13-EC534 **OPTICAL SIGNAL PROCESSING**

SYLLABUS

Basics of signal processing and optics, Characterization of a General signal, examples of signals, Spatial signal. Basic laws of geometrical optics, Refractions by mirrors, the lens formulas, General Imaging conditions, the optical invariant, Optical Aberrations. **Physical Optics,** The Fresnel Transforms, the Fourier transform, Examples of Fourier transforms, the inverse Fourier transform, Extended Fourier transform analysis, Maximum information capacity and optimum packing density, System coherence. **Spectrum Analysis and Spatial Filtering**, Light sources, spatial light modulators, The detection process in Fourier domain, System performance parameters, Dynamic range. Some fundamentals of signal processing, Spatial Filters, **Binary Spatial Filters**, Magnitude Spatial Filters, Phase Spatial Filters, Real valued Spatial Filters, Interferometric techniques for constructing Spatial Filters. Optical signal processor and filter generator, Applications for optical signal processing. **Acousto-optic cell spatial light modulators**, Applications of acousto-optic devices. Basic Acousto-optic power spectrum analyzer. Heterodyne systems: Interference between two waves, the optical Radio.

TEXT BOOKS
1. Anthony Vanderlugt ,"Optical signal processing" ,Wiley-Interscience
2. Hiroshi Ishikawa ,"Ultrafast All-Optical Signal Processing Devices",Wiley

REFERENCES

1. D. Casasent, "Optical data processing-Applications", Springer-Verlag, Berlin,

2. H.J. Caulfield, "Handbook of holography", Academic Press New York 1979
3. P.M. Dufffieux, "The Fourier Transform and its applications to Optics", John Wiley and sons
4. J. Horner ,"Optical Signal Processing ",Academic Press 1988
5. Joseph W. Goodman," Introduction to Fourier Optics", second edition Mc Graw Hill.
6. Francis T. S. Yu, Suganda Jutamulia, "Optical Signal Processing, Computing, and Neural Networks", Krieger Publishing Company; 2nd edition