M.A./ M.Sc. (Two Years Degree Program)	
III Semester	
Subject-Geography	
Code of the Course	GEG9100P
Title of the Course	LAND SURVEYING & FIELD WORK
Qualification Level of the Course	NHEQF Level 6.5
Credit of the course	4
Type of the course	Discipline Specific Elective Practical Course in Geography
Delivery type of the Course	Practical (80+40). The 80 hours for content delivery include hands-on exercises, and 40 hours of diagnostic assessment, formative assessment, and subject/class activity, problem solving.
Pre-requisites	Fundamental understanding of geographical concepts & phenomena
Co-requisites	Basic concepts of surveying, mapping and cartography techniques.
Objectives of the course	• To develop skill to map locations of real-world features. • Develops skill to determine the distances on ground and height of various features on the earth. • Develops a sound knowledge of surveying and levelling instruments with focus on improving precision in field measurements. • To develop vocational expertise for work as surveyors, town planners and cartographers.
Learning outcomes	• To learn about fundamentals of surveying and levelling techniques in geographical studies. • To learn various survey and levelling instruments – Plane Table, Clinometer, Dumpy Level. • To learn basics of Mobile GPS to collect locational data.
Syllabus **पाठ्यक्रम**	
UNIT - I	Science and art of Surveying. Principles of surveying. General errors and inaccuracies in surveying. Precautions in using survey instruments**.** Trigonometrical methods of solution of triangles and computation of lengths. विज्ञान और सर्वेक्षण की कला। सर्वेक्षण के सिद्धांत। सर्वेक्षण में सामान्य त्रुटियां और अशुद्धताएं। सर्वेक्षण उपकरणों का उपयोग करते समय सावधानियां। त्रिकोणमितीय तरीकों से त्रिकोणों का समाधान और लंबाइयों की गणना।
UNIT - II	**Plane Table survey** Use of Plane Table in composite surveys and related methods, methods of resectioning. General planning of large area plane surveys. Drawing of control points and surveyed plan. A composite survey of college campus or village/neighborhood. **प्लेन टेबल सर्वेक्षण**

	समग्र सर्वेक्षण और संबंधित विधियों में प्लेन टेबल का उपयोग, स्थिति-निर्धारण की विधियाँ। बड़े क्षेत्र के सतह सर्वेक्षण की सामान्य योजना। नियंत्रण बिंदुओं और सर्वेक्षण योजना का चित्रण। कॉलेज परिसर या गांव/पड़ोस का समग्र सर्वेक्षण।
UNIT - III	**Clinometer** Use of Clinometer as instrument of leveling. Measuring spot heights. Contouring and interpolation of contours. Drawing profiles. **क्लिनोमीटर** समतलन के उपकरण के रूप में क्लिनोमीटर का उपयोग। स्थानिक ऊंचाई मापन। समोच्च रेखाकरण और सामोच्च रेखा का अंतर्वेषण। परिच्छेदिका चित्रण।
UNIT - IV	**Dumpy level** Use of Dumpy level as an instrument of leveling. Adjustment of the dumpy level**.** Principles: calculation of difference of level, series leveling, back sights, foresights, intermediate sights. Level field-book and computation of reduced level: Rise and Fall, and collimation method Drawing profiles. **डम्पी लेवल** समतलन के उपकरण के रूप में डम्पी लेवल का उपयोग। डम्पी लेवल का समायोजन। सिद्धान्त: लेवल अंतर की गणना, श्रृंखला समतलन, पश्चदृष्टि, अग्रदृष्टि, मध्यवर्ती दृष्टियाँ। लेवल क्षेत्र–पुस्तिका और समानीत लेवल की गणना: उत्थान-पतन, और संधान विधि। परिच्छेदिका चित्रण।
UNIT - V	**Mobile GPS** Introduction to Mobile Mapping. Point data collection. Route mapping. **मोबाइल जीपीएस** मोबाइल मानचित्रण का परिचय। बिंदु डेटा संग्रहण। मार्ग मानचित्रण।
	Candidates will submit following exercises as record work: 1. Resectioning: 3 exercises of geographical methods of Llano's, Bessel's and trial and error 2. Profiles: 2 exercises based on leveling measurements obtained with dumpy level 3. Contouring: 1 exercise based on leveling measurements obtained with dumpy level 4. Contouring: 1 exercise based on leveling measurements obtained with clinometers 5. Measuring and plotting reduced levels using tacheometer: 2 exercises 6. Triangulation survey based on a minimum of 15 control points using theodolite: 2 exercises including one related to composite survey 7. Plan of un-surveyed campus/neighborhood/village area based on composite survey: 1 exercise (10 day's camp) 8. Thematic maps showing characteristics of the surveyed area: form of built-up area, and building material: 6 exercises 9. Point data collection and Route mapping using Mobile GPS. (1 exercise) All exercises will be based on surveying and leveling work done by the candidates themselves for areas hitherto un-surveyed
	Suggested Readings **सहायक ग्रन्थ / सामग्री**
Text Books	1. शर्मा, जे.पी., प्रयोगात्मक भूगोल, रस्तोगी पब्लिशर्स, मेरठ 2. Mishra, R. P. and A. Ramesh, Fundamentals of Cartography, Concept Publishers, New Delhi.

Reference Books	1. Clark, D., Plane and Geodetic Surveying, Constable 2. Davis, R. E. and F. S. Foot, Surveying: Theory and Practice, McGraw Hill 3. Hinks, H.R., Map and Survey, Cambridge 4. Kanetkar, T. P., Surveying and leveling, Volume I & II, A. U. Grah Prakashan 5. Kiley, P. T., Surveying and leveling, Volume I & II, A. U. Grah Prakashan 6. Survey Manual, Volume I-VIII, Survey of India 7. Williamson, J. T., Surveying and Field Work, Constable
Suggested E-resources	1. https://www.surveyofindia.gov.in/ 2. https://theconstructor.org/surveying/ 3. https://unacademy.com/content/gate/study-material/civil-engineering/surveying-and-leveling-measurement-of-distance-and-area/ 4. https://mapscaping.com/exploring-how-cell-phone-gps-tracking-works/#:~:text=GPS%20tracking%20works%20by%20using,it%20receives%20from%20multiple%20satellites.