

DHANALAKSHMI SRINIVASAN
COLLEGE OF ENGINEERING AND TECHNOLOGY, MAMALLAPURAM
DEPARTMENT OF CIVIL ENGINEERING -QUESTION BANK

CE8351-SURVEYING

Unit -1

PART-A

1.Tell the length of one link in engineer's chain and Gunter's chain

Metric chains are available in length of 20m or 30m length. The 20m chain is divided into 100 links, the 30m chain is divided into 150 links and tallies connected at every 10 links and 25 links

Engineer's chain is 100 fit in length and divided into 100 links. The details of construction are the same as that of the metric chain. For every ten links brass tags are provided.

2.Define surveying and list out its various classification

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 are the principles of Surveying?

Following are the two fundamental principles of surveying.

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

4.What are the instruments used for the chain surveying?

Following instruments are used in chain surveying

- 1.Chain
2. Tape
3. Ranging Rods
- 4.Offset Rods
5. Plumb Bob
6. Pegs
- 7.Cross-Staff
8. Optical Square
9. Arrows
10. Whites etc.

5.What do youmean by reciprocal Ranging?

Reciprocal ranging is the method of indirect ranging, and it is adopted when the two end stations are notinter-visible due to raised grounds

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6. What do you understand by the term traversing?

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

7. What are different sources of errors in chain surveying?

- (a) Displacement of the arrows
- (b) Adding (or) Omitting the full chain length
- (c) Reading from the wrong end of the chain
- (d) Reading numbers wrongly
- (e) Reading wrong metre marks
- (f) Recording the reading in the field book wrongly etc.

8. Distinguish between angle and bearing?

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

9. Differentiate between Magnetic declination and Dip?

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 increases when approaching the poles. It becomes 90° at poles.

∞ 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

10. Convert the following WCB into RB (a) $112^\circ 04'$ (b) $339^\circ 42'$

- (a) RB of $112^\circ 04' = 180 - 112^\circ 04' = S 67^\circ 56' E$
- (b) RB of $339^\circ 42' = 360 - 339^\circ 42' = N 20^\circ 18' W$

11. Convert the following WCB into RB. (a) $151^\circ 20'$ (b) $332^\circ 40'$

- (a) RB of $151^\circ 20' = 180 - 151^\circ 20' = S 28^\circ 40' E$
- (b) RB of $332^\circ 40' = 360 - 332^\circ 40' = N 27^\circ 20' W$

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PART-B

- 1.(i) What are the basic principles of surveying? Describe it.
(ii) Discuss about the different sources of error in chain surveying
2. (i) Describe the field and office work in chain surveying?
(ii) Examine how you will conduct chain survey to measure a land in agriculture field.
- 3.Explain the methods of chaining with neat sketches. While you do chaining to overcome obstacles for chaining and not for ranging.
4. The following staff readings were observed successively with a level, the instrument having been moved after third, sixth and eighth readings 2.228, 1.606, 0.988, 2.090, 2.864, 1.262, 0.602, 1.982, 1.044, 2.684 meters. Enter the above readings in a page of a level book and evaluate the R.L. of points if the first reading was taken with a staff held on a bench mark of 432.384 m.
5. What are the different sources of error in leveling and explain them in detail.
6. Describe the profile leveling and cross sectional leveling

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UNIT 2

PART-A

1. Define Contour.

Contour is defined as the imaginary line, joining the points of equal elevation (RLs). It is a line of intersection of a level surface with the ground. Generally, Contour lines are marked with their elevations from the datum. The map representing the contour lines is called Contour Map.

2. What are the uses of Contours?

1. To identify the topography of the place, whether the ground is flat, undulating or mountainous.
2. To finalize the most suitable and most economical sites for engineering projects such as roads, railways, reservoirs, canals, sewers etc.
3. To determine the catchment area of the drainage basin and the capacity of the reservoir.
4. To calculate the earth work for engineering projects.
5. To ascertain the intervisibility of points.
6. To identify the contour gradient for road alignment.
7. To draw the L.S and C.S to ascertain the nature of the ground.
8. To decide the intervisible and invisible points, positions of **Gunman**, etc., in the military field.

3. What is transit Theodolite?

Transit theodolite is defined as the theodolite, in which its telescope can be rotated horizontally through 180° in the vertical plane.

4. How do you eliminate parallax in Theodolite?

- Parallax effect can be eliminated as follows.
- (a) Focussing the eye piece
- (b) Focussing the objective

5. What you mean by temporary adjustments of a Theodolite?

- The adjustments required to be made at every instrument station before taking observations are called temporary adjustments.
- The temporary adjustments of a theodolite consist of the following operations.
 1. Setting and centering the theodolite
 2. Levelling of the theodolite
 3. Elimination of parallax

6. Explain face left and face right observations in Theodolite traversing? (Nov/Dec 2007)

- When the vertical circle of the theodolite is on the left of the observer, the telescope position is called

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Face Left.

When the vertical circle of the theodolite is on the right of the observer, then the telescope position is called **Face Right**

7. Define Tacheometry:

Tacheometry is a branch of angular surveying in which the horizontal and vertical distances (or) points are obtained by optional means as opposed to the ordinary slower process of measurements by chain (or) tape

8. What are the merits and demerits of movable hair method?

Merits:

Long sights can be taken with greater accuracy than stadia method
The error obtained is minimum

Demerits:

The computations are not quicker
Careful observation is essential

Fixed hair method:

In this method, the stadia wires are fixed (or) fitted at constant distance apart.

Staff intercept:

The difference of the reading corresponding to the top and bottom stadia wires.

Stadia intercept:

The difference of the distance between the top and bottom cross hairs.

Sub tense method: In this method stadia interval is variable. The staff intercept is kept fixed while the stadia interval is variable.

The tangential method:

In this method, the stadia hairs are not for taking readings. The readings being taken against the horizontal cross hair.

9. Define Satellite Station

A subsidiary station is established as near the true or principal station as possible, the station so established is called a satellite station or eccentric station or false station.

10. What Are The Types Of Benchmark ?

Types of Bench Mark:

- Great Trigonometric survey Bench mark
- Permanent Bench mark
- Arbitrary Bench mark
- Temporary Bench mark

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11. What Are The Types Of Correction Errors Made?

Corrections made while calculation of true length

- Correction for absolute length
- Correction for temperature
- Correction for pull or tension
- Correction for Sag
- Correction for Slope

PART-B

1. Explain the different between tangential and stadia tachometry. How will you determine the stadia constants?
2. Describe the indirect methods of locating contours .An embankment of width 8 m and side slopes 1:5:1 is required to be made on a ground which is leveled in a direction transverse to the centre line. The centre height at 24 m intervals is as follows 0.80, 1.42, 1.90, 2.20, 2.65, 2.20, 2.20, 1.65, 1.30 and 0.90. Calculate the volume of earthwork to be carried out informing the embankment.
3. (i) Explain the essential parts of theodolite?
(ii) Explain the permanent adjustment of theodolite?
4. Discuss the various characteristics and uses of contours with suitable examples
5. Recommend the various methods of horizontal angle using a theodolite

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UNIT-3
PART –A

1. What are the types of errors?

Errors:

Mistakes (or) gross Errors
Systematic (or) Cumulative Errors
Accidental (or) Random Errors

2. Define true value

True Error:

A true error is the difference b/w the true value of the quantity and its observed value.

True value = True value – observed value

The most probable value of the quantity is the value which is more likely to be the true value than any other value

3. Explain most probable value

Most probable Errors: It is defined as the quantity which added to and subtracted from the most probable value, fixes the limit within which it is an even chance the true value of the measured quantity must lie.

4. What is systematic error ?

Systematic Errors:The systematic error is an error that under the same conditions will always be of the same size and sign. It is simply due to the error in instrument. These errors may be regarded as positive or negative according with whether they make the result too small (or) too great. This effect is cumulative

5. Define well conditioned triangles

The shape of the triangle formed by the selected triangulation stations should be such that any error in the measurement of the angle shall have a minimum effect upon the length of the calculated sides. Such a triangle is called Well – conditioned triangle.

6. What is the main principle involved in triangulation?

The principle of triangulation is the accurate measurement of one side and two adjacent angles of a triangle, the length of other two sides can be calculated accurately.

Give the specification of first order triangulation. (AUC May/June 2009)

7. Give the specification of first order triangulation. Average triangle closure : less than second.

Maximum triangle closure : not more than 3 seconds

Length of the base line : 5 to 15 km

Length of the sides of triangles : 30 to 150 km

Actual error of base : 1 in 300000

Probable error of base : 1 in 1000000

Discrepancy between two measures of section: 10 mm
km

Probable error of computed distance : 1 in 60000 to 1 in 250000

Probable error in astronomic azimuth : 0.5 seconds

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8. Give the specification of first order triangulation. (AUC May/June 2009)

Average triangle closure : less than 1 second
Maximum triangle closure : not more than 3 seconds
Length of the base line : 5 to 15 km
Length of the sides of triangles : 30 to 150 km
Actual error of base : 1 in 300000
Probable error of base : 1 in 1000000
Discrepancy between two measures of section: 10 mm
km

Probable error of computed distance : 1 in 60000 to 1 in 250000
Probable error in astronomic azimuth : 0.5 seconds

9. Name the different corrections to be applied to the length of a base line. (AUC May/June 2013) (AUC May/June 2012) (AUC May/June 2009)

- Correction for absolute length
- Correction for temperature
- Correction for pull or tension
- Correction for sag
- Correction for slope
- Correction for alignment
- Reduction to sea level

10. What is satellite station and reduction to center? (AUC Nov/Dec 2012)

Satellite station:

It is selected as near as possible to the true station. From this station observations are taken to the other triangulation stations with the same precision.

Reduction to centre:

Angles taken from satellite station are corrected and reduced to what they would have been if the true station was occupied. This operation of applying corrections to the observed

angles due to the eccentricity of the station is termed as Reduction to centre.

PART –B

1. i) Describe the satellite station and reduction to centre?
(ii) Show the expression for reducing the angles measured at the satellite station to centre
2. Two triangulation stations A and B are 60 km apart and have elevations 240m and 280m. Identify the minimum height of signal required at B so that the line of sight may not pass the ground than 2metres. The intervening ground may be assumed to have a uniform elevation of 200metres.
3. Describe the triangulation adjustment and explain the different conditions and cases with sketches.
4. Write down the various laws of weight.

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5. Show the most probable value of the following

B=	32° 14'16.3"
C=	51° 18'18.8"
A+B=	60° 38'45.6"
B+C=	83° 32'28.2"

UNIT -4

PART –A

- 1. What do you understand by parallax? (AUC Nov/Dec 2012) (AUC Apr/May 2010)**

Parallax is defined as the apparent displacement of an object due to the real displacement of the observer. For example the apparent movement of the stars is due to the real displacement of the observer from one position to another upon the earth's orbit.

- 2. Distinguish between crab and drift. (AUC Apr/May 2010)**

Crab:

The angle formed between the flight line and the edges of the photograph in the direction of flight is designated by a term called crab. The crab is caused in the photograph when the focal plane of the camera is not square with the direction of flight.

Drift:

Drift is caused by the failure of the photograph to stay on the predetermined flight line. If an aircraft is allowed to go on its course without allowance for wind velocity, it will drift.

- 3. What do you mean by sounding? (AUC Nov/Dec 2010) (AUC Apr/May 2011)**

The measurements of depths below the water surface are called soundings. It is to find the depth measurement in land with reference to a datum.

- 4. Distinguish between 'terrestrial photogrammetry' and 'aerial photogrammetry'. (AUC Apr/May 2011)**

Terrestrial photogrammetry:

Photographs taken from a fixed position on or near the ground and the branch deals on such aspects are called terrestrial photogrammetry.

Aerial photogrammetry:

Aerial photogrammetry is the other branch wherein the photographs are taken by cameras mounted on an aircraft flying over the area.

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5. What is meant by scale of a photograph? (AUC May/June 2009)

Scale of photograph is obtained from the ratio of the distance of any two points on the photograph and the distance between the corresponding points on the ground. The two points chosen for scaling should lie nearly equidistant on either side of the principal point.

6. Write the concept of map – marking in cartography? (AUC May/June 2009)

While there are many steps involved in the map making process, they can be grouped into three main stages: data collection, organization, and manipulation; map design and artwork preparation; and map reproduction.

7. What is a fathometer? (AUC May/June 2012)

A fathometer is used for measuring depth of large rivers and seas with depth more than 10 m. by this instrument the depth of water is obtained by sending a sound impulse from the surface of water towards the bottom of the river or sea bed.

8. Differentiate between ‘tilted photograph’ and ‘oblique photograph’.(AUC May/June 2012)

Tilted photograph:

A tilted photograph is an aerial photograph made with the camera axis unintentionally. The tilt from the vertical axis is usually less than 30

Oblique photograph:

An oblique photograph is the one made in an aerial photograph intentionally between the horizontal and the vertical.

9. Define hydrographic surveying. (AUC Nov/Dec 2010) (AUC May/June 2013)

Hydrographic surveying is that branch of surveying connected with all the observations and measurements concerned with bodies of water. These observations and measurements are needed for the design of marine structures, hydraulic structures and other cross-drainage works.

10. Define EDM. (AUC May/June 2013)

Electro-magnetic distance measurement is a general term used collectively in the measurement of distances applying electronic methods. Basically the EDM method is based on generation, propagation, reflection and subsequent reception of electromagnetic waves.

PART-B

1. With the help of suitable sketches, describe the following methods of Locating soundings.
 - (i) Location by range and one angle from the shore.
 - (ii) Location by two angles from the shore
2. What is a three point problem in hydrographic surveying? List the Various solutions for the problem? Explain in detail.
3. Describe briefly the different methods of prediction of tides
4. Enumerate and explain the relationships between the coordinates of celestial sphere

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5. i) Explain the correction needed for observation to sun to determine the azimuth of a line.(5)
ii) Explain about Nautical Almanac .(5)

UNIT-5
PART-A

1. Define Celestial Horizon. (AUC Nov/Dec 2010)

Celestial horizon is the great circle traced upon the celestial sphere by that plane which is perpendicular to the Zenith-Nadir line, and which passes through the center of the earth.

2. What is meant by solar Apparent Time? (AUC Nov/Dec 2010)

The apparent solar time is the time calculated on the basis of the daily motion of the sun. As the sun does not move uniformly along the ecliptic, the apparent solar time or the solar day is not uniform. Thus it cannot be recorded by a clock which moves with a uniform rate.

Apparent solar time = hour angle of the sun + 12 hours

3. What is equation of time? (AUC May/June 2013) (AUC Apr/May 2010)

At any instant the difference between apparent solar time and mean solar time is known as the equation of time.

Values of equation of time are sometimes prefixed with the plus sign (sun after clock) or minus sign (sun before clock).

Equation of time = R.A. of the mean sun – R.A. of the sun

4. Distinguish between latitude and co-latitude. (AUC Apr/May 2010)

Latitude (θ):

It is angular distance of any place on the earth's surface north or south of the equator, and is measured on the meridian of the place. It is marked + or – (N or S) according as the place is north or south of the equator. The latitude may also be defined as the angle between the zenith and the celestial equator.

Co-latitude (c):

The Co-latitude of a place is the angular distance from the zenith to the pole. It is the complement of the latitude and equal to $(90^\circ - \theta)$.

5. Distinguish between the 'Zenith' and 'Nadir'. (AUC Apr/May 2011)

Zenith:

The Zenith (Z) is the point on the upper portion of the celestial sphere marked by plumb line above the observer. It is thus the point on the celestial sphere immediately above the observer's station.

Nadir:

The Nadir (Z') is the point on the lower portion of the celestial sphere marked by the plum line below the observer. It is thus the point on the celestial sphere vertically below the observer's station.

6. Differentiate 'Tropic of cancer' from 'Tropic of Capricorn'.

Tropic of cancer:

The parallel of latitude

1' 23 272° north of equator is known as tropic of cancer. Tropic of capricorn: The parallel of latitude 1' 23 272° south of equator is known as tropic of capricorn.

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7. Explain the term “sidereal time”.

The sidereal time at any instant is the hour angle of the first point of aries reckoned westward from 0 to 24h. The right ascension of the meridian of a place is known as Local sidereal time (L.S.T).
$$\text{Local sidereal time (L.S.T)} = \text{Right ascension of a star} + \text{westerly hour angle of a star}$$

8. What is the correction for parallax when the altitude of celestial body is observed?

When the sun or star is viewed from different points, change in the direction of the body is observed due to parallax. The parallax in altitude is called diurnal parallax. Correction for parallax $8.8'' \cos \alpha$ Where α is the observed altitude. This correction is always additive.

9. Define the right ascension

Right ascension is the equatorial angular distance measured eastward from the First Point of Aries to the hour circle through the heavenly body.

10. Enumerate the properties of a spherical triangle.

- Any angle is less than two right angles or π .
- Sum of the three angles is less than six right angles or 3π and greater than two right angles or π .
- Sum of any two sides is greater than the third.
- If the sum of any two angles is equal to two right angles or π , the sum of the angles opposite them is equal to two right angles.
- The smaller angle is opposite to the smaller side and vice – versa.

PART-B

1. What are the space, control and user segments of GPS and their functions
2. List out the various measurements of GPS. Explain them
3. Briefly explain the Characteristics of GPS Navigation and Satellite navigation?
4. List out the features of total station and merits and demerits of total station
5. (i)What are the types of GPS receivers?
(ii) Explain the task of control segment in GPS