HEMCHANDRACHARYA NORTH GUJARAT UNIVERSITY, PATAN

B.E. FORTH YEAR

ELECTRONICS & COMMUNICATION

(In Force June 2006)

SEMESTER – VII

EC 705: OPTICAL COMMUNICATION SYSTEMS

Teaching Scheme		Examination Scheme				
Theory Hrs.	Practical Hrs.	Theory Hrs.	Theory Marks	Pract./ Viva Marks	Term Work Marks	Total Marks
3	2	3	100	25	25	150

SYLLABUS

1. **Introduction:** General Optical system, Advantages of Optical Communication system.
2. **Optical Fiber Wave guides:** Ray theory transmission, Electromagnetic Modes, Theory for optical propagation, cylindrical fibers, and single mode fibers.
3. **Transmission Characteristics of Optical Fibers:** Attenuation, Linear & Nonlinear losses within the fiber, Dispersion - Intramodal & Intermodal, Polarization.
4. **Optical Fibers & Cables:** Preparation of optical fibers, Fiber drawing, Liquid phase techniques, Vapor Phase deposition techniques Optical fibers, fiber strength & bending.
5. **Optical Fiber Joints & Couplers:** Fiber Alignment & joint losses, Fiber splices, Fiber Connectors, Fiber Couplers.
6. **Optical Sources - Laser:** Basic concepts, Optical emission from semiconductors, Semiconductor injection laser, their structures, Injection laser characteristics, Non-semiconductor lasers.
7. **Optical Sources - LED:** LED power & efficiency, LED structures, LED characteristics, Modulation.
8. **Optical Detectors:** Devices types, Optical Detection Principles, Absorption, Quantum efficiency, Responsivity, Long Wavelength cutoff, Semiconductor Photodiodes with & without internal gain, Phototransistors.
9. **Direct Detection Receiver Performance Considerations:** Noise, Receiver Noise, FET Preamplifiers, High performance receivers.
10. **Optical Amplification & Integrated Optics:** Optical Amplifiers, Semiconductor Laser Amplifiers, Fiber Amplifiers, Integrated Optics, Beam Splitters, Directional couplers, switches, Modulators.
11. **Optical Fiber Systems - Intensity modulation:** Optical transmission & Receiver circuits, Digital systems, Analog systems, Application of optical amplifiers.
12. **Optical Fiber Systems - Coherent:** Basic systems, Detection Principle Modulation formats, demodulation schemes, receiver sensitivities.
13. **Optical Fiber Measurements:** Fiber Attenuation, Dispersion, and Refractive Index Profile, Cutoff Wavelength, Numerical Aperture Measurements, Field Measurements.
14. **Applications & Future Developments:** Public Network Applications, Military applications, Civil Applications, Optical Sensor Systems, Computer applications, LANs.

REFERENCE BOOKS:

1. Optical Communication systems by Keiser (McGraw Hill)
2. Optical Fiber Communications - Principles & Practice by John M. Senior (PHI)