ADVANCED SURVEYING

ENGE 255

Lecture : 3 **Year : II**
Tutorial : 0 **Part : II**
Practical : 4

Course Objectives:
The objective of this course is to equip students with the theoretical knowledge and practical skills necessary to apply appropriate surveying methods for accurate map production and spatial data representation.

1 Orientation (3 hours)

1.1 Analytical intersection and resection
1.2 Two points and three points resection and their significance
1.3 Instruction on field application

2 Triangulation and Trilateration (7 hours)

2.1 Concepts and terminology
2.2 Accuracy of horizontal control systems
2.3 Triangulation figures; Choice of figures; Triangulation procedure
2.4 Angle and side conditions; Error propagation in triangulation; Strength of figure in triangulation; Base line
2.5 Triangulation computations
2.6 Trilateration
2.7 Combined triangulation and trilateration

3 Curves (9 hours)

3.1 Types of curve
3.2 Simple circular curve
3.3 Transition curve
3.4 Vertical curve
3.5 Compound and reverse curve
3.6 Setting out of simple circular curve
3.7 Setting out of transition curve
3.8 Computation and staking of vertical curve

4 Mining Survey (7 hours)

4.1 Concepts and terminology
4.2 Design of horizontal control networks in underground mines
4.3 Measuring depth of shaft
4.4 Measuring vertical depth

4.5 Mine orientation survey: Basic principle and classification
4.6 Measuring cross section
4.7 Gyroscopic methods of mine orientation
4.8 Roles and responsibilities of mine surveyor

5 Hydrographic Survey (7 hours)

5.1 Hydrographic survey and its application
5.2 Sounding: Methods, equipment and location
5.3 Reduction of sounding
5.4 Plotting the sounding
5.5 Accuracy of positions
5.6 Depth determination
5.7 Ship borne echo-sounding and mechanical methods, airborne laser and electromagnetic methods, related corrections
5.8 Use of current meter and stream measurement

6 Construction Surveying (4 hours)

6.1 Construction survey, importance and its application
6.2 Equipment for setting out
6.3 Horizontal and vertical control
6.4 Setting out of a bridge
6.5 Setting out of building and structures
6.6 Staking out a highway

7 Areas and Volumes (8 hours)

7.1 Method of measuring area of irregular boundaries (Mid ordinate, average ordinate, Simpson's rule)
7.2 Area of closed traverse (Double meridian distance method, coordinates method)
7.3 Volumes by cross section method (Average end area, mean area, trapezoidal rule, prismoidal formula)
7.4 Volume from spot levels, contour plan
7.5 Mass haul curve, use of mass diagram

Practical (60 hours)

1. Prepare a computer program in C for corrections to field observations
2. Intersection and resection using theodolite, computation and plotting
3. Triangulation and trilateration field works using theodolite and total station equipment, computation, adjustment and plotting
4. Discharge measurement of a stream
5. Setting out of curve
6. Computation of volume of earthwork of given alignment of a road

Final Exam

The questions will cover all the chapters in the syllabus. The evaluation scheme will be as indicated in the table below:

Chapters	Hours	Marks distribution*
1 and 5	10	12
2	7	8
3	9	14
4	7	8
6	4	6
7	8	12
Total	**45**	**60**

* There may be minor deviation in marks distribution.

References

1. Banister, A., Raymond, S. (1980). Surveying. ELBS.
2. Roy, S. (2010). Fundamentals of Surveying. India: PHI Learning.
3. Wolf, P.R., Brinker, R.C. (1994). Elementary Surveying. UK: HarperCollins.
4. Davis, R.E., Foote, F.S., Kelly, J.W. (1966). Surveying Theory and Practice. McGraw-Hill.
5. Agor, R. (1980). Surveying and Leveling. Delhi: Khanna Publishers.
6. Basak, N.N. (2014). Surveying and Levelling. India: McGraw Hill Education.
7. Duggal, S.K., Basak, N.N. (2017). Surveying. New Delhi: Tata McGraw Hill.