INSTITUTE OF AERONAUTICAL ENGINEERING
(Autonomous)
Dundigal - 500 043, Hyderabad, Telangana

COURSE CONTENT

GEOMATICS ENGINEERING LABORATORY								
III Semester: CE								
Course Code	**Category**	**Hours/Week**			**Credits**	**Maximum Marks**		
		L	**T**	**P**	**C**	**CIA**	**SEE**	**Total**
ACEE07	**Core**	0	0	2	1	40	60	100
Contact Classes: Nil	**Tutorial Classes: Nil**	**Practical Classes: 36**				**Total Classes: 36**		
Prerequisite: Nil								

I. COURSE OVERVIEW:

The *Geomatics Engineering Laboratory* provides practical training in the measurement, representation, and analysis of the Earth's surface using traditional and modern surveying techniques. Students will gain hands-on experience in operating surveying instruments, collecting field data, and processing it into usable maps, plans, and digital models. The lab bridges theoretical knowledge from geomatics with applied skills in land measurement, mapping, and emerging geospatial technologies. Students learn techniques for gathering field data with both traditional and modern instruments. A set of traditional and modern instruments are used, including auto level, theodolite, total station, level rods, tripods, tape measures, chaining pins, and other common surveying tools and ancillary equipment.

II. COURSE OBJECTIVES:

The students will try to learn:

I. The practical knowledge on computation of an area, volume of an irregular and regular land surface using chains and tapes.
II. Different types of instruments in surveying, perform field surveys for horizontal and vertical measurements.
III. Understand error sources in surveying and apply correction techniques.
IV. Integrate surveying data with modern geomatics tools for engineering applications.

III. COURSE OUTCOMES:

After successful completion of the course, students should be able to:

CO 1 Utilize the concept of bearing system to measure azimuth and survey lines in field.

CO 2 Make use of digital theodolite apparatus to measure vertical and horizontal distances, gradients and elevations.

CO 3 Demonstrate the two point and three-point problem in plane table surveying for tracing out the centering point or station point.

CO 4 Identify the reduced levels using leveling apparatus for illustrating longitudinal section and cross section and plotting.m

CO 5 Make use of Rankine's curve setting procedure for investigating the suitable path along the alignment and conflict points.

CO 6 Distinguish between tacheometry and trigonometry surveying for various operating conditions data record keeping.

IV. COURSE CONTENT:

EXERCISE – I: INTRODUCTION TO GEOMATICS ENGINEERING LABORATORY
Introduction to geomatics engineering laboratory.

EXERCISE – 2: SURVEY OF AN AREA BY CHAIN SURVEY CLOSED TRAVERSE AND PLOTTING
Survey of a given area using the chain survey method with a closed traverse, and to prepare a plotted plan of the surveyed area by accurately measuring and recording linear distances, and offsets.

EXERCISE – 3: CHAINING ACROSS OBSTACLE
Determine the distance between two points when a direct measurement is not possible due to an obstacle, by applying suitable chaining techniques and geometric methods.

EXERCISE – 4: DETERMINE OF DISTANCE BETWEEN TWO INACCESSIBLE POINTS WITH COMPASS
Finding the horizontal distance between two inaccessible points using a compass by taking bearings from suitable accessible stations and applying the principles of triangulation.

EXERCISE – 5: SURVEYING OF A GIVEN AREA BY PRISMATIC COMPASS CLOSED TRAVERSE AND PLOTTING AFTER ADJUSTMENT
Survey a given area using a prismatic compass by the closed traverse method, record the magnetic bearings of the traverse sides.

EXERCISE – 6: CORRECTION FOR LOCAL ATTRACTION BY PRISMATIC COMPASS
Detect and correct errors in observed bearings caused by local attraction while using a prismatic compass, and to obtain the true bearings of the traverse sides for accurate plotting.

EXERCISE – 7: RADIATION METHOD, INTERSECTION METHODS BY PLANE TABLE SURVEY
Locate the details of a given area by the radiation method and positions of objects in a given area by the intersection method using a plane table.

EXERCISE – 8: THREE-POINT PROBLEMS IN PLANE TABLE SURVEY
Determine the location of the plane table station on the map by solving the three-point problem.

EXERCISE – 9: TRAVERSING BY PLANE TABLE SURVEY
Conduct a survey of a given area by the plane table traversing method and determining the positions of traverse stations.

EXERCISE – 10: FLY LEVELLING AND DIFFERENTIAL LEVELLING
Determine the reduced levels of points along a route between two known benchmarks by fly levelling and difference in elevation between two or more points by carrying out differential levelling.

EXERCISE – 11: EXERCISE OF LONGITUDINAL SECTION AND CROSS SECTION AND PLOTTING
determine and record the longitudinal section and cross sections of a given alignment by levelling.

EXERCISE – 12: EXERCISE ON CONTOURING HILLY AREA
Conduct a contour survey of a given hilly area by taking levels at suitable points and preparing a contour map.

EXERCISE – 13: EXERCISE ON CONTOURING FLAT GROUND
Conduct contour survey of a given flat ground by taking levels at systematically selected points and preparing a contour map to represent the topography.

EXERCISE – 14: STUDY OF TOTAL STATION, MEASURING HORIZONTAL AND VERTICAL ANGLES
To study the components, working principle, and operation of a Total Station, and to measure horizontal and vertical angles accurately using the instrument.

V. TEXTBOOKS:

1. H. S. Moondra, Rajiv Gupta, “Laboratory Manual for Civil Engineering”, CBS Publishers Pvt.Ltd., New Delhi, 2nd Edition, 2013.
2. 2. S. S. Bhavikatti, “Surveying Theory and Practice”, IK Books, New Delhi, 2010.

VI. REFERENCE BOOKS:

1. James M. Anderson, Edward M. Mikhail, “Surveying: Theory and Practice”, Tata Mc Graw Hill Education, 2012.

VII. ELECTRONICS RESOURCES:

1. https://www.iare.ac.in/sites/default/files/lab1/Surveying
2. https://aust.edu/lab-manuals/CE/ce-104.pdf

VIII. MATERIAL ONLINE:

1. Course Template
2. Laboratory manual