

25UCET303	SURVEYING AND GEOMATICS	Category	L	T	P	R	Credit	Year of Introduction
		PBL	3	0	0	1	4	2025

Preamble: The course covers fundamental surveying techniques such as linear and angular measurements, levelling and contouring, along with modern geospatial tools like Total Station, GPS, Remote Sensing, and GIS. It equips students with practical skills in field data collection, analysis, and spatial data interpretation for engineering applications.

Prerequisite: Nil

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

CO	Course Outcomes	Knowledge Level
CO1	Apply surveying principles, instruments, and leveling methods for accurate field data collection.	K3 Apply
CO2	Compute contours, area, volume, and triangulation for land features and earthwork.	K3 Apply
CO3	Apply EDM, Total station and GPS techniques for accurate surveying measurements and positioning.	K3 Apply
CO4	Apply the principles of remote sensing and GIS for geospatial analysis.	K3 Apply

Mapping of course outcomes with program outcomes and program specific outcomes

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2	PSO3
CO1	3	3	2	2	2	1	-	-	-	-	-	3	2	1
CO2	3	3	2	2	2	1	-	-	-	-	-	3	2	1
CO3	3	3	1	2	3	1	-	-	-	-	-	3	2	2
CO4	3	3	2	2	3	2	-	-	-	-	-	3	2	3
Avg	3	3	1.75	2	2.5	1.25	-	-	-	-	-	3	2	1.75

Mapping of course outcomes with Knowledge and Attitude Profile (WK)

	WK1	WK2	WK3	WK4	WK5	WK6	WK7	WK8	WK9
CO1	*	*	*	*	*	*	*	*	
CO2	*	*	*	*	*	*	*	*	
CO3	*	*	*	*	*	*	*	*	
CO4	*	*	*	*	*	*	*	*	

Wks Mapped with the course

WK1	WK2	WK3	WK4	WK5	WK6	WK7	WK8	WK9
*	*	*	*	*	*	*	*	

Mark Distribution:

Total Marks	CIE Marks	ESE Marks	ESE Duration
100	60	40	2.5 hrs

Continuous Internal Evaluation Pattern:

Attendance	: 5 marks
Continuous Assessment Test	: 25 marks
Project	: 30 marks

SYLLABUS**Module 1 (14 hrs)**

Definition – Classifications – Basic principles – Equipment and accessories for ranging and chaining – Methods of ranging - Compass – Basic principles – Types – Bearing – System and conversions – Sources of errors and Local attraction – Magnetic declination – Principles of leveling - Temporary and permanent adjustments – Methods of leveling – Procedure in leveling – Booking.

Module 2 (14 hrs)

Contouring - Characteristics, methods, uses - Areas enclosed by straight lines - Irregular figures - Volumes - Earth work calculations. Triangulation: Triangulation figures, Triangulation stations, Inter visibility of stations, Satellite Stations and reduction to centre.

Module 3 (14 hrs)

Electromagnetic Distance Measurement, principle, classification - Electronic Theodolite, Characteristics, Measurement of horizontal and vertical angle measurement - Total station, features, working principle, uses - Global Positioning Systems, components and principles, satellite constellation, operating procedure, GPS Receivers, classification, GPS surveying methods.

Module 4 (14 hrs)

Remote Sensing - Definition - Electromagnetic spectrum – Elements – Electromagnetic energy - Electromagnetic radiation - Energy interactions with atmosphere and earth surface features - platforms - Digital image processing - Resolution of images - advantages and applications of remote sensing - Geographical Information System - Components of GIS, Subsystem of GIS -- Data structures - Database management - Applications of GIS - Sources of error in GIS.

Text Books:

1. Dr. B. C. Punmia, Ashok K. Jain and Arun K Jain(2016).Surveying Vol. I & II. Sixteenth Edition.Lakshmi Publications Pvt Ltd.New Delhi.
2. T. P. Kanetkar and S. V. Kulkarni(2008). Surveying and Levelling, Parts 1 & 2.Pune Vidyarthi Griha Prakashan. Pune.
3. M. Anji Reddy(2012). Textbook of Remote Sensing And Geographical Information Systems.Fourth Edition. B.S Publications .

Reference Books:

1. R. Subramanian(2012). Surveying and Levelling.Second Edition. Oxford University Press.
2. K. Roy(2010). Fundamentals of Surveying. Second Edition. Prentice^ Hall of India.
3. K. R. Arora(2013). Surveying Vol I & II.Twelfth Edition . Standard Book house.
4. C. Venkatramaiah(2011). Textbook of Surveying.Second Edition.Universities Press.
5. Burrough P(1998). Principles of Geographical Information Systems. Oxford University Press.

Suggested Project Topics

- Conduct the land surveying using linear measurements (tape or distomat).
- Determine the errors in traverse and apply corrections.
- Prepare the survey sketch.
- Determine the reduced levels and prepare the contour maps using conventional (level or theodolite) methods.
- Conduct the total station survey and prepare the contour maps.
- Prepare sketch for profile leveling and cross sectioning.
- Determine the earthwork quantity.
- Conduct GIS survey.

Assessment and Evaluation for Project Activity

Sl. No	Evaluation for	Allotted Marks
1	Project Planning and Proposal	5
2	Contribution in Progress Presentations and Question Answer Sessions	4
3	Involvement in the project work and Team Work	3
4	Execution and Implementation	10

5	Final Presentations	5
6	Project Quality, Innovation and Creativity	3
Total		30

1. Project Planning and Proposal (5 Marks)
 - Clarity and feasibility of the project plan
 - Research and background understanding
 - Defined objectives and methodology
2. Contribution in Progress Presentation and Question Answer Sessions (4 Marks)
 - Individual contribution to the presentation
 - Effectiveness in answering questions and handling feedback
3. Involvement in the Project Work and Team Work (3 Marks)
 - Active participation and individual contribution
 - Teamwork and collaboration
4. Execution and Implementation (10 Marks)
 - Adherence to the project timeline and milestones
 - Application of theoretical knowledge and problem-solving
 - Final Result
5. Final Presentation (5 Marks)
 - Quality and clarity of the overall presentation
 - Individual contribution to the presentation
 - Effectiveness in answering questions
6. Project Quality, Innovation, and Creativity (3 Marks)
 - Overall quality and technical excellence of the project
 - Innovation and originality in the project
 - Creativity in solutions and approaches

END SEMESTER EXAMINATION – MODEL QUESTION PAPER

Course Code	25UCET303
Course Name	SURVEYING AND GEOMATICS
Max. Marks: 40	Duration: 2.5 Hours

Part A				
<i>(Answer all questions. Each question carries 2 marks)</i>				
Qn No.	Question	Marks	CO	BL
1	The length of a line measured with a 20 m chain was found to be 250 m. Calculate the true length of the line, if the chain was 10 cm too long.	2	1	L3
2	Describe the Reversible level.	2	1	L2
3	Summarise the methods of determining areas.	2	2	L2
4	Distinguish between survey station and tie station.	2	2	L2
5	Describe the weight of an observation.	2	3	L2
6	Explain the Global Positioning Systems.	2	3	L2
7	Outline the disadvantages of using remotely sensed data.	2	4	L2
8	Summarise the purposes of GIS.	2	4	L2
Part B				
<i>(Answer any one full question from each Module. Each carry 6 marks)</i>				
Module I				
Qn No.	Question	Marks	CO	BL
9	The following consecutive readings were taken with a level and a 4 m levelling staff on a continuously sloping ground at a common interval of 30 m. 0.780, 1.535, 1.955, 2.430, 2.985, 3.480, 1.155, 1.960, 2.365, 3.640, 0.935, 1.045, 1.630 and 2.545. The RL of first point A was 180.750 m. Estimate the RL of points and the gradient of line joining first and last points.	6	1	L3
OR				
10	The following consecutive readings were taken with a dumpy level and a 4 m level staff on a continuous sloping ground at common interval of 30m. 0.585 on A, 0.930, 1.955, 2.840, 3.645, 3.930, 0.960, 1.035, 1.680, 2.535, 3.845, 0.950, 1.575, 3.015 on B. The elevation at A was 520.15m. (i) Rule out a page of level book and enter above readings. (ii) Determine the RL of B (iii) Determine the gradient of line AB. Adopt the rise and fall method.	6	1	L3
Module II				
Qn No.	Question	Marks	CO	BL
11	The offsets taken from a chain line to an irregular boundary	6	2	L3

