

CE 323: Advanced Surveying Techniques (3-1-0: 4)

Course Objectives: The objectives is to make students

- To know about significance of advanced surveying in field measurements in terms of utility and precision of data collection
- To learn on the principles of Electronic distance measurements, Total station and their accuracy
- To get introduced to the concept of photogrammetry in preliminary identification and map making
- To know in detail the concept of remote sensing in identification of land features from space and to get introduced to different data acquisition techniques like LIDAR, RADAR
- To get introduced to the field of geodesy, coordinate systems, Map projections, GPS, its working principles, data collection, data processing and analysis

Electromagnetic distance measurement (EDM)

Principle of EDM Carrier waves, Types of EDM instruments, Distomat, Total Station, Principle, procedure & surveying using Total Station, precise leveling, micro-optic theodolite.

Photogrammetry

Terrestrial and Aerial Photogrammetry, Horizontal position of a point from photographic measurement, elevation of a point, Determination of focal length of camera, Geometry and scale of vertical photographs, Ground co-ordinates from vertical photographs, Relief displacement, Planimetric mapping from vertical photos, Stereoscopy, Photo interpretation.

Remote sensing

Concepts, Idealized remote sensing system, characteristics, Types of remote sensing system, Remote sensing from space, Data interpretation, application of remote sensing, LIDAR – RADAR - SONAR.

Geodesy

Figure of earth, Classification , Earth surface, Geodetic reference surfaces, Coordinate systems, Geodetic datums and elements, Scale of map, projection, UTM, Map projection of India, Space Geodesy, VLBI, SLR LLR.

GPS Basics

System overview, working principle of GPS, Satellite ranging, calculating position, Ranging errors and its correction, GPS surveying Methods static, Rapid static, DGPS and Kinematic methods, Real time and post processing DGPS, visibility diagram ,GAGAN.

References

1. Duggal, S.K., "Surveying Vol. I and II", Tata McGraw Hill.
2. Satheesh Gopi, "Advanced Surveying", Pearson Education.

References:

1. Punmia, B.C. "Surveying Vol.III", Standard Publishers.
2. Arora, K. R. "Surveying Vol. III", Standard Book House,
3. Satheesh Gopi, "The Global Positioning System and Surveying using GPS", Tata McGraw
4. Lillesand T.M. and Kiefer R.W., "Remote Sensing and Image Interpretation", John Wiley & Sons.
1. Schofield G. W., Butterworth, Heinemann, "Engineering Surveying", New Delhi.
2. Joseph G., "Fundamentals of Remote Sensing", Universities Press.
3. Kanetkar T. P. and Kulkarni S. V., "Surveying and Levelling, Vol-I and Vol-II", Pune Vidyarthi Griha Prakshan.
4. Chandra A.M. "Higher Surveying", New Age International.

Course outcomes: On completion of the course, the students will be able to:

- apply advanced surveying techniques in different fields of civil engineering
 - select the advanced surveying technique which is best suited for a work
 - apply total station and EDM in distance measurement and traversing
 - demonstrate the principles of the earth surface, its projections and different coordinates involved in map making
 - apply GPS in transportation engineering, structural engineering and land use planning
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