

Th 1. LAND SURVEY– II

Name of the Course: Diploma in Civil Engineering			
Course code:		Semester	6th
Total Period:	75	Examination	3 hrs
Theory periods:	5P/week	Class Test:	20
Maximum marks:	100	End Semester Examination:	80

A. RATIONALE

Modern survey techniques are heavily dependent on advanced instruments and image based data. The course enables students to acquaint themselves with necessary information and processing procedures.

B. COURSE OBJECTIVES

On completion of the subject a student will be able to –

1. Solve numerical problems in the segment off tacheometry
2. Comprehend concepts of curve ranging and solve simple numerical
3. Study and interpret maps
4. Acquaint themselves with modern surveying methods including use of digital theodolite and total station
5. Comprehend basics of GPS setup, data processing and export
6. Comprehend basics of GIS and prepare map using GIS data

C. TOPIC WISE DISTRIBUTION

Chapter	Name of topics	Hours
1	TACHEOMETRY: (Only concepts; applications without derivation)	09
2	CURVES	08
3	BASICS ON SCALE AND BASICS OF MAP:	08
4	SURVEY OF INDIA MAP SERIES:	10
5	BASICS OF AERIAL PHOTOGRAPHY, PHOTOGRAMMETRY, DEM AND ORTHO IMAGE GENERATION:	10
6	MODERN SURVEYING METHODS :	10
7	BASICS ON GPS & DGPS AND ETS:	10
8	BASICS OF GIS AND MAP PREPARATION USING GIS	10

D. COURSE CONTENTS:

- 1 **TACHEOMETRY:**
(Only concepts; applications without derivation)
 - 1.1 Principles, stadia constants determination
 - 1.2 Stadia tacheometry with staff held vertical and with line of collimation horizontal or inclined, numerical problems
 - 1.3 Elevations and distances of staff stations – numerical problems

- 2 **CURVES :**
 - 2.1 compound, reverse and transition curve, Purpose & use of different types of curves in field

- 2.2 Elements of circular curves, numerical problems
- 2.3 Preparation of curve table for setting out
- 2.4 Setting out of circular curve by chain and tape and by instrument angular methods (i) offsets from long chord, (ii) successive bisection of arc, (iii) offsets from tangents, (iv) offsets from chord produced, (v) Rankine's method of tangent angles (No derivation)
- 2.5 Obstacles in curve ranging – point of intersection inaccessible

3 BASICS ON SCALE AND BASICS OF MAP:

- 3.1 Fractional or Ratio Scale, Linear Scale, Graphical Scale
- 3.2 What is Map, Map Scale and Map Projections
- 3.3 How Maps Convey Location and Extent
- 3.4 How Maps Convey characteristics of features
- 3.5 How Maps Convey Spatial Relationship
 - 3.5.1 Classification of Maps
 - 3.5.1 Physical Map
 - 3.5.2 Topographic Map
 - 3.5.3 Road Map
 - 3.5.4 Political Map
 - 3.5.5 Economic & Resources Map
 - 3.5.6 Thematic Map
 - 3.5.7 Climate Map

4 SURVEY OF INDIA MAP SERIES:

- 4.1 Open Series map
- 4.2 Defense Series Map
- 4.3 Map Nomenclature
 - 4.3.1 Quadrangle Name
 - 4.3.2 Latitude, Longitude, UTM's
 - 4.3.4 Contour Lines
 - 4.3.5 Magnetic Declination
 - 4.3.6 Public Land Survey System
 - 4.3.7 Field Notes

5 BASICS OF AERIAL PHOTOGRAPHY, PHOTOGRAMMETRY, DEM AND ORTHO IMAGE GENERATION:

- 5.1 Aerial Photography:
 - 5.1.1 Film, Focal Length, Scale
 - 5.1.2 Types of Aerial Photographs (Oblique, Straight)
- 5.2 Photogrammetry:
 - 5.2.1 Classification of Photogrammetry
 - 5.2.2 Aerial Photogrammetry
 - 5.2.3 Terrestrial Photogrammetry
- 5.3 Photogrammetry Process:
 - 5.3.1 Acquisition of Imagery using aerial and satellite platform
 - 5.3.2 Control Survey
 - 5.3.3 Geometric Distortion in Imagery
 - Application of Imagery and its support data
 - Orientation and Triangulation
 - Stereoscopic Measurement
 - 19.9.1 X-parallax
 - 19.2.2 Y-parallax

- 5.4 DTM/DEM Generation
- 5.5 Ortho Image Generation

6 MODERN SURVEYING METHODS :

- 6.1 Principles, features and use of (i) Micro-optic theodolite, digital theodolite
- 6.2 Working principles of a Total Station (Set up and use of total station to measure angles, distances of points under survey from total station and the co-ordinates (X,Y & Z or northing, easting, and elevation) of surveyed points relative to Total Station position using trigonometry and triangulation.

7 BASICS ON GPS & DGPS AND ETS:

- 7.1 GPS: - Global Positioning
 - 7.1.1 Working Principle of GPS,GPS Signals,
 - 7.1.2 Errors of GPS,Positioning Methods

- 7.2 DGPS: - Differential Global Positioning System
 - 7.2.1 Base Station Setup
 - 7.2.2 Rover GPS Set up
 - 7.2.3 Download, Post-Process and Export GPS data
 - 7.2.4 Sequence to download GPS data from flashcards
 - 7.2.5 Sequence to Post-Process GPS data
 - 7.2.6 Sequence to export post process GPS data
 - 7.2.7 Sequence to export GPS Time tags to file

- 7.3 ETS: - Electronic Total Station
 - 7.3.1 Distance Measurement
 - 7.3.2 Angle Measurement
 - 7.3.3 Leveling
 - 7.3.4 Determining position
 - 7.3.5 Reference networks
 - 7.3.6 Errors and Accuracy

8 BASICS OF GIS AND MAP PREPARATION USING GIS

- 8.1 Components of GIS, Integration of Spatial and Attribute Information
- 8.2 Three Views of Information System
 - 8.2.1 Database or Table View, Map View and Model View
- 8.3 Spatial Data Model
- 8.4 Attribute Data Management and Metadata Concept
- 8.5 Prepare data and adding to Arc Map.
- 8.6 Organizing data as layers.
- 8.7 Editing the layers.
- 8.8 Switching to Layout View.
- 8.9 Change page orientation.
- 8.10 Removing Borders.
- 8.11 Adding and editing map information.
- 8.12 Finalize the map

E. COURSE COVERAGE UPTO INTERNAL ASSESSMENT

Chapters 1, 2, 3, 4, 5

F. RECOMMENDED BOOKS

Sl. No	Name of Authors	Titles of Book	Name of Publisher
1	D. Gaikwad	Advanced Surveying	S.Chand
2	B. C. Punmia	Surveying Vol. I, II, III	Laxmi Publication, Delhi – 06
3	R. Agor	A text book of surveying and leveling	Khanna Publishers, Delhi-6
4	N. N. Basak	Surveying and Levelling	Tata Mcgraw Hill

REFERENCE Materials

1. <https://theconstructor.org/surveying/surveying-principles-methods-civil-engineering/13048/>
2. <https://www.novatel.com/an-introduction-to-gnss/chapter-2-basic-gnss-concepts/>
3. http://gps.alaska.edu/jeff/Spatial_Reference/Freymueller_DOT_GPS.pdf
4. <https://drive.google.com/file/d/0B7srsI9Fr4QdUzAzSIRwZnNRZ3M/view> :-
5. Surveying and Levelling by N.N. Basak, 2nd Edition
6. https://2018.foss4g-na.org/sites/default/files/slides/survey_resurvey_cadastral_layer_Odisha.pdf
7. <http://www.lawsofindia.org/pdf/orissa/2012/2012OR5.pdf>
8. http://revenueodisha.gov.in/sites/default/files/document/DILRMP/SOP_MRR_2016.pdf
9. http://revenueodisha.gov.in/sites/default/files/document/Govt_Land/22958_4_8_14.pdf
10. <https://www.google.co.in/search?q=map+reading+and+interpretation+ppt&dq=Map+reading+and+&aqs=chrome.3.69i57j0l5.9755j0j7&sourceid=chrome&ie=UTF-8>
11. Map Use: Reading, Analysis and Interpretation by Juliana O. Muehrcke and Philip Muehrcke
12. <http://indiageospatialforum.org/2012/proceedings/ppt/P%20K%20parida.pdf>
13. <http://www.indiana.edu/~paleoind/Resources/Guide%20to%20Topographic%20Maps.pdf>
14. <http://www.dst.gov.in/sites/default/files/nationalmappolicy.pdf>
15. Remote sensing and GIS / BasudebBhatta, 2nd edition, New Delhi, India, Oxford University Press, - Oxford higher education.
16. http://www.gisresources.com/basic-of-photogrammetry_2/
17. http://giswin.geo.tsukuba.ac.jp/isis/tutorial/Fundamentals_of_GIS_Estoque.pdf
18. Learning Material Approved by R&DM Deptt., Govt. of Odisha