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| INSTITUTE | FACULTY OF TECHNOLOGY |
| PROGRAM | BACHELOR OF TECHNOLOGY (CIVIL ENGINEERING) |
| SEMESTER | 5 |
| COURSE TITLE | ADVANCED SURVEYING |
| COURSE CODE | 01CI0515 |
| COURSE CREDITS | 3 |

Objective:

- 1 To learn about the advance fundamentals of surveying, such as the advanced measures and its representations.
- 2 Able to use the modern surveying equipments
- 3 To learn the importance of the survey database in all phases of a project.

Course Outcomes: After completion of this course, student will be able to:

- 1 Demonstrate tacheometry and geodetic survey.
- 2 Apply principles of theory of errors for correction of measurements in field observations.
- 3 Apply knowledge of astronomy for solving civil engineering problems.
- 4 Describe use of aerial camera, aerial photographs and the procedure of aerial survey.
- 5 Explain total stations and other cutting-edge survey equipment.

Pre-requisite of course:SURVEYING

Teaching and Examination Scheme

| Theory Hours | Tutorial Hours | Practical Hours | ESE | IA | CSE | Viva | Term Work |
|---------------------|-----------------------|------------------------|------------|-----------|------------|-------------|------------------|
| 2 | 0 | 2 | 50 | 30 | 20 | 25 | 25 |

| Contents : Unit | Topics | Contact Hours |
|------------------------|---|----------------------|
| 1 | Geodetic Surveying Principle of triangulation system and its classification, Base line and stations Selection, Orders of triangulation-triangulation figures, Station marks and signals, marking signals, ase extension, center reduction, stations selection and its marking | 6 |
| 2 | Theory of Errors Errors- Introduction and its types, Rules of accidental errors, Rules for weights, Concept of least squares , guidelines for giving weights and distribution of errors in the field observations, etermine most likely values of quantities | 6 |

| Contents : Unit | Topics | Contact Hours |
|----------------------------|---|--------------------------|
| 3 | Field Astronomy Introduction & purpose of field astronomy, Terminologies of field astronomy, Time Conversion, Azimuth determination, Latitude and longitude | 6 |
| 4 | Modern Surveying Instruments Introduction and various types of modern surveying instruments, Electromagnetic spectrum,, Total Station - Introduction, Electronic Distance Measurement, angle measurements horizontal and vertical, setting up the total station, various field applications of total station surveying, data transfer, processes, and advantages. , Digital self-leveling levels, scanners for topographical survey, Drone Survey (visual, LIDAR, multispectral & Thermal), DGPS survey, hydrographic survey. | 5 |
| 5 | Aerial Photogrammetry Introduction, Principle, Uses, Aerial camera, Aerial photographs, Definitions, Scale of the vertical and tilted photograph,, Ground Co-ordinates, Displacements and errors, Ground control, Procedure of aerial survey, Photomaps and mosaics, Stereoscopes, Parallax bar. | 5 |
| Total Hours | | 28 |

Suggested List of Experiments:

| Contents : Unit | Topics | Contact Hours |
|----------------------------|--|--------------------------|
| 1 | Experiment-1 Extension of Baseline using Theodolite | 2 |
| 2 | Experiment-2 Analysis of the Geodetic Survey | 4 |
| 3 | Experiment-3 Calculation of horizontal and vertical angles utilizing Total Station. | 2 |
| 4 | Experiment-4 Calculation of area and perimeter utilizing Total Station. | 4 |
| 5 | Experiment-5 Identification of Latitude and longitude of various locations | 2 |
| 6 | Experiment-6 Examples on the Triangulation adjustments | 2 |
| 7 | Experiment-7 Examples on the Theory of Error | 2 |
| 8 | Experiment-8 Staking out points using Differential Global Positioning System (DGPS) | 4 |
| 9 | Experiment-9 Demonstration of Geographic Information System: Google Earth, QGIS, ARC GIS. & Image Interpretation: Remote Sensing | 6 |
| Total Hours | | 28 |

Textbook :

- 1 Surveying Vol. I & II , Duggal, S. K, Tata McGraw Hill Publication, New Delhi. , 2018
- 2 Surveying & Levelling, Subramanian, R., Oxford University Press, New Delhi., 2016
- 3 Surveying Vol. I, II & III, Punamia, B.C, Laxmi Publications, 2015

References:

- 1 Surveying and Levelling, Surveying and Levelling, Basak, N.N., Tata McGraw Hill, New Delhi., 2017

Suggested Theory Distribution:

The suggested theory distribution as per Bloom’s taxonomy is as follows. This distribution serves as guidelines for teachers and students to achieve effective teaching-learning process

| Distribution of Theory for course delivery | | | | | |
|--|-------------------|--------------|----------------|-----------------|---|
| Remember / Knowledge | Understand | Apply | Analyze | Evaluate | Higher order Thinking / Creative |
| 5.00 | 10.00 | 35.00 | 30.00 | 15.00 | 5.00 |

Instructional Method:

- 1 At the start of course, the course delivery pattern, prerequisite of the subject will be discussed.
- 2 Lectures will be taken in class room with the use of multi-media presentations, white board– mix of both.
- 3 Attendance is compulsory in lectures and laboratory which carries a 5% component of the overall evaluation.
- 4 Minimum two internal exams will be conducted and average of two will be considered as a part of 15% overall evaluation
- 5 Assignments based on course content will be given to the students at the end of each unit/topic and will be evaluated at regular interval. It carries a weightage of 5%.
- 6 Surprise tests/Quizzes will be conducted which carries 5% component of the overall evaluation
- 7 The course includes a laboratory, where students have an opportunity to build an appreciation for the concepts being taught in lectures. Minimum 8 experiments are planned based on the course content

Supplementary Resources:

- 1 https://onlinecourses.nptel.ac.in/noc22_ce78/preview