GIH 402: REMOTE SENSING AND PHOTOGRAMMETRY		
Unit 1	**Introduction:** History and concept of Remote Sensing, Electromagnetic Spectrum, Energy Interaction with atmosphere and earth surface features. Basic concepts of visible, Optical, Thermal (Infrared), and Microwave Remote Sensing. Platforms and Sensors. **Optical Remote Sensing:** Principles of Optical Remote Sensing, spectral reflectance of earth's features indifferent wave length regions, multispectral concepts of remote sensing, scanners, applications of optical Remote Sensing, Indian Remote Sensing Programme and Important Indian Satellites.	06 hrs
Unit 2	**Thermal Remote Sensing:** Principles of thermal remote sensing, black body, radiant temperature, radiation from Earth's objects, thermal conductivity, thermal capacity, thermal inertia, thermal diffusivity, thermal radiometers, scanners, calibration of scanners, mapping with thermal scanners, Imaging Spectrometer, Applications of Thermal Remote Sensing.	06 hrs
Unit 3	**Hyper Spectral Remote Sensing:** Introduction to Hyperspectral Remote Sensing, Sensors/Imaging Spectrometers, Hyperspectral Satellite Systems, Hyperspectral Image Analysis Techniques including Correction.	06 hrs
Unit 4	**Microwave Remote Sensing & RADAR Remote Sensing***:* Concept and principles of Microwave Remote Sensing, SLAR, SAR and Scaterometer, Application of Microwave Remote Sensing. Outlines of Radar Image Interpretations. **Image Interpretation:** Visual and Digital Interpretation techniques-Basic concepts of visual interpretation, tone, color, texture, pattern, shape and contextual features. Basic Principles of Digital Image Processing.	06 hrs
Unit 5	**Principles of Aerial photography; Geometry of aerial photography:** Fundamentals of photogrammetry and aerial photography: History, aerial cameras, aerial films and processing. Types of aerial photos. Fundamentals and geometry of aerial photographs, Scale, Advantages and disadvantages of small scale and large scale aerial photographs.	06 hrs
Unit 6	**Relief and tilt displacements,** mosaics and types of mosaics, stereoscopic vision and stereoscopes, image displacement due to relief, concepts of stereo-photogrammetry, normal vision, depth perception and vertical exaggeration. **Planning for aerial photographs**, flight procedures, planning and execution of photographic flights, radiometric characteristics. Elements of aerial photo interpretation: tone, color, texture, pattern, shape, size and associated features, geotechnical analysis and convergence of evidence.	06 hrs
Unit 7	**Principles and Applications of Aerial Photography:** Aerial photo interpretation in resource evaluation–geology, delineation of geological structures, mineral exploration, geomorphology, geological structure.	06 hrs
Unit 8	Digital photogrametry and interpretation techniques: definition, creation of digital images, automatic measurements, automatic surface modeling, aerial triangulations, digital photogrammetric workstation.	06 hrs

BIBLIOGRAPHY

1. Avery T.E., and G.L. Berlin, 1985. Interpretation of Aerial Photographs, 4th Ed, Bergess, Minneapolis, Minn, 34-98.
2. Betnstein, R. 1978. Digital Image processing for Remote Sensing, IEEb Press, NY, 26-64.
3. Bruno Marcolongo and Franco Mantovani, 1997, *Photogeology, Remote sensing Applications in Earth science*, Oxford and IBH Pub. Co Pvt. Ltd., New Delhi, 12-108.
4. Drury, S. A. 1987. *Image Interpretation in Geology*, Allan & Unwin (Publishers) Ltd, 23-67.
5. Kenneth R, Castle man, 1979. Digital *Image Processing*, Prentice Hall**,** 24-98.
6. Lilliesand T.M. & Kiefer R.W. 1994, Remote Sensing and Image Interpretation, John Wiley & Sons, New York, 56-78.
7. Falls Church, 1980. *Manual of Remote sensing* Vol. I and II, American Society of Photogrammetry, 4th Ed, 39-58.
8. Miller and Miller, 1961. *Photogeology*, Mc Graw-Hill Book Company, New York.
9. P. M. Mather, *Computer Processing of Remotely Sensed Images- An Introduction*, John. Wiley and Sons, 1999.
10. Pandey S. N., 1987. *Principles and Applications of Photogeology*, Wiley Eastern.
11. Ravi. P. Gupta, 1991. *Remote Sensing Geology*, Publisher-Berlin: Springer.
12. Reddy, A. M., 2006. Remote *Sensing and Geographical Information Systems.* BS Publications, 1-436.
13. Robert, H. Arnold., *Interpretations of Air Photo and Remotely Sensed Imagery*.
14. Robert, K. Vincent., *Fundamentals of Geological and Environmental Remote Sensing*.
15. Sabins, F.F., 1986. *Remote sensing Principles and Interpretations*, 2nd Ed. W.H. Freeman and Company, New York.
16. Schowengerd R.A. 1995. *Techniques for Image processing and classification in Remote Sensing*, Academic Press. New York.
17. Siegel, B.S. and Gillespie, A.R. 1994. (eds). *Remote sensing and Image Interpretations*, John Wiley and Sons, New York.
18. Swain P. H. Davis S.M. (Editor), 1978. *Remote Sensing, The quantitative approach*, McGraw, Hill Book Co., New York.
19. Thomas M. Lillesand and Raiph W. Kiefer, 2000. *Remote sensing and Image Interpretations*, John Wiley and Sons, New York, 4th Edition, 24-254.
20. Verbyla, D. 1995. *Satellite remote sensing for natural resources*; Lewis Publishers, Boca Rotaon, FL.
21. Rees, W.G. 1990. *Physical Principles of Remote sensing*, Cambridge University Press.
22. Wolf, P. R. 1983. *Elements of Photogrammetry*, 2nd Ed, Mc Graw-Hill, New York.