

Unit I Electro Optical and Micro Wave System

Electro-optical system: Measuring principle, Working principle, Sources of Error, Infrared and Laser Total Station instruments. Microwave system: Measuring principle, working principle, Sources of Error, Microwave Total Station instruments. Comparison between Electro-optical and Microwave system. Care and maintenance of Total Station instruments. Modern positioning systems – Traversing and Trilateration.

Unit II GPS Satellite System and Data Processing

GPS - Different segments - space, control and user segments - satellite configuration - GPS signal structure - Orbit determination and representation - Anti Spoofing and Selective Availability - Task of control segment - GPS receivers. GPS observables - code and carrier phase observation - linear combination and derived observables - concept of parameter estimation – downloading the data -data processing – software modules -solutions of cycle slips, ambiguities, RINEX format. Concepts of rapid, static methods with GPS - semi Kinematic and pure Kinematic methods -basic constellation of satellite geometry & accuracy measures - applications- long baseline processing- use of different softwares available in the market.

Unit III Microwave Remote Sensing

Introduction - History, plane waves, antenna systems, Resolution Concepts, Radiometry - Passive microwave sensing components – Emission laws - Roughness and Dielectric Constant - Radiometers – Components - Brightness temperature - Antenna temperature - Power - temperature correspondence, passive microwave interaction with atmospheric constituents - Emission characteristics of various earth features – Passive missions - Data products and Applications, RADAR operation and measurements - RADAR equation - RAR - frequency bands - SLAR Imaging Geometry - Geometric Distortions, SAR – Concepts - Doppler principle & Processing System Parameters and fading concepts, Target Parameters. Interaction with Earth surface and vegetation - Physical Scattering Models - Surface and Volume Backscattering,

Unit IV Platforms, Sensors and Data Processing,

Airborne, Space borne and Indian missions, Data products and selection procedure, SAR Image Processing software - Measurement and discrimination - Backscatter Extraction – Pre-processing and speckle filtering - Image Interpretation, SAR Image Fusion

Unit V Thermal and Hyperspectral Remote Sensing

Thermal radiation principles, thermal interaction behaviour of terrain elements, thermal sensors and specifications – MUST (Medium Scale Surface Temperature Missions) infrared sensors and radiometers - aerial thermal images - Image characters, spatial and radiometry- sources of image degradation –radiometric and geometric errors and correction – interpretation of thermal image Extraction of environmental variables – LST retrieval methods – mapping of surface energy balance components – surface flux studies – thermal and optical RS for plant biophysics – hydrology, Forestry and Agriculture applications,

Spectral radiometry - Diffraction principles- imaging spectrometry : considerations - experimental design and instrumentation – factors affecting the field spectrum – hyperspectral sensor systems imaging spectrometry – scattering principles - BDRF and hemispherical reflectance –models; MODTRAN - Sensors and platforms – data characteristics

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6. Seeber G, Satellite Geodesy, Walter De Gruyter, Berlin, 1998
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14. John A. Richards and Xiuping Jia, “Remote sensing digital Image Analysis – an introduction” fifth edition, Springer Verlag., 2012 ISBN 978 3 642 30061 5.
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17. Lillesand, “Remote Sensing and Image Interpretation, 5Th Ed”, John Wiley & Sons, 2007, ISBN: 8126513357, 9788126513352 8. www.oksi.com, 9. <http://ccrs.nrcan.gc.ca/optic/hyper>