GI8491 TOTAL STATION AND GPS SURVEYING

DETAILED SYLLABUS.

UNIT I FUNDAMENTALS OF TOTAL STATION AND ELECTROMAGNETIC WAVES

Methods of Measuring Distance, Basic Principles of Total Station, Historical Development, Classifications, applications and comparison with conventional surveying. Classification - applications of Electromagnetic waves, Propagation properties, wave propagation at lower and higher frequencies- Refractive index (RI) - factors affecting RI-Computation of group for light and near infrared waves at standard and ambient conditions-Computation of RI for microwaves at ambient condition - Reference refractive index- Real time application of first velocity correction. Measurement of atmospheric parameters- Mean refractive index- Second velocity correction -Total atmospheric correction- Use of temperature - pressure transducers.

UNIT II ELECTRO-OPTICAL AND MICROWAVE 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 – Traversing and Trilateration-COGO functions, offsets and stake out-land survey applications.

UNIT III SATELLITE SYSTEM

Basic concepts of GPS - Historical perspective and development - applications - Geoid and Ellipsoid- satellite orbital motion - Keplerian motion – Kepler‘s Law - Perturbing forces - Geodetic satellite - Doppler effect - Positioning concept –GNSS, IRNSS and GAGAN - 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.

UNIT IV GPS DATA PROCESSING

GPS observables - code and carrier phase observation - linear combination and derived observables - concept of parameter estimation – downloading the data RINEX Format – Differential data processing – software modules -solutions of cycle slips, ambiguities, Concepts of rapid, static methods with GPS - semi Kinematic and pure Kinematic methods - satellite geometry & accuracy measures - applications- long baseline processing- use of different softwares available in the market.

UNIT V HYDROGRAPHIC, MINE AND CADASTRAL SURVEYING

Reconnaissance – Route surveys for highways, railways and waterways – Hydrographic survey- Tides – MSL – Sounding methods – Three point problem – River surveys – Measurement of current and discharge – Mine surveying Equipment – Weisbach triangle – Tunnel alignment and setting out – Transfer of azimuth – Gyro Theodolite – Shafts and audits - Cadastral survey- Legal – Real – Tax cadastre – Land record system – Settlement procedure – deformation studies.

OBJECTIVE:

- To understand the working of Total Station equipment and solve the surveying problems

TEXTBOOKS:

1. Rueger, J.M. Electronic Distance Measurement, Springer-Verlag, Berlin, 1996

2. Satheesh Gopi, rasathishkumar, N. madhu, — Advanced Surveying, Total Station GPS and Remote Sensing — Pearson education, 2007 isbn: 978-81317 00679

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1. R. Subramanian, Surveying and Levelling, Oxford University Press, Second Edition, 2012.

2. Laurila, S.H. Electronic Surveying in Practice, John Wiley and Sons Inc, 1993.

3. Guocheng Xu, GPS Theory, Algorithms and Applications, Springer - Verlag, Berlin, 2003.

4. Alfred Leick, GPS satellite surveying, John Wiley & Sons Inc., 3rd Edition, 2004.

5. Seeber G, Satellite Geodesy, Walter De Gruyter, Berlin, 1998