

SEMESTER - IV

Paper - IV : Fibre Optics

Max. Marks : 55

Time : 3 Hrs

Note : Nine questions will be set and students will attempt 5 questions. Question No. 1 will be compulsory consisting of 4 parts based on the conceptual aspects of the whole syllabus. The answers should not be in yes/no. In addition to Question No. 1 there will be four Units in the question-paper each containing two questions belonging to four Units in the syllabus. Students will select one question from each unit.

UNIT - I

Introduction to Optical Fibres : Importance, An Idea about generations of Telephone System and Optical fibres.

Propagation of light in optical fibres, Propagation of light in an optical fibre, Basic structure and optical path of an optical fibre, Acceptance angle and acceptance cone, Numerical aperture (General), Modes of propagation, meridional and skew rays, number of modes and cut off parameters of fibres, Single mode propagation, Comparison of step and graded index fibres.

UNIT - II

Classification of optical fibres, Fibres : Stepped-index fibre, stepped - index Monomodefibre, Disadvantage of monomodefibre, graded index multi mode fibre

Fibre Fabrication Techniques : Outside vapour phase oxidation, vapour phase axial deposition, modified chemical vapour deposition.

Fibre Cables : Fibre cable construction, Strength member, Cable tensile loading, Minimum bend radius, Losses incurred during installation of cables or during subscriber service, testing of cables, cable selection criteria.

UNIT - III

Measurement of optical fibres : Measurement of numerical aperture and its related terms, measurement of fibre attenuation, loss measurement of each mode, scattering losses measurement, Measurement of dispersion losses, Measurement of refractive index, cut off wavelength measurement, Measurement of dispersion together with cut off wavelength,

macrobending loss measurement, measurement of mode field diameter, Near field scanning technique, Indirect method, Transverse offset technique, Variable aperture technique.

UNIT - IV

Optical fibre communication systems : Transmitter for fibre optic communication - High performance transmitter circuit, LED analog transmitter, Comparison between analog and digital transmitter, Laser transmitter, Digital Laser transmitter, Analog Laser transmitter, Analog laser transmitter with A/D conversion and digital multiplexing, Transmitter design, Bit stuffing : fibre optic receiver, a high performance receiver, Repeaters, Fibre based Modems, Transreceiver.

Reference

1. Optical fibre communication (second edition) - Gerd Keiser, McGraw Hill, Inc. New York.
2. Optical fibres and fibre optic communication systems - S.Sarkar.
3. Opto Electronics (second edition) - J. Wilson, J.F.B. Hawkes, Prentice Hall of India, New Delhi.