GUJARAT TECHNOLOGICAL UNIVERSITY, AHMEDABAD, GUJARAT

COURSE CURRICULUM

Course Title: Surveying
(Code: 3330605**)**

Diploma Programme in which this course is offered	**Semester in which offered**
Civil /Mining/ Environmental/Transportation Engineering	Third

1. RATIONALE

Field survey is the basic requirement for preparing any engineering maps or drawings. Field survey can be done only when various steeps involved in the survey work are known. To achieve this skill operation and handling of various survey instruments like compass, level, plane table, GPS etc should be known. In this course such desired performing abilities will be developed which are expected from a civil engineering technician.

2. COMPETENCY

The course contented should be taught and implemented with the aim to develop different types of skills so that students are able to acquire following competencies:

1. **To carry out field survey and to prepare drawings & maps.**
2. **To interpret the drawings and find out different physical quantities like length, area, volume, elevations etc.**

3. TEACHING AND EXAMINATION SCHEME

Teaching Scheme (In Hours)			**Total Credits (L+T+P)**	**Examination Scheme**				
				Theory Marks		**Practical Marks**		**Total Marks**
L	**T**	**P**	**C**	**ESE**	**PA**	**ESE**	**PA**	**200**
3	0	6	9	70	30	40	60	

Legends: L - Lecture; **T** - Tutorial/Teacher Guided Student Activity; **P** - Practical; **C** - Credit; **ESE** - End Semester Examination; **PA** - Progressive Assessment

Note: It is the responsibility of the institute heads that marks for **PA of theory & ESE and PA of practical** for each student are entered online into the GTU Portal at the end of each semester within the dates specified by GTU.

4. COURSE DETAILS

Unit	Major Learning Outcomes	Topics and Sub-topics
Unit – I **Introduction and Scale**	1a. To understand the basics of surveying. 1b. Apply various types of scale as per needs.	1.1 Definitions 1.2 Objective and uses of surveying 1.3 Plain and Geodetic Survey 1.4 Classification of Survey 1.5 Principals of Survey 1.6 Types of Scale and selection of scale 1.7 Construction of diagonal scale
Unit – II **Chain Survey**	2a. To understand and carry out linear measurements. 2b. To prepare drawing as per recorded measurements.	2.1 Introduction 2.2 Instruments used in chain survey Metric Chain, Tapes, Arrow, Tapes, Ranging rod, Offset rod, Open cross staff, optical square 2.3 Technical terms related with chain survey Survey Station, Base line, Check line, Tie line, Offset, Tie station 2.4 Method of Chaining 2.5 Errors in length due to incorrect length and Related problems. 2.6 Obstacles in chaining 2.7 Ranging - Direct Ranging & Indirect Ranging 2.8 Methods of taking offsets - Perpendicular & Oblique 2.9 Location Sketch of survey station and running measurements of building. 2.10 Conventional Signs 2.11 Recording of measurements in a field book
Unit – III **Compass Survey**	3a. To understand and carry out angular measurements. 3b. To prepare drawing as per recorded measurements.	3.1 Introduction - Triangulation Survey & Traversing 3.2 Components of Prismatic Compass 3.3 Functions of different parts of prismatic compass 3.4 Differentiate Prismatic and Surveyor compass 3.5 Method to use Prismatic Compass 3.6 Technical Terms - True Meridian & Bearing, - Magnetic Meridian & Bearing, - Arbitrary Meridian & Bearing, - Dip of Magnetic needle - Declination,

Unit	Major Learning Outcomes	Topics and Sub-topics
		- Fore Bearing & Back Bearing 3.7 Whole Circle Bearing System and Reduced Bearing System & examples 3.8 Method of finding included angles from bearings & examples 3.9 Local attraction and Closing error with reverent examples 3.10 Errors in compass survey and elimination of errors
Unit – IV **Levelling**	4a. To understand and carry out levels. 4b. To prepare contour maps by calculating Reduce level.	4.1 Introduction 4.2 Basic terminology related with levelling like Level surfarces,Horizontal & vertical surfaces, Datum, Bench Marks, Reduced Level, Rise, Fall, Line of collimation, Axis of Telescope, Axis of bubble tube, Station, Back sight, Fore sight, intermediate sight, Change point, Height of instruments, Focusing ans parallax,etc. 4.3 Types of Level Dumpy Level, Tilting Level, Auto Level, Digital Level 4.4 Components of Dumpy Level with neat sketch 4.5 Types of Levelling Staffs Self-reading staff & Target staff 4.6 Temporary adjustment of Level 4.7 Classification of Levelling - Simple Levelling, Differential Levelling, Fly Levelling, Profile Levelling, Reciprocal Levelling and Precise Levelling 4.8 Examples & methods of finding out the R. L. in Level Book by H.I. Methods & Rise & Fall Methods 4.9 Correction for Curvature and refraction and related examples 4.10 Errors in Levelling 4.11 Contour 4.12 Uses of contours 4.13 Characteristics of contours 4.14 Methods of Contouring 4.15 Interpolation of contours 4.16 Preparing drawing & estimation of gradients 4.17 Calculation of capacity of reservoirs &

Unit	Major Learning Outcomes	Topics and Sub-topics
		related examples
Unit – V **Plane Table Survey**	5a. To prepare drawing as per recorded measurements. 5b. To find the areas of prepared drawings	5.1 Introduction to Plane Table surveying 5.2 Equipments and accessories of plane table survey 5.3 Advantages and disadvantages of plane table survey 5.4 Orientation of plane table survey 5.5 Methods of setting up plane table over the station 5.6 Points to be kept in mind during plane table surveying 5.7 Errors in plane table surveying
Unit – VI Introduction to Global Positioning System (GPS)	6a. To understand GPS.	6.1 Introduction to GPS 6.2 Maps & types of maps 6.3 Various satellite used by GPS 6.4 Fundamentals of GPS 6.5 Uses of GPS 6.6 GPS Receivers(Hand Held GPS Receivers) 6.7 Its Function 6.8 Field procedures of GPS 6.9 Observations and applications in Civil Engineering

5. SUGGESTED SPECIFICATION TABLE WITH HOURS & MARKS (THEORY)

Unit	Unit Title	Teaching Hours	Distribution of Theory Marks			
			R Level	U Level	A Level	Total Marks
1	**Introduction and Scale**	**04**	00	04	03	07
2	**Chain Survey**	**06**	02	02	06	10
3	**Compass Survey**	**06**	04	04	06	14
4	**Levelling**	**14**	04	10	14	28
5	**Plane Table Survey**	**06**	03	04	00	07
6	**Introduction to Global Positioning System (GPS)**	**06**	02	02	00	04
Total		**42**	**10**	**28**	**32**	**70**

Legends: R = Remember; U = Understand; A = Apply and above levels (Bloom's revised taxonomy)

Note: This specification table shall be treated as only general guideline for students and teachers. The actual distribution of marks in the question paper may vary from above table.

6. SUGGESTED LIST OF EXERCISES/PRACTICAL

The practical/exercises should be properly designed and implemented with an attempt to develop different types of skills so that students are able to acquire the competency. Following is the list of experiments for guidance.

Sr. No.	Unit No.	Practical/Exercise	Apprx. Hrs. Required	Apprx. Hrs. Required for Project
1	**I,II**	**Chain Tape and Compass Survey** - **To Carry out the project for a building and prepare the drawing sheet** - **Minimum Five Station**	**16**	**06**
2	**III**	**Profile Levelling** - **To carry out the project on an undulating ground and prepare the drawing sheet** - **Size of profile 100m X 60 m**	**24**	**08**
3	**IV**	**Plane Table Survey** - **Prepare map of open vacant land (min 1000 sq.m) using any plane table method**	**12**	**06**
4	**V**	**Introduction to Global Positioning System (GPS)**	**04**	**--**
		Total	**56**	**20**

7. SUGGESTED LIST OF STUDENT ACTIVITIES

Following is the list of proposed student activities like: Course/topic based seminars, internet based assignments, teacher guided self learning activities, course/library/internet/lab based mini-projects etc. These could be individual or group-based.

S. No.	Unit No.	Student Activities
1	**I**	**Visit the area to be surveyed and collect the primary data**
2	**II**	**Visit the area to be surveyed and collect the primary data**
3	**III**	**Visit the area to be surveyed and collect the primary data**
4	**IV**	**Visit the area to be surveyed and collect the primary data**
5	**V**	**Visit the area to be surveyed and collect the primary data**

8. SUGGESTED LEARNING RESOURCES

A. List of Books:

S. No.	Title of Books	Author	Publication
1	Surveying and levelling Vol-I	T. P. Kanetkar & S. V. Kulkarni	Puna Vidyarthi Griha Prakashan
2	Surveying and Levelling Vol-I	Dr. B. C. Punmia	Laxmi Publications Pvt. Ltd.

3	Surveying	C.L.Kochher	
4	Surveying and Levelling Vol-I	Hussain & Nagrani	
5	Surveying	Mimi Das Saikia	PHI Learning Pvt. Ltd
6	Fundamentals of Surveying	S. K. Roy	PHI Learning Pvt. Ltd
7	CD Programme on GPS and GIS	Learning Materials Development Project	NITTTR, Taramani, Chennai

B. List of Major Equipment/Materials:

Metric Chain, Tapes, Open Cross staff, Optical Square, Prismatic Compass,Surveyor's Compass, Dumpy Level, Tilting Level, Auto Level, Levelling Staff, Target Staff, Plane Table And its accessories, GPS, other misc. equipments, etc.

C. List of Software/Learning Websites

www.Autodesk.com
www.drawingnow.com
www.learn-to-draw.com

9. COURSE CURRICULUM DEVELOPMENT COMMITTEE

Faculty Members from Polytechnics

(1) Dr. K. G. Mehta **Principal – Merchant Engg. College,Visnagar**
(2) Mr. Prakash Kalyani **L.C.E. - Tolani Polytechnic, Adipur**
(3) Mr. Prakash D. Gohil **L.C.E. - Sir B. P. T. I., Bhavanagar**
(4) Mr. Vyom B. Pathak **L.C.E. – BVPIT (DS) Umarakh Ta-Bardoli**

Coordinator and Faculty Members from NITTTR Bhopal

(1) Prof. A. K. JAIN - Prof. & Head of Civil Engineering

(2) Prof. Pathak - Prof. of Civil Engineering