

**HWRM-104 SURVEYING TECHNIQUES FOR WATER RESOURCES DEVELOPMENT (THEORY)**  
**(02 Credit hrs)**

**PRE-REQUISITE:** F.Sc. or equivalent

**LEARNING OUTCOMES:**

- This course will provide an introduction to the surveying and leveling to the students.
- The students will learn about the different equipment used for surveying and leveling
- They will have the knowledge about various types of surveying like compass survey and plane table survey etc.
- The students will get knowledge about various types of leveling techniques, computations of area and volumes, Cut-fill ratio and earthwork calculations etc.
- Students will get knowledge about modern instruments used for surveying and leveling purposes.

**CONTENT**

This course is designed to provide Introduction to the principles and practices of surveying and leveling techniques, methods and applications in water resources management.

**THEORY**

**Unit-1 Introduction to Surveying:**

- 1.1. Introduction to Surveying:
- 1.2. Definition; importance, types of survey
- 1.3. Planning survey and leveling of an area
- 1.4. Surveying Instruments
- 1.5. Chains, tapes, steel bands, their types and uses, GPS

**Unit-II Compass Surveying:**

- 2.1. Prismatic compass survey
- 2.2. Surveyor compass, uses
- 2.3. Bearing
- 2.4. Local attraction

**Unit-III: Plane Table Surveying:**

- 3.1. Parts and accessories
- 3.2. methods of plane table surveying and topographic mapping
- 3.3. Contour map preparation and uses, contour lines
- 3.4. Two point and three-point problems

**Unit-IV: Introduction to Leveling:**

- 4.1. Definition, benefits, general principles and methods of leveling
- 4.2. Types and uses of levels
- 4.3. Trigonometric leveling
- 4.4. Leveling instruments/equipment
- 4.5. Temporary and permanent adjustments of levels
- 4.6. computation of areas and volumes
- 4.7. Precision land leveling, land grading
- 4.8. Cut-fill ratio and earthwork calculations

4.9. Measurement of area, cross-section, elevations, contour lines, mass diagram, planimeter and its uses.

**Unit-V: Modern Survey Instruments:**

- 5.1. Total station, theodolites, electronic distance measurement (EDM), GPS
- 5.2. Temporary and permanent adjustments
- 5.3. Measurement of horizontal and vertical distances and angles
- 5.4. Control hydrographic surveys
- 5.5. Photogrammetry and GPS surveys

**TEACHING – LEARNING STRATEGIES**

- Lecture based examination
- Presentation/seminars
- Class discussion
- Quizzes

**ASSIGNMENTS – TYPE AND NUMBER WITH CALENDAR**

It is continuous assessment. The weightage of Assignments will be 25% before and after midterm assessment. It includes:

- classroom participation,
- attendance, assignments and presentation,
- homework
- attitude and behavior,
- hands-on-activities,
- short tests, quizzes etc.

**ASSESSMENT AND EXAMINATIONS:**

Sr. No.	Elements	Weightage	Details
1.	Mid Term Assessment	35%	It takes place at the mid-point of the semester
2.	Formative Assessment	25%	It is continuous assessment. It includes: classroom participation, attendance, assignments and presentation, homework, attitude and behavior, hands-on-activities, short tests, quizzes etc.
3.	Final Assessment	40%	It takes place at the end of the semester. It is mostly in the form of a test, but owing to the nature of the course the teacher may assess their students based on term paper, research proposal development, field work and report writing etc.

**RECOMMENDED TEXT BOOKS / SUGGESTED READINGS**

1. Wolf P. R. & Ghilani C. D., (2012), *Elementary Surveying – An introduction to Geomatics*, 13th Edition, Prentice Hall, USA.
2. Thomas, M. Lillesand & Ralph W. Kiefer, (2005), *Remote Sensing and Images Interpretation*, 5th edition, John Wiley & Sons, Inc.

3. Kavanagh Barry, (2010), *Surveying with Construction Applications*, 7th Edition, Pearsons Education.
4. havikatti, S. S. (2008). *Surveying and Levelling*, Volume 1. I. K. International Pvt Ltd, India
5. Kanetkar, T.P. (2006). *Surveying and Leveling (Part 1)*. Pune Vidyarthi Griha Prakashan, India.
6. Johnson, A. (2004). *Plane and Geodetic Surveying*. Spon Press, London.
7. Schofield, W., and Breach, M. (2007). *Engineering Surveying*. Butterworth-Heinemann Burlington, MA, USA.
8. Brinker, A.C. and Taylor, W.C. (2002). *Elementary Surveying*. International Textbook Co. Scranton, Pennsylvania.

## **HWRM-104 SURVEYING TECHNIQUES FOR WATER RESOURCES DEVELOPMENT (LAB)**

**(01 Credit hr)**

**PRE-REQUISITE:** F.Sc. or equivalent

### **LEARNING OUTCOMES**

- This course will provide practical demonstrations on various equipment used for surveying and leveling.
- The students will learn about the practical applications of surveying and leveling in water resources management
- They will learn how to set up instruments and perform different types of surveying and leveling procedures

### **CONTENTS**

This course is designed to make student practices on surveying and levelling equipment, performing different methods to plan and conduct survey and levelling of an area using different methods and well as related calculations.

### **PRACTICAL**

#### **Unit-I Surveying in Water Management**

- 1.1. Introduction to Surveying equipment and demonstrations
- 1.2. Measurement of distances by different methods, pacing, Chain and Tape Survey
- 1.3. Plane Table Survey, Compass surveying and traversing
- 1.4. Profile and cross-sectioning
- 1.5. Coordinates and area determination using GPS

#### **Unit-II: Leveling in Water Management**

- 2.1. Introduction to the leveling equipment and demonstrations, level books
- 2.2. Setting up, elimination of parallax, Level adjustments by two-peg method
- 2.3. Theodolite traversing,
- 2.4. Contour mapping through Surfer software
- 2.5. Total station demonstration

### **TEACHING – LEARNING STRATEGIES**

- Lecture based examination

- Presentation/seminars
- Class discussion
- Quizzes

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- attendance, assignments and presentation,
- homework
- attitude and behavior,
- hands-on-activities,
- short tests, quizzes etc.

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5. Kanetkar, T.P. (2006). *Surveying and Leveling (Part 1)*. Pune Vidyarthi Griha Prakashan, India.
6. Johnson, A. (2004). *Plane and Geodetic Surveying*. Spon Press, London.
7. Schofield, W., and Breach, M. (2007). *Engineering Surveying*. Butterworth-Heinemann Burlington, MA, USA.
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