Course Information Sheet

Programme:UG	**Degree:** B. Tech AGRICULTURAL ENGINEERING	
Course Code:	**Course Title: SURVEYING AND LEVELING**	
Year: II **Sem:** II **A.Y. :2025-26**	**Regulation:** IS23 **University:** JNTU Kakinada.	
L T/P/D C: 3/0/0/3	**Credits: 3**	**Contact Hrs: 5**
Mid Marks: 30	**External Marks: 70**	**Total Marks:** 100
Teaching Hrs: 30	**Exam Duration1:** 3 hrs.	

Course Pre-Requisites: Agricultural Engineering

Course Code	Course Name	Description	Year-Sem
IS23	SURVEYING AND LEVELING	1.This course provides a comprehensive introduction to the principles and practices of surveying and leveling. 2. To covering fundamental concepts of horizontal and vertical positioning. 3. field data collection using surveying instruments, calculations, and map preparation. 4.essential for Agricultural engineering projects	II AGRI Semester -2

Course outcomes:

Student will able to

No.	Description	Skill /Bloom's Taxonomy Level
CO1	Understand the basic principles of surveying and leveling techniques.	Remember Understand TL1/TL2
CO 2	Gain proficiency in using surveying instruments like theodolite, level, and total station.	Apply/TL3
CO 3:	Learn to perform field surveys including distance measurements, angle observations, and levelling operations.	Create /TL4
CO4	Calculate and plot survey data to create accurate maps and plans.	Design/TL 6
CO5	Apply surveying principles to different civil engineering projects such as land development, construction layout, and topographic mapping	Derived it from lower-level Blooms /TL5

Course Articulation Matrix:

Mapping of Course Outcomes (CO) with Program Outcomes (PO) and Program Specific Outcomes (PSOs):

Course Outcomes (CO)	Program Outcomes (PO)												Program Specific Outcomes (PSO's)	
	PO 1	**PO 2**	**PO 3**	**PO 4**	**PO 5**	**PO6**	**PO 7**	**PO 8**	**PO 9**	**PO 10**	**PO 11**	**PO 12**	**PSO 1**	**PSO 2**
CO1	3	3	1	1	-	-	-	3	-	3	2	3	3	
CO2	3	3	1	2	3	1	2	3	2	-	-	-	3	
CO3	3	3	1	1	-	1	-	-	-	3	1	2	3	
CO4	3	1	3	2	1	-	1	2	3	-	-	2	3	
CO5	3	1	3	1	-	1	-	3	-	3	1	-	3	
Overall	**3**	**2.5**	**2.5**	**1.5**	**2.0**	**1.0**	**1.5**	**3**	**2.5**	**3.0**	**1.3**	**2.7**	**3**	

Level: 1- Low correlation (Low), 2- Medium correlation (Medium), 3-High correlation (High)

JUSTIFICATIONS OF CO-PO MAPPING

AGRI-101.1		
AGRI-P01	2	Apply the knowledge of Mathematics,science,Engineering Fundamentals and an Engineering Specialization to the Solution of complex Engineering problems.
AGRI-P02	3	Identify formulate, review Research literature and Analyze Complex Engineering Problems reaching Substantiated conclusions using first principles of Mathematics, Natural Sciences, and Engineering Sciences
AGRI-P03	2	Design Solutions for Complex Engineering and Problems and design System Components are processes that meet the specified needs with appropriate Consideration for the public health and Safety and the cultural, Societal and Environmental Considerations
AGRI-P04	1	Use research-based Knowledge and research Methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide conclusions
AGRI-PO5	-	
AGRI-PO6	-	
AGRI-PO7	-	
AGRI-PO8	-	
AGRI-PO9	-	
AGRI-P10	-	
AGRI-P11	-	
AGRI-P12	-	

AGRI-101.2		
AGRI-P01	2	Apply the knowledge of Mathematics,science,Engineering Fundamentals and an Engineering Specialization to the Solution of complex Engineering problems.
AGRI-P02	3	Identify formulate, review Research literature and Analyze Complex Engineering Problems reaching Substantiated conclusions using first principles of Mathematics , Natural Sciences , and Engineering Sciences
AGRI-P03	1	Design Solutions for Complex Engineering and Problems and design System Components are processes that meet the specified needs with appropriate Consideration for the public health and Safety and the cultural,Societial and Environmental Considerations
AGRI-P04	2	Use research-based Knowledge and research Methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide conclusions
AGRI-PO5	-	
AGRI-PO6	-	
AGRI-PO7	**1**	Understand the impact of the professional Engineering Solutions in Social and Environmental Contexts, and demonstrate the knowledge of, and need for sustainable development.
AGRI-PO8	-	
AGRI-PO9	--	
AGRI-P10	-	
AGRI-P11	-	
AGRI-P12	**1**	Recognize the need for, and have the preparation and ability to engage in independent and life long learning in the broadest context of technical change

AGRI-101.3		
AGRI-	2	Apply the knowledge of Mathematics,science,Engineering Fundamentals and an

P01		Engineering Specialization to the Solution of complex Engineering problems.
AGRI-P02	2	Identify formulate, review Research literature and Analyze Complex Engineering Problems reaching Substantiated conclusions using first principles of Mathematics , Natural Sciences , and Engineering Sciences
AGRI-P03	1	Design Solutions for Complex Engineering and Problems and design System Components are processes that meet the specified needs with appropriate Consideration for the public health and Safety and the cultural,Societial and Environmental Considerations
AGRI-P04	2	Use research-based Knowledge and research Methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide conclusions
AGRI-PO5	**1**	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
AGRI-PO6	**1**	Apply reasoning informed by the contextual knowledge to assess social, health, safety legal cultural issues and the consequent responsibilities relevant to the professional Engineering practice
AGRI-PO7	**3**	Understand the impact of the professional Engineering Solutions in Social and Environmental Contexts, and demonstrate the knowledge of, and need for sustainable development.
AGRI-PO8	**-**	
AGRI-PO9	**-**	
AGRI-P10	**1**	Communicate effectively on complex Engineering activities with the Engineering community and with society at large, such as , being able to comprehend and write effective reports and design documentation , make effective presentation, and give and receive clear instructions
AGRI-P11		
AGRI-P12	**1**	Recognize the need for, and have the preparation and ability to engage in independent and life long learning in the broadest context of technical change

Justification for Avg CO-PO Mapping		
Mapping	**Level**	**Justification**
AGRI-P01	1	Apply the knowledge of Mathematics,science,Engineering Fundamentals and an Engineering Specialization to the Solution of complex Engineering problems.
AGRI-P02	2	Identify formulate, review Research literature and Analyze Complex Engineering Problems reaching Substantiated conclusions using first principles of Mathematics , Natural Sciences , and Engineering Sciences
AGRI-P03	1	Design Solutions for Complex Engineering and Problems and design System Components are processes that meet the specified needs with appropriate Consideration for the public health and Safety and the cultural,Societial and Environmental Considerations
AGRI-P04	1	Use research-based Knowledge and research Methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide conclusions
AGRI-PO5	1	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
AGRI-PO6	1	Apply reasoning informed by the contextual knowledge to assess social, health, safety legal cultural issues and the consequent responsibilities relevant to the professional Engineering practice
AGRI-PO7	1	Understand the impact of the professional Engineering Solutions in Social and Environmental Contexts, and demonstrate the knowledge of, and need for sustainable development.
AGRI-PO8	--	
AGRI-PO9	--	
AGRI-P10	--	
AGRI-P11	--	
AGRI-P12	-	

TOPICS BEYOND SYLLABUS/ASSIGNMENT/INDUSTRY VISIT/PROJECTS/NPTEL ETC

S.No.	Description	Proposed Actions
1	Surveying for environmental monitoring	Seminar
2	Surveying for disaster response	Seminar

Topic beyond Syllabus: Mapping with PO and PSO:

Topic beyond syllabus	**Topics** **Program Outcomes (PO)**												**Program Specific Outcomes (PSO's)**	
1.	**PO 1**	**PO 2**	**PO 3**	**PO 4**	**PO 5**	**PO 6**	**PO 7**	**PO 8**	**PO 9**	**PO 10**	**PO 11**	**PO 12**	**PSO 1**	**PSO 2**
	3	3	2	3	3	-	-	-	-	-	-	2	3	2

Justification for Topic beyond the Syllabus (TBS) -PO Mapping.

Mapping	Level	Justification
TBS-PO1	3	Apply the knowledge of Mathematics, science, Engineering Fundamentals and an Engineering Specialization to the Solution of complex Engineering problems.
TBS-PO2	3	Identify formulate, review Research literature and Analyze Complex Engineering Problems reaching Substantiated conclusions using first

		principles of Mathematics , Natural Sciences , and Engineering Sciences
TBS-PO3	2	Design Solutions for Complex Engineering and Problems and design System Components are processes that meet the specified needs with appropriate Consideration for the public health and Safety and the cultural,Societial and Environmental Considerations
TBS - PO4	3	Use research-based Knowledge and research Methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide conclusions
TBS - PO5	3	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

Justification for Topic Beyond the Syllabus (TBS) -PSO Mapping.

Mapping	**Level**	**Justification**
TBS-PSO1	3	Ability in terms of innovative and creative thinking, formulate problem solutions towards real and practical field problems in Basic knowledge in other engineering streams (Core Skills).
TBS-PSO2	2	Ability to learn new Scientific technologies by acquiring knowledge in agricultural engineering to generate employment and entrepreneurship opportunities in other engineering streams (Professional Development).

WEB SOURCE REFERENCES :

1	https://onlinecourses.nptel.ac.in/noc...
2	https://onlinecourses.nptel.ac.in/noc..

Syllabus / Lesson Plan:

				Text book/references/web references and additional

S.No	SYALLABUS	Periods	Methodology	text book reference
	UNIT- I			
1	Introduction to Surveying	**1**	**Chalk & Talk**	**T2, A1**
2	Overview of plane surveying (chain, compass, plane table)	**1**		
3	Objectives, principles and classifications	**1**	**Chalk & Talk,**	**T1, T2, A1**
4	Distance measurement conventions and methods (use of chain and tape)	**1**	**Chalk & Talk,**	**T2, A1**
5	Meridians, bearings, declination.	**1**	**Chalk & Talk,**	**T1,T2**
6	Computation of angles.	**1**	**Chalk & Talk,**	**T1,T2**
	UNIT- II			
1	Concept and terminology	**1**	**Chalk & Talk**	**T2, A1**
2	Temporary and permanent adjustments	**1**	**Chalk & Talk**	
3	Methods of levelling	**1**		**T1, T2, A1**
4	Characteristics and uses of contours	**1**	**Chalk & Talk,**	**T2, A1**
5	Methods of Conducting contour surveys and their plotting	**1**	**Chalk & Talk,**	**T1,T2**
	UNIT-III			

1	Area from field notes, computation of along irregular boundaries and area consisting of regular boundaries.	**1**	**Chalk & Talk** **Demo of mechanisms**	
2	**Embankments and cutting for a level section.**	**1**		
3	Two level sections with and without transverse slopes	**1**	**Chalk & Talk**	**T1, A1,A2**
4	Determination of the capacity of reservoir	**1**	**Chalk & Talk**	**T1, A1,A2**
5	Volume of barrow pits	**1**	**Chalk & Talk**	**T1, A1, A2**
	Unit-IV			
1	Theodolite, description	**1**	**Chalk & Talk**	**T2, A1, A2**
2	Uses and adjustments-temporary and permanent	**1**	**Chalk & Talk**	**T2, A1, A2**
3	Measurement of horizontal and vertical angles	**1**	**Chalk & Talk**	**T2, A1, A2**
4	Trigonometrical leveling	**1**	**Chalk & Talk**	**T2, A1, A2**
5	Traversing	**1**	**Chalk & Talk**	**T2, A1, A2**
	Unit-v			
1	Stadia and tangential methods of tacheometry	**1**	**Chalk & Talk**	**T2, A1, A2**
2	Distance and elevation formulae for staff vertical position	**1**	**Chalk & Talk**	**T2, A1, A2**
3	Types of curves	**1**	**Chalk & Talk**	**T2, A1, A2**
4	Design and setting out	**1**	**Chalk & Talk**	**T2, A1, A2**

5	Simple and compound curves	**1**	**Chalk & Talk**	**T2, A1, A2**
8	**Introduction to geographic information system (GIS)**	**1**	**Chalk & Talk**	**T2, A1, A2**
	GRAND TOTAL	**29**		

Topic Beyond Syllabus:

S.No.	**Topic Beyond Syllabus Planning**	**PERIODS**	**Methodology**	**Text book/references/web references and additional text book reference**
1	Artificial intelligence in surveying	**2**	Seminar	**T1, T3,A1**
2	Surveying software	**2**	Seminar	

Note: Bloom's Taxonomy Levels

BTL1-Remember	**BTL2 – Understand**	**BTL3 –Apply**
BTL4-Analyze	**BT56 Evaluate**	**BTL6–Create**

Text books (T) / Reference books (R)/Additional text books (A):

T/R/A	Book Title/Author/Publication
T1	"Surveying and leveling" by N.N.Basak, McGraw-Hill Education,2018, 4th edition
T2	"Surveying" by S.K.ROY, Tata McGraw-Hill Education,2015, 3rd edition
T3	Geospatial Surveying by J.D.Bossler,CRCpublishing, 2020,2ND Edition.
R1	Surveying, Vol- I and Vol-II, S.K. Duggal, Tata McGraw Hill Publishers 2019. Fifth Edition.
R2	**Surveying Vol. 1, 2 &3,** Dr. B.C. Punmia, Ashok Kumar Jain, Arun Kumar Jain, 17th Edition (2023), Laxmi Publications
R3	**Higher Surveying,** A.M. Chandra,3rd Edition (2015), New Age International Publishers
R4	**Surveying and Levelling,**T.P. Kanetkar, S.V. Kulkarni,25th Edition (2022), Vidyarthi Griha Prakashan
R5	**Surveying and Leveling,** R. Subramanian 2nd Edition, Oxford University Press

Web References:

W1	https://swayam.gov.in/...
W2	https://swayam.gov.in/...
W3	https://swayam.gov.in/...
W4	https://swayam.gov.in/...
W5	https://swayam.gov.in/...

ASSESSMENT METHODOLOGIES-DIRECT

☑ASSIGNMENTS	☑ STUD. SEMINARS	☑TESTS/MODEL EXAMS	☑UNIV. EXAMINATION
☐ STUD. LAB PRACTICES	☐ STUD. VIVA	☐ MINI/MAJOR PROJECTS	☐ CERTIFICATIONS
☐ ADD-ON COURSES	☐ OTHERS		

ASSESSMENT METHODOLOGIES-INDIRECT

☑ ASSESSMENT OF COURSE OUTCOMES (BY FEEDBACK, ONCE)	☑ STUDENT FEEDBACK ON FACULTY (TWICE)
☐ ASSESSMENT OF MINI/MAJOR PROJECTS BY EXT. EXPERTS	☐ OTHERS

Prepared by **Approved by**