

CE8351 SURVEYING

UNIT I FUNDAMENTALS OF CONVENTIONAL SURVEYING AND LEVELLING

TWO MARKS

1. Define surveying. (Nov/Dec 2005)

Surveying is an art of determining the relative position of various points on, above or below the earth surface by means of direct and indirect measurement of distance, direction and elevation.

2. Classify surveying based on instrument used. (May / June 2006) (Nov/Dec 2016)

Based on the instruments used and method of surveying, it can be classified as follows.

1. Chain Surveying
2. Compass Surveying
3. Plain Table Surveying
4. Level Surveying (or) Levelling
5. Theodolite Surveying
6. Tacheometric Surveying
7. Total Station Surveying etc.

3. What do you mean by plane surveying? (May / June 2013)

Plane surveying is defined as the division of surveying, in which all the survey works are carried based on the assumption that the surface of earth is a plane and the curvature of the earth is ignored.

4. What is meant by geodetic surveying? (Nov/Dec 2012)

The surveys, in which curvature of the earth is taken into account and higher degree of accuracy, required is called Geodetic surveying.

5. What are the principles of Surveying? (Apr/May 2011) (May / June 2007) (Nov/Dec 2009) (Nov/Dec 2010) (Nov/Dec 2016) (Apr/May 2015)

- (a) Working from Whole to Part
- (b) Location of a Point

6. What is meant by reconnaissance survey? (Nov/Dec 2015)

To explore site conditions and availability of infrastructures reconnaissance survey is made.

7. How do you fix a point from the control points (or a survey line)?

The position of third point can be located from the control points by any one of the following ways.

1. Two linear measurements
2. Two angular measurements.
3. One linear measurement and One angular measurement.

8. What is Plumb Bob?

Plumb bobs are used to test the verticality of ranging rods and levelling staves. It is also used to transfer the end points of the chain onto ground while measuring the distances in a hilly terrain.

9. What is the purpose of an Optical Square? (Apr/May 2011)

Optical Squares are also like cross-staves used for setting out the right angles in change-surveying. It consists of a circular metal box about 5 cm in diameter and the 1.25 cm deep. The periphery is formed by two cylinders, one capable of sliding over the other so that the eye and object openings can be closed to protect the mirrors from the dust.

10. What is well conditioned triangle? (Apr/May 2018)

A triangle is said to be well conditioned or well proportioned when it contains no angle less than 30° and more than 120° .

11. What is ranging? (Nov/Dec 2015)

Method of locating or establishing intermediate points on a straight line between two fixed point or two survey stations is called as ranging.

12. What do you mean by reciprocal Ranging? (Apr/May 2010) (May / June 2012) (May / June 2006) (Apr/May 2008)

Reciprocal ranging is the method of indirect ranging, and it is adopted when the two end stations are not inter-visible due to raised grounds.

13. What is the use of a line ranger?

The line ranger is a small reflecting instrument used for fixing intermediate points on the chain lines. Without going to either end, we can fix the intermediate points.

14. What do you understand by the term traversing? (Nov/Dec 2009)

Traverse is defined as the series of connected straight lines, each joining two stations on the ground. The endpoints are called traverse stations. The straight lines between the two consecutive stations are called traverse legs.

There are two types of traverse

1. Closed Traverse
2. Open Traverse

15. What are offsets? Name the types. (May / June 2007) (Nov/Dec 2007)

Offsets are defined as the lateral measurements taken from the chain line, to locate the position of the boundaries, culverts, building, road markings, etc., An offset may be either left or right of the chain line. There are two types of offsets, which are

- (i) Perpendicular offset
- (ii) Oblique offset

16. What are the obstacles in chain surveying? (Nov/Dec 2017)

- Obstacles in Chaining but not ranging
- Obstacles in Ranging but not chaining
- Obstacles to both chaining and ranging

17. Differentiate between check line and tie line. (May / June 2009) (Nov/Dec 2006)(Nov/Dec 2017)

The line which runs across the field to check the accuracy of the survey work is called **check-line** (or) **proof line**.

A **tie-line** is a one which connects the two-tie stations. Sometimes, tie lines are used to check the accuracy of the field work and used to take the offset distances.

18. Distinguish between engineers chain and revenue chain.(April/May 2017)

S.No.	Engineers chain	Revenue chain
1	100ft long	The standard size of this type of chain is 33ft.
2	100 links	The number of links are 16, each link being $2\frac{1}{16}$ ft.

19. Distinguish between survey station and tie station.(April/May 2018)

S.No.	Survey Station	Tie Station
1	Prominent point on the chain line	Station used to take the locations
2	Either at beginning and end of the chain line	At any point in the survey line

20. Distinguish between angle and bearing? (May / June 2012)

An angle is defined as the deviation of one straight line with respect to the other one.

Bearing is defined as the angle (or) inclination of a survey line with respect to the north-south direction.

21. Define true meridian. (Nov/Dec 2012) (Nov/Dec 2010)

True meridian (or) Geographical meridian is defined as the line joining the geographical north and south poles. True meridian at various places are not parallel to each other.

22. What is magnetic meridian? (Nov/Dec 2009)

Magnetic Meridian is defined as the longitudinal axis, indicated by the freely suspended, properly balanced magnetic needle. It does not coincide with the true meridian except in certain places during the year.

23. Define true and magnetic bearing. (April/May 2017) (Nov/Dec 2015) (Apr/May 2015)

The true bearing of a line is the horizontal angle between true meridian and the survey line.

The magnetic bearing of a line is the horizontal angle which the line makes with magnetic meridian.

24. What are the various types of variations in declination? (April/May 2017)

The following type of variations are observed in declination:

- (i) Secular variation,
- (ii) Annual variation,
- (iii) Daily variations, and
- (iv) Irregular variations.

25. Define Local Attraction. (Nov/Dec 2016)

The deflection of the magnetic needle from its normal position due to attraction of magnetic materials such as magnetic rocks, iron ores, electrical cables etc., is called Local Attraction.

26. Define the term Dip. (Nov/Dec 2011) (Apr/May 2011)

The inclination of the magnetic needle with the horizontal plane is called Dip (or) Angle of Dip.

The angle of dip at equator is 0° and it increase when approaching the poles. It becomes 90° at poles.

27. What is Magnetic declination? (Nov/Dec 2010) (Nov/Dec 2012)

Magnetic Declination is defined as the horizontal angle between the true north and magnetic north at a place, at the time of observation. The magnetic needle can either be deflecting, towards east (or) west of the true meridian.

28. Convert the following WCB into RB (a) $112^\circ 04'$ (b) $339^\circ 42'$ (Nov/Dec 2009)

(a) RB of $112^\circ 04' = 180 - 112^\circ 04' = S 67^\circ 56' E$

(b) RB of $339^\circ 42' = 360 - 339^\circ 42' = N 20^\circ 18' W$

29. Convert the following WCB into RB. (a) $151^\circ 20'$ (b) $332^\circ 40'$ (Apr/May 2011)

(a) RB of $151^\circ 20' = 180 - 151^\circ 20' = S 28^\circ 40' E$

(b) RB of $332^\circ 40' = 360 - 332^\circ 40' = N 27^\circ 20' W$

30. Differentiate between the fore bearing and back bearing of a line. (Nov/Dec 2005)

The bearing of a survey line in the direction of the progress of survey is known as **Fore Bearing** (or) **Forward Bearing (FB)**, and the bearing taken in the opposite direction of the progress of survey is called **Reverse (or) Back Bearing (BB)**.

31. Differentiate between a level line and horizontal line. (May/June 2007) (Apr/May 2015)

Level line is defined as the line lying on the level surface. At every point, the level surface and the level line are normal to the plumb line. The surface of still water (in a lake) represents the level surface and the level line.

Horizontal line is defined as the line, lying on the horizontal surface. It is a straight line tangential to the level line.

32. Distinguish between line of Collimation and line of sight. (Nov/Dec 2007)

The imaginary straight line passing through the optical centre of the object and the point of intersection of the cross-hairs is called line of collimation.

The imaginary straight line passing through the optical centre of the object, traversing the eye piece and entering the eye is called line of sight.

33. Explain the use of Tilting Levels. (May/June 2013)

In tilting level, the line of sight and the vertical axis need not be exactly perpendicular to each other, and hence tilting levels are used for quick levelling.

34. What is fore sight? (Nov/Dec 2009) (April/May 2017)

Foresight is the last sight taken on a levelling staff held over an unknown elevation, before shifting the level.

35. Differentiate agonic and isogonic lines.

Isogonic lines are lines on the Earth's surface along which the declination has the same constant value, and lines along which the declination is zero are called agonic lines.

36. What is back sight? (Nov/Dec 2009) (May/June 2006) (April/May 2017)

The first reading on the levelling staff, at a station of known elevation is called **back sight**. Back sight is used to obtain the height of the instrument.

37. Define turning Point, Back Sight and Bench Mark (May/June 2007)

Turning Point or Change point is defined as the instrument station, at which, the instrument is shifted from one point to another. It is the point, on which the back sight of the new station and foresight of the previous station are taken. Stable points and well-defined points are taken as the change (or) turning points.

38. Define Fore Sight.

Foresight is the last sight taken on a levelling staff held over an unknown elevation, before shifting the level.

39. Define Back Sight.

The first reading on the leveling staff, at a station of known elevation is called **back sight**. Back sight is used to obtain the height of the instrument.

40. Define bench mark. (May/June 2016)

In **surveying**, a "bench mark" (two words) is a post or other permanent mark established at a known elevation that is used as the basis for measuring the elevation of other topographical points

41. Write the types of bench mark. (Nov/Dec 2010) (May/June 2012) (May/June 2006) (Nov/Dec 2007) (Nov/Dec 2006) (May/June 2016) (Apr/May 2015)

1. G.T.S. Benchmark
2. Permanent Benchmark
3. Temporary Benchmark
4. Arbitrary Benchmark

42. What are G.T.S. Bench marks? (Apr/May 2008)

G.T.S. benchmarks are established by the Great Trigonometrical Survey Department of India, with highest accuracy at an interval of about 100 km, all over the country. Their elevations are referred to as M.S.L. datum.

43. What are the types of Staves? (Nov/Dec 2009) (Nov/Dec 2010) (Nov/Dec 2016)

1. Self-Reading staff
 - (a) Solid Staff
 - (b) Folding Staff
 - (c) Telescopic Staff
2. Target staff

44. Write the formula for curvature correction, refracture correction and combined correction. (May/June 2016)

$$\text{Curvature correction} = 0.07849d^2$$
$$\text{Refracture correction} = 0.01121d^2$$

Combined correction= $0.06728d^2$

- D in Km
- Correction in m

45. What are the different methods of leveling? (May/June 2015)

Indirect or Trigonometric Leveling: By measuring vertical angles and horizontal distance; Less precise.

Stadia Leveling: Using tacheometric principles.

Barometric Leveling: Based on atmospheric pressure difference; using altimeter; Very rough estimation.

46. What are the temporary adjustments of a dumpy level?

The **temporary adjustment** of a **dumpy level** consists of

- Setting,
- Leveling,
- Focusing.

47. What is fly leveling?

Fly leveling is conducted when the benchmark is very far from the work station. In such case, a temporary bench mark is located at the work station which is located based on the original benchmark. Even it is not highly precise it is used for determining approximate level.

48. What is reduction in leveling? Name the methods.

Reduced Level in surveying refers to equating elevations of survey points with reference to a common assumed datum. It is a vertical distance between survey point and adopted datum plane

49. What is Reciprocal Levelling? (Nov/Dec 2006)

It is the method of leveling, when the instrument is placed equidistant from the back staff and foreword staff stations, the difference in elevation of two stations, is equal to the difference of staff readings.

50. What is check leveling?

It is the operation of running levels for the purpose of checking the series of levels, which have been previously fixed.