

M. Sc. II Year		MPH-E414			Semester-IV
ELCETIVE PAPER IV/V		OPTOELECTRONICS AND LASERS			
Total Lectures	Time Allotted for End Semester Examination	Marks Allotted for Continuous Assessment	Marks Allotted for End Semester Examination (ESE)	Maximum Marks (MM)	Total Credits
60	3 Hrs	30	70	100	04

NOTE: The question paper shall consist of two sections (Sec.-A and Sec.-B). Sec.-A shall contain 10 short answer type questions of six marks each and student shall be required to attempt any five questions. Sec.-B shall contain 8 descriptive type questions of ten marks each and student shall be required to attempt any four questions. Questions shall be uniformly distributed from the entire syllabus. The previous year paper/model paper can be used as a guideline and the following syllabus should be strictly followed while setting the question paper.

UNIT I

Light wave fundamentals: Electromagnetic waves -dispersion – pulse distortion – and information rate – polarisation- resonant cavities at plane boundary – critical angle – reflections.

UNIT II

Integrated wave guides: Dielectric slab guide – modes in the symmetric slab guide – modes in the asymmetric slab wave guide – coupling to the wave guide- integrated optical network.

UNIT III

Optic fiber wave guides : Step index fiber – graded index fibre – attenuation in fibers – modes in step index fiber – modes in graded index fibre pulse distortion and information rate in optic fibers – construction of optical fibers.

UNIT IV

Lasers : Emission and absorption of radiation- Einstein relations – absorption of radiation- population inversion – threshold conditions – laser losses - line shape functions – population inversion and pumping threshold conditions - Laser modes – Axial modes -Transverse modes- classes of laser - doped insulator laser - semiconductor laser - gas lasers - liquid gas lasers- single mode operation- frequency stabilization - mode locking - active mode-passive mode locking- Q-switching methods

UNIT V

Holography: Wavefront reconstruction – linearity of holographic process – image formation of holographic process – Gabor hologram – limitations – Recording the hologram – minimum reference angle – holography of three dimensions – practical problems in holography – types of holograms- Fresnel - Fraunhofer – transmission- reflection – rainbow multiplex- embossed and thick holograms - application of holography – holography interferometry – holography computer memories.

BOOKS FOR STUDY

1. Fiber Optic Communications, Joseph C. Palais, Prentice Hall Publications. IV Edition (Unit 1-3)
2. Optoelectronics, J. Wilson and J.F.B.Hawkes, Prentice Hall Publications, 1989 (Unit 4)
3. Introduction to Fourier Optics, Joseph W. Goodman, McGraw Hill, Person Education II Edition, 1996. (Unit 5)

BOOKS FOR REFERENCE

1. Photonics Optical Electronics in Modern Communications, Amnon Yariv and Pochi Yeh, Oxford University Press, VI Edition, 2006
2. Optical Fibers and Fiber Optic Communication Systems, Subir Kumar Sarkar, S. Chand & Co
3. Introduction to Fiber Optics, Ajoy Ghatak and K. Thyagarajan, Tata McGraw Hill