



INSTITUTE OF AERONAUTICAL ENGINEERING

(Autonomous)

Dundigal - 500 043, Hyderabad, Telangana

COURSE CONTENT

ENGINEERING SURVEYING								
III Semester: CE								
Course Code	Category	Hours/Week			Credits	Maximum Marks		
ACED02	Core	L	T	P	C	CIA	SEE	Total
		3	0	0	3	40	60	100
Contact Classes: 48	Tutorial Classes: Nil	Practical Classes: Nil			Total Classes: 48			
Prerequisite: Linear Algebra and Calculus								

I. COURSE OVERVIEW:

Surveying is the technique, profession, science and art of making all essential measurements to determine the relative position of points or physical and cultural details above, on, or beneath the surface of the Earth. Surveyor measures certain dimensions that generally occur on the surface of the Earth. Surveying equipment, such as levels and theodolites, are used for accurate measurement of angular deviation, horizontal, usable form, or to establish the position of points or details. These points are usually on the surface of the earth, and they are often used to establish land maps and boundaries for ownership or governmental purposes. To accomplish vertical and slope distances with computerization, electronic distance measurement (EDM), total stations, remote sensing, Photogrammetry, GPS surveying and laser scanning have supplemented to a large extent.

II. COURSE OBJECTIVES:

The students will try to learn:

- I. Fundamentals of surveying for measuring field parameters using traditional and modern instruments involved in civil construction.
- II. Designing of curves and path alignment at suitable locations by implementing the principles of geometry and trigonometry.
- III. Programming tools of perspective geometry for preparing 3D geographical maps using aerial and terrestrial photogrammetric surveying
- IV. Applications of Remote Sensing in civil construction alteration works, detecting land use and land cover, creating base maps for visual reference.
- V. Modern surveying techniques for addressing the field measurement problems in real time.

III. COURSE OUTCOMES:

At the end of the course students should be able to:

- CO 1 List the needs for accurate and thorough note taking field work in serving as a legal record.
- CO 2 Illustrate the various methods of setting out curves in tracing alignment and path at suitable locations.
- CO 3 Demonstrate different types of digital instruments used in surveying for accurate measurement and data record keeping.
- CO 4 Explain the practical application on total station using the principle of Electronic Distance Measurement for minimizing local errors.
- CO 5 Recall the importance of terrestrial photogrammetry, flight planning and Stereoscopy for preparing 3D geographical maps.
- CO 6 Analyze remote sensing data acquisition on platforms and sensors using satellite images in providing base maps for graphical reference in real time.

IV. COURSE CONTENT:

MODULE-I: INTRODUCTION TO SURVEYING (12)

Principles, Linear, angular and graphical methods, Survey stations, Survey lines ranging, chain surveying, bearing of survey lines, levelling: Plane table surveying, Principles of levelling booking and reducing levels; differential,

reciprocal levelling, profile levelling and cross sectioning. Digital and Auto Level, Errors in levelling; contouring: Characteristics, methods, uses; areas and volumes.

MODULE II: THEODOLITE SURVEY AND CURVES (12)

Theodolite survey: Instruments, Measurement of horizontal and vertical angle; Horizontal and vertical control methods, Inter visibility of height and distances, Trigonometric levelling, and Tacheometric surveying. Elements of simple and compound curves, Method of setting out, Elements of Reverse curve, Transition curve, length of curve, Elements of transition curve, Vertical curves.

MODULE III: ADVANCED SURVEYING (12)

Principle of Electronic Distance Measurement, Modulation, types of EDM instruments, distomat, total Station, parts of a total station, accessories, advantages and applications, field procedure for total station survey, Errors in Total Station Survey.

Global Positioning Systems (GPS), Segments, GPS measurements, errors and biases, surveying with GPS, Co-ordinate transformation, accuracy considerations

MODULE IV: PHOTOGRAMMETRIC SURVEYING (12)

Introduction, Basic concepts, perspective geometry of aerial photograph, relief and tilt displacements, terrestrial photogrammetry, flight planning; Stereoscopy, ground control extension for photographic mapping aerial triangulation, radial triangulation, methods; photographic mapping, mapping using paper prints, mapping using stereo plotting instruments, mosaics, map substitutes.

MODULE V: REMOTE SENSING (12)

Introduction, Electromagnetic Spectrum, interaction of electromagnetic radiation with the atmosphere and earth surface, remote sensing data acquisition: platforms and sensors; visual image interpretation; digital image processing.

V. TEXT BOOKS:

1. Madhu, N, Sathikumar, R and Satheesh Gobi, *Advanced Surveying: Total Station, GIS and Remote Sensing*, Pearson India, 2nd Edition, 2006.
2. Punmia, B.C, Jain Ashok, K, Jain Arun, K, *Surveying*, Laxmi Publications, Vol. I, New Delhi, 2010.
3. Manoj, K. Arora and Badjatia, *Geomatics Engineering*, Nem Chand & Bros, 2011
4. Bhavikatti, S.S., *Surveying and Levelling*, I.K. International, Vol. I &II, 2010

VI. REFERENCE BOOKS:

1. Chandra, A.M., *Higher Surveying*, New Age International (P) Limited, 3rd Edition, 2002.
2. Anji Reddy, M., *Remote sensing and Geographical information system*, B. S. Publications, 2001.
3. Arora, K.R., *Surveying*, Standard Book House, Vol-I, II and III, 2015.

VII. ELECTRONIC RESOURCES:

1. <https://nptel.ac.in/courses/105104100/43>
2. <https://www.coloradomesa.edu/wccc/programs/land-surveying-geomatics.html>.
3. <https://books.google.co.in/books?id=FaCgAAQBAJ&printsec=frontcover&dq=surveying+and+geomatics+ONLINE+text+books&hl=en&sa=X&ved=0ahUKEwi1wP3x24HgAhUJ5o8KHS2EDzkQ6AEIMzAB#v=onepage&q&f=false>

VIII. MATERIAL ONLINE:

1. Course template
2. Tech-talk topics
3. Assignments
4. Definition and terminology
5. Tutorial question bank
6. Model question paper – I
7. Model question paper – II

8. Lecture notes
 9. Early lecture readiness videos (ELRV)
- Power point presentation