative Forms of Pull Up, NMOS and CMOS Inverter Transfer Characteristics, CMOS Gates

 **Optical Network**

**CS2714**

## Module - 1:

## Optical Network Elements-I:

Passive Components, 2x2 fiber couplers, Scattering Matrix representation, Star Couplers, Mach-Zehnder multiplexers, Fiber Grating, Phase-array-based WDM devices, Tunable Sources, Tunable filters, Circulators, Isolators. (8)

**Text Book:**

1. “Optical Fiber Communications”, G.Keiser, 3/e, McGraw Hill.

## Module - 2:

## Optical Network Elements-II:

Wave length Converters, Switching Elements, Nonreconfigurable and Reconfigurable wavelength Router. (4)

**Text Book:**

1. “Optical Communication Networks”, B. Mukherjee, McGraw Hill.

## Module - 3:

## Optical Amplifiers:

Types, Semiconductor Optical Amplifiers, Erbium doped fiber amplifier, Amplification mechanism, Conv. Efficiency, Gain, Noise, Applications, Power amplifiers, In-line amplifiers, Preamplifiers, Application to Optical Video distribution, Long Span Transmission, Repeater less Transmission, Under Sea Transmission system. (12)

**Text Book:**

1. “Optical Fiber Communications”, G.Keiser, 3/e, McGraw Hill.

## Module - 4:

## Optical Networks:

Topological performance, SONET/SDH, Broadcast and select WDM networks, Signal-Hop networks, Multi-Hop Networks, Testbeds. (6) **Text Book:**

1. “Optical Fiber Communications”, G.Keiser, 3/e, McGraw Hill.

## **Module – 5:**

Wavelength Routed networks, Wavelength Routing Testbeds, Nonlinear Effects on network performances, SRS, SBS, SPM, XPM, FWM, Dispersion Management, Optical CDMA networks. (6)

**Text Book:**

1. “Optical Fiber Communications”, G.Keiser, 3/e, McGraw Hill.

## Module – 6:

## Optical Switching:

 Photonic packet switching, Bit interleaving, Packet interleaving, Optical AND gates, NOLM, OTDM Testbeds. (4)