INSTITUTE OF AERONAUTICAL ENGINEERING

(Autonomous)
Dundigal, Hyderabad -500 043

CIVIL ENGINEERING

COURSE DESCRIPTOR

Course Title	**SURVEYING AND GEOMATICS LABORATORY**				
Course Code	ACEB03				
Programme	B.Tech				
Semester	III	CIVIL			
Course Type	Core				
Regulation	IARE - R18				
Course Structure	**Theory**			**Practical**	
	Lectures	**Tutorials**	**Credits**	**Laboratory**	**Credits**
	-	-	-	3	1.5
Chief Coordinator	Mr. B Suresh, Assistant Professor				
Course Faculty	Mr. B Suresh, Assistant Professor Mr. P Vinay Kumar, Assistant Professor				

I. COURSE OVERVIEW:

The Surveying Laboratory is equipped with the instruments and tools that students use throughout the surveying course. Students learn techniques for gathering field data with both traditional and modern instruments. A set of instruments are used, including auto level, theodolite, and total station, level rods, tripods, tape measures, chaining pins, and other common surveying tools and ancillary equipment's.

II. COURSE PRE-REQUISITES:

Level	Course Code	Semester	Prerequisites
UG	AHSB02	I	Linear Algebra and Calculus

III. MARKS DISTRIBUTION:

Subject	SEE Examination	CIA Examination	Total Marks
Surveying And Geomatics Laboratory	70 Marks	30 Marks	100

IV. DELIVERY / INSTRUCTIONAL METHODOLOGIES:

✘	Chalk & Talk	✘	Quiz	✘	Assignments	✘	MOOCs
✔	LCD / PPT	✔	Seminars	✘	Mini Project	✔	Videos
✘	Open Ended Experiments						

V. EVALUATION METHODOLOGY:

Each laboratory will be evaluated for a total of 100 marks consisting of 30 marks for internal assessment and 70 marks for semester end lab examination. Out of 30 marks of internal assessment, continuous lab assessment will be done for 20 marks for the day to day performance and 10 marks for the final internal lab assessment.

Semester End Examination (SEE): The semester end lab examination for 70 marks shall be conducted by two examiners, one of them being Internal Examiner and the other being External Examiner, both nominated by the Principal from the panel of experts recommended by Chairman, BOS.

The emphasis on the experiments is broadly based on the following criteria:

20 %	To test the preparedness for the experiment.
20 %	To test the performance in the laboratory.
20 %	To test the calculations and graphs related to the concern experiment.
20 %	To test the results and the error analysis of the experiment.
20 %	To test the subject knowledge through viva – voce.

Continuous Internal Assessment (CIA):
CIA is conducted for a total of 30 marks (Table 1), with 20 marks for continuous lab assessment during day to day performance, 10 marks for final internal lab assessment.

Table 1: Assessment pattern for CIA

Component	**Laboratory**		**Total Marks**
Type of Assessment	Day to day performance	Final internal lab assessment	
CIA Marks	20	10	30

Continuous Internal Examination (CIE):
One CIE exams shall be conducted at the end of the 16th week of the semester. The CIE exam is conducted for 10 marks of 3 hours duration.

Preparation	**Performance**	**Calculations and Graph**	**Results and Error Analysis**	**Viva**	**Total**
2	2	2	2	2	10

VI. HOW PROGRAM OUTCOMES ARE ASSESSED:

Program Outcomes (POs)		Strength	Proficiency assessed by
PO 1	**Engineering knowledge**: Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.	2	Presentation on real-world problems
PO 2	**Problem analysis:** Identify, formulate, review research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.	2	Open Ended Experiments
PO 5	**Modern tool usage:** Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modeling to complex engineering activities with an understanding of the limitations.	2	Presentation on real-world problems
PO 9	**Individual and team work:** Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.	1	Open Ended Experiments

3 = High; 2 = Medium; 1 = Low

VII. HOW PROGRAM SPECIFIC OUTCOMES ARE ASSESSED:

Program Specific Outcomes (PSOs)		Strength	Proficiency assessed by
PSO 1	**Engineering Knowledge:** Graduates shall demonstrate sound knowledge in analysis, design, laboratory investigations and construction aspects of civil engineering infrastructure, along with good foundation in mathematics, basic sciences and technical communication.	1	Presentation on real-world problems
PSO 2	**Broadness and Diversity:** Graduates will have a broad understanding of economical, environmental, societal, health and safety factors involved in infrastructural development, and shall demonstrate ability to function within multidisciplinary teams with competence in modern tool usage.	-	-
PSO 3	**Self-Learning and Service**: Graduates will be motivated for continuous self-learning in engineering practice and/ or pursue research in advanced areas of civil engineering in order to offer engineering services to the society, ethically and responsibly.	-	-

3 = High; 2 = Medium; 1 = Low

VIII. COURSE OBJECTIVES (COs):

The course should enable the students to:	
I	Gain the practical knowledge on calculation of an area, volume of an irregular and regular land surface using chains and tapes.
II	Operate different types of instruments in surveying. Perform leveling and contouring of ground surfaces.
III	Apply knowledge of mathematics in surveying field to calculate areas and volumes for different projects.
IV	Utilize total station and other modern survey instruments.

IX. COURSE LEARNING OUTCOMES (CLOs):

CLO Code	CLO's	At the end of the course, the student will have the ability to:	PO's Mapped	Strength of Mapping
ACEB03.01	CLO 1	Measurement of an area by chain survey	PO 1	1
ACEB03.02	CLO 2	Chaining across obstacles	PO 1 PO 2	1
ACEB03.03	CLO 3	Calculation of distance between two points with compass survey.	PO 5	2
ACEB03.04	CLO 4	Corrections for local attraction by prismatic compass	PO 5	2
ACEB03.05	CLO 5	Radiation method and intersection methods by plane table survey	PO 1	1
ACEB03.06	CLO 6	An exercise of longitudinal section and cross section and plotting.	PO 2	2
ACEB03.07	CLO 7	Measurement of horizontal angles	PO 2	2
ACEB03.08	CLO 8	Trigonometric leveling- heights and distance problems	PO 1, PO 2	1
ACEB03.09	CLO 9	Heights and distances using principles of tacheometric survey	PO 2	2
ACEB03.10	CLO10	Curve setting: different methods	PO 2	2
ACEB03.11	CLO11	Determination of an area using total station	PO 5, PO 9	2
ACEB03.12	CLO 12	Determination of remote height using total station	PO 5, PO 9	2
ACEB03.13	CLO 13	Calculating distance, gradient and different heights between two inaccessible points using total station.	PO 5, PO 9	2

3 = High; 2 = Medium; 1 = Low

X. MAPPING COURSE LEARNING OUTCOMES LEADING TO THE ACHIEVEMENT OF PROGRAM OUTCOMES AND PROGRAM SPECIFIC OUTCOMES:

Course Learning Outcomes (CLOs)	Program Outcomes (POs)												Program Specific Outcomes (PSOs)		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CLO 1	1														
CLO 2	2	1											1		
CLO 3					2										
CLO 4					2								1		
CLO 5	1														
CLO 6		2											2		
CLO 7		2													
CLO 8	1	2											1		
CLO 9		2											1		
CLO 10		2											2		

Course Learning Outcomes (CLOs)	Program Outcomes (POs)												Program Specific Outcomes (PSOs)		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CLO 11					2				2						
CLO 12					2				2				2		
CLO 13					2				2						

3 = High; 2 = Medium; 1 = Low

XI. ASSESSMENT METHODOLOGIES – DIRECT

CIE Exams	PO 1, PO 2, PO5, PO9, PSO1	SEE Exams	PO 1, PO 2, PO5, PO9, PSO1	Assignments	-	Seminars	-
Laboratory Practices	PO 1, PO 2, PO5, PO9	Student Viva	PO 1, PO 2, PO5, PO9	Mini Project	-	Certification	-

XII. ASSESSMENT METHODOLOGIES - INDIRECT

✔	Early Semester Feedback	✔	End Semester OBE Feedback
✘	Assessment of Mini Projects by Experts		

XIII. SYLLABUS

LIST OF EXPERIMENTS	
Week-1	**SURVEY OF AN AREA BY CHAIN SURVEY (CLOSED TRAVERSE) AND PLOTTING**
Batch I: Measurement of an area by chain survey Batch II: Measurement of an area by chain survey	
Week-2	**CHAINING ACROSS OBSTACLES**
Batch I: Chaining across obstacles Batch II: Chaining across obstacles	
Week-3	**DETERMINATION OF DISTANCE BETWEEN TWO INACCESSIBLE POINTS WITH COMPASS**
Batch I: Calculation of distance between two points with compass survey. Batch II: Calculation of distance between two points with compass survey.	
Week-4	**CORRECTION FOR LOCAL ATTRACTION BY PRISMATIC COMPASS**
Batch I: Corrections for local attraction by prismatic compass. Batch II: Corrections for local attraction by prismatic compass	
Week-5	**RADIATION METHOD, INTERSECTION METHODS BY PLANE TABLE SURVEY**
Batch I: Radiation method and intersection methods by plane table survey. Batch II: Radiation method and intersection methods by plane table survey	
Week-6	**AN EXERCISE OF LONGITUDINAL SECTION AND CROSS SECTION AND PLOTTING**
Batch I: An exercise of longitudinal section and cross section and plotting. Batch II: An exercise of longitudinal section and cross section and plotting.	

Week-7	**MEASUREMENT OF HORIZONTAL ANGLES BY METHOD OF REPETITION AND REITERATION**
Batch I: Measurement of horizontal angles Batch II: Measurement of horizontal angles	
Week-8	**TRIGONOMETRIC LEVELING- HEIGHTS AND DISTANCE PROBLEMS**
Batch I: Trigonometric leveling- heights and distance problems Batch II: Trigonometric leveling- heights and distance problems	
Week-9	**HEIGHTS AND DISTANCES USING PRINCIPLES OF TACHEOMETRIC SURVEY**
Batch I: Heights and distances using principles of tacheometric survey. Batch II: Heights and distances using principles of tacheometric survey	
Week-10	**CURVE SETTING –DIFFERENT METHODS**
Batch I: Curve setting: different methods. Batch II: Curve setting: different methods	
WeeK-11	**DETERMINATION OF AN AREA USING TOTAL STATION**
Batch I: Determination of an area using total station. Batch II: Determination of an area using total station.	
Week-12	**DETERMINATION OF REMOTE HEIGHT USING TOTAL STATION**
Batch I: Determination of remote height using total station. Batch II: Determination of remote height using total station	
Week-13	**CALCULATING DISTANCE, GRADIENT AND DIFFERENT HEIGHTS BETWEEN TWO INACCESSIBLE POINTS USING TOTAL STATION**
Batch I: Calculating distance, gradient and different heights between two inaccessible points using total station. Batch II: Calculating distance, gradient and different heights between two inaccessible points using total station.	

XIV. COURSE PLAN:

The course plan is meant as a guideline. Probably there may be changes.

Week	Topics to be covered	Course Learning Outcomes (CLOs)	Reference
1	Measurement of an area by chain survey	CLO1	T1,T2
2	Chaining across obstacles	CLO 2	T1,T2
3	Calculation of distance between two points with compass survey.	CLO 3	T1,T2
4	Corrections for local attraction by prismatic compass	CLO 4	T1,T2
5	Radiation method and intersection methods by plane table survey	CLO 5	T1,T2
6	An exercise of longitudinal section and cross section and plotting.	CLO 6	T1,T2
7	Measurement of horizontal angles	CLO 7	T1,T2
8	Trigonometric leveling- heights and distance problems	CLO 8	T1,T2
9	Heights and distances using principles of tacheometric survey	CLO 9	T1,T2
10	Curve setting: different methods	CLO 10	T1,T2

Week	Topics to be covered	Course Learning Outcomes (CLOs)	Reference
11	Determination of an area using total station	CLO 11	T1,T2
12	Determination of remote height using total station	CLO 12	T1,T2
13	Calculating distance, gradient and different heights between two inaccessible points using total station.	CLO 13	T1,T2

XV. GAPS IN THE SYLLABUS - TO MEET INDUSTRY / PROFESSION REQUIREMENTS:

S NO	Description	Proposed actions	Relevance with POs	Relevance with PSOs
1	To improve standards and analyze the concepts.	Open ended problems	PO 1	PSO 1
2	Encourage students to solve real time applications such as Photogrammetric survey, GIS and GPS	Open ended problems	PO 1	PSO 1

Prepared by:
Mr. B Suresh, Assistant Professor

HOD, CE