DEPARTMENT OF CIVIL ENGINEERING
ODD Semester
CE8351- SURVEYING – TWO AMRKS
UNIT-I
FUNDAMENTALS OF CONVENTIONAL SURVEYING AND LEVELLING

1) What is meant by well conditioned triangle?(April/May2018)(April/May2011) (Nov/Dec2014)

- A well conditioned triangle is one in which no included angle is less than 30^0 or greater than 120^0. An equilateral triangle is the best conditioned triangle or an ideal triangle.

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

- A **Survey Station** is a point of Importance at the beginning and end of a chain line. There are two main types of stations namely **Main station** and **Subsidiary or Tie station.**
- Any Point selected on the main survey line where it is necessary to run the auxiliary lines to locate the interior details such as fences, hedges, buildings,etc., when they are at some distance from the main survey lines are known as Subsidiary or Tie stations.

3) What are the applications of plane table surveying. (April/May 2018)

- It is suitable for location of details as well as contouring for large scale maps directly in the field.
- As surveying and plotting are done simultaneously in the field, chances of getting omission of any detail get less.
- As the instruments used are simple, not much skill for operation of instruments is required. This method of survey requires no field book.

4) Distinguish between a check line and tie line. (Nov/Dec 2017)

- Base line: It is the most important line & is the longest line. Main frame works of survey line are built on it.
- Check lines: These are the lines connecting Main station to a subsidiary station on opposite site are connecting to subsidiary station. On the sides of main lines the purpose measuring such lines is to check the accuracy within main station are located this lines are also known as group line.
- Tie line : a tie line is a line which joins subsidiary or tie stations to the main line. the main object of running a tie line is to take the details of nearby objects but it also serves the purpose of a check line.

5) List out the few types of obstacles in chaining. (Nov/Dec 2017)

The three main obstacles in chaining of a line are of the following types: 1. Chaining Free, Vision Obstructed 2. Chaining Obstructed, Vision Free 3. Chaining and Vision Both Obstructed.

6) Define Magnetic declination. (Nov/Dec 2017) (April/May 2015)

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.

7) Name the different types of bench marks. (Nov/Dec 2017) (April/May 2016)

- GTS benchmark
- Permanent benchmark
- Arbitrary benchmark
- Temporary benchmark

8) Write short notes on Ranging. (April/May 2017)

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

- Direct Method (Two ends of survey line or stations are inter-visible)
- Indirect Method (Two ends of survey line or stations are not inter-visible)

9) Define true bearing and magnetic bearing. (April/May 2017)

- Magnetic bearing: using magnetic compass readings to navigate from beginning to end points on the Earth's surface. Magnetic compass readings show the user where the Magnetic Poles are in relation to their own location at a certain time and show that using minutes and seconds of arc.
- True bearing refers to the geometric lines which also define loci on the surface of the earth and are thought of as "true" because they never move like the Magnetic Poles and because the North and South Geographical poles are precisely opposite "points" on the spherical Earth.

10) What are the principal of surveying? (Nov/Dec 2016)(April/May 2017)

The fundamental principles upon which the surveying is being carried out are

- working from whole to part.
- after deciding the position of any point, its reference must be kept from at least two permanent objects or stations whose position have already been well defined.

11) What are the source of local attraction? (Nov/Dec 2016)

The sources of local attraction may be natural or artificial. Natural sources include Iron ores or magnetic rocks while as artificial sources consist of steel structures, iron pipes, current carrying conductors. The iron made surveying instruments such as metric chains, ranging rods and arrows should also be kept at a safe distance apart from compass.

12) What are the different methods of surveying based on instruments? (Nov/Dec 2016)

Based on various types of instruments used, surveying can be classified into six types.

- Chain surveying
- Compass surveying
- Plane table surveying
- Theodolite surveying
- Tacheometric surveying
- Photographic surveying

13) What is the object of Surveying?

Following are the various purposes of the surveying methods.

1. To check out the alignment of various engineering structures.
2. To calculate the areas and volumes, involved in the various engineering projects.
3. To prepare the plans and maps, sections (or) profiles, contours, etc.

14) Name the different ways of Classification of surveying.

Classification of surveys based on,

(*i*) Purpose of surveying

(*ii*) Nature of the field

(*iii*) Methods employed

(*iv*) Instruments used

15) 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.

16) Define compass surveying?

The branch of surveying in which direction of survey line are determine by a compass and their length by a chain or tape is called compass surveying. This type of survey can be used to measure large areas with reasonable speed and accuracy.

17) What is a prismatic compass?

Prismatic compass is an instrument used to measure the bearing of a line. It consists of a magnetic needle pivoted at the centre and is free to rotate. The area below the magnetic needle is graduated between 0 to 360 degrees.

The instrument cover consists of a sighting vane and vertical hair to align the compass along the instrument station and the staff station

18) Define true meridian.

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.

19) What is magnetic meridian?

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.

20) Define levelling. what are the use of levelling?

It is a branch of surveying, the object of which is

- To find the elevation of given or assumed datum
- To establish points at a given elevation or at different elevation with respect to a given or assumed datum

21) What is meant by height of collimation?

The R.L. (or) elevation of the line of collimation, when the instrument is perfectly levelled, is called the **Height of the Instrument.**

22) Compare height of collimation and rise and fall method

S.NO	HEIGHT OF COLLIMATION METHOD	RISE AND FALL METHOD
1.	It is more rapid and less tedious and simpler as it involving few calculation	It is more laborious and tedious involving several calculation
2.	There is no check on the RL of the intermediate points	There is check on the RL of the intermediate points
3.	Errors in intermediate RL's cannot be detected	Errors in intermediate RL's can be detected
4.	It is suitable in the case of LS & CS contour etc	It is suitable in the case of fly levelling intermediate sights are less

UNIT-II
THEODOLITE AND TACHEOMETRIC SURVEYING

1) What are the uses of a contour map? (April/May 2018)(April/May 2011) (April/May 2017)

Contour maps are very useful since they provide valuable information about the terrain. Some of the uses are as follows:

- The nature of the ground and its slope can be estimated. Earth work can be estimated for civil engineering projects like road works, railway, canals, dams etc.It is possible to identify suitable site for any project from the contour map of the region.Inter-visibility of points can be ascertained using contour maps. This is most useful for locating communication towers.

2) What are the various methods of doing the theodolite traversing? (April/May 2018)

1. Magnetic bearing method
2. Loose needle method
3. Direct angle method
4. Included angle method
5. Deflection angle method

3) What are the various methods of doing the tachometric surveying.? (April/May 2018) (April/May 2016)

- There are two methods of tachometry survey.They are *Stadia system, and tangential system.*

4) State any two characteristics of contour. (Nov/Dec 2017)

- All points on a contour line are of the same elevation.
- No two contour lines can meet or cross each other except in the rare case of an overhanging vertical cliff or wall.Closely spaced contour lines indicate steep slope
- Widely spaced contour lines indicate gentle slope
- Equally spaced contour lines indicate uniform slope
- Closed contour lines with higher elevation towards the centre indicate hills
- Closed contour lines with reducing levels towards the centre indicate pond or other depression.
- Contour lines of ridge show higher elevation within the loop of the contours. Contour lines cross ridge at right angles.

5) Define Standards of theodolite. (Nov/Dec 2017)

- Theodolite has many parts which needs to be adjusted every time while surveying. It is important to know about theodolite parts and their functions before using it to minimize errors during theodolite surveying.
- Theodolite is an instrument used in surveying to measure horizontal and vertical angles. It is also used for leveling, indirect measure of distances and prolonging a line etc. The line of sight of theodolite can be rotated through 180° in vertical plane about its horizontal axis.

6) What are the uses of a tacheomertry?(April/May 2017)

- The primary objective of this tacheometric surveying is to prepare contoured maps or plans requiring both the horizontal as well as vertical control.
- On surveys of higher accuracy, it provides a check on distances measured with the tape.
- Preparation of topographic maps which require both elevations and horizontal distances.
- Survey work in difficult terrain where direct methods are inconvenient.
- Reconnaissance surveys for highways, railways, etc.
- Checking of already measured distances.
- Hydrographic surveys.

7) Define Contour intervals. (Nov/Dec 2017)

- Contour interval means the difference in altitude represented by the space between two contour lines on a map.

8) What are the different types of telescope used in stadia surveying? (Nov/Dec 2016)

Based on various types of instruments used, surveying can be classified into six types.

1) Chain surveying
2) Compass surveying
3) Plane table surveying
4) Theodolite surveying
5) Tacheometric surveying
6) Photographic surveying

9) What are the various methods of locating countour? (Nov/Dec 2016)

There are two methods of contour surveying:

- Direct method
- Indirect method

10) What are the three types of telescopes used in stadia surveying? (Nov/Dec 2016) (Nov/Dec 2009)

- External focusing telescope
- External focusing anallatic telescope
- Internal focusing telescope

11) What is meant face left and face right? (April/May 2016)

- When the vertical circle of the theodolite is on the left of the observer at the time of observation is called Face left
- When the vertical circle of the theodolite is on the right of the observer at the time of observation is called Face right

12) What are the two methods of measuring the horizontal angle using a Theodolite? When each method is advantageously used?

Repetition Method
Reiteration Method

The method of repetition is preferred for the measurement of a single angle.
The method of reiteration is preferred in triangulation, where a number of angles may be required at one point by the instrument.

13) What are the errors eliminated in measurements of horizontal angle by method of repetition?

Instrumental and Observational errors are eliminated in measurements of horizontal angle by method of repetition.

14) List out the major parts of a Theodolite.

1. Top Assembly (Alidade Assembly)
2. Middle Assembly (Horizontal Circle Assembly)
3. Bottom Assembly (Levelling Head Assembly)

15) 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 centring the theodolite
  2. Levelling of the theodolite
  3. Elimination of parallax

16) What are the different systems of tacheometric surveying?

i) Stadia system

In the stadia system the diaphragm of the tacheometer is provided with two stadia hairs (upper & lower).

They are two kinds of stadia system.

Fixedhair method & movable hair method.

ii) Tangential system

In the tangential system the diaphragm of the tacheometer is not provided with stadia hairs**.** Only the single horizontal hair is used to take the reading

17) What is mean by tacheometric surveying?

Tacheometric surveying is the branch of surveying in which angular observations are made with an instrument called tacheometer to determine horizontal and vertical distance. Here, use of chain has been completely eliminated.

18) What is an anallatic lens?

An anallatic lens is an additional convex lens is mounted in external focusing telescope in between the object glass and diaphragm. This arrangement is made to reduce the additive constant zero. This arrangement simplifies the mathematical calculations and only multiplying constant is zero.

19) What are the three types of telescopes used in stadia surveying?

i. External focussing telescope
ii. External focussing anallactic telescope
iii. internal focussing telescope

20) Define height and distance?

Trigonometrical levelling is an indirect method of levelling. The relative elevation of various points are determined from the observed vertical angles and horizontal distance by the use of trigonometrical relations. The vertical angle are measured with the theodolite and horizontal are measured with the tape or chain

21) What are the different methods used to find the elevations of the points in the case of inaccessible points? Differentiate that?

Single plane method & Double plane method

s.no	Single plane method	Double plane method
1	Two instrument stations are chosen in line with the object.	Two instrument stations are chosen which are not in line with the object.
2	Two vertical angles are measured in the same vertical plane	Two vertical angles are measured in the two vertical plane
3	Horizontal angles are not required	Horizontal angles are also measured

UNIT-III
CONTROL SURVEYING AND AD JUSTMENT

1) Define true error and residual error?(April/May 2018)(April/May 2017)(Nov/Dec 2014)

- A true error is the difference between the true value of a quantity and its observed value.
- A residual error is the difference between the most probable value of a quantity and its observed value.

2) What is reciprocal observation? (April/May 2018)

- One of two measurements made as a pair to reduce the size of some systematic error in the individual measurement. In particular, one or a pair of measurement taken forward and backward at the end of the line. Example-Reciprocal leveling .

3) Give the specification of first order triangulation. (April/May 2018)

- The specification of first order triangulation is of the highest order and is employed either to determine the earth figure or to finish the most precise control points to which secondary triangulation may be connected.

4) Define triangulation. (Nov/Dec 2017) (April/May 2015)

- Triangulation is the process of determining the location of a point by forming triangles to it from known points.

5) What is weight of observation? (Nov/Dec 2017) (Nov/Dec 2014)

Weight of an observation is a measure of its relative worth which may be indicated by a number. Thus if a certain observation is said to have weightage five, it is meant to say that it is five times as much as an observation of weight one.

6) What is satellite station? (Nov/Dec 2017) (Nov/Dec 2012)

- In order to form to well-conditioned triangles of triangulation and also to have better visibility objects such as church spirals, towers of temples, flag poles, etc are selected. But the instrument cannot be set up over thesetrue stations for the measurement of angles. In such cases, a subsidiary station called as satellite station or eccentric station or false station, is selected as near as possible to the true station.

7) What is meant by phase of signals? (April/May 2017) (Nov/Dec 2016)

- When a cylindrical signal is partly illuminated and partly in shade, the observer sees only the illuminated portion and bisects it. The error of bisection thus introduced is called phase. It is apparent displacement of the centre of the signal.

8) What are the classifications of errors? (April/May 2017) (Nov/Dec 2012)

- Mistakes
- Systematic errors
- Accidental errors

9) State the principle of least squares. (Nov/Dec 2016) (April/May 2015)

- "In observations of equal precision the most probable values of the observed quantities are those that render the sum of the squares of the residual errors a minimum"

10) What is parallax? How it can be eliminated. (Nov/Dec 2016)

Parallax is a displacement or difference in the apparent position of an object viewed along two different lines of sight, and is measured by the angle or semi-angle of inclination between those two lines.

11) What is true and most probable value?(April/May 2015)

- The true value of a quantity is the value which is absolutely free from all the errors. It is indeterminate since the true error is never known.
- Most probable value of a quantity is the value which is more likely to be the true value than any other value.

12) What is the application Gale's table?(April/May 2015)

- Traverse computations are usually done in tabular form. A more common tabular form is "Gales Traverse Table".
- The reduced bearings of all the lines are computed based on the whole circle bearing of the lines.
- The latitudes and departures of all the lines are computed.

13) 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.

14) Define Tacheometer.

It is an ordinary transit theodolite fitted with an extra lens called analytic lens. The purpose of fitting the analytic lens is to reduce the additive constant to zero.

15) Define Analytic lens.

Analytic lens is an additional lens placed between the diaphragm and the objective at a fixed distance from the objective. This lens will be fitted in ordinary transit theodolite. After fitting this additional lens the telescope is called as external focusing analytic telescope. The purpose of fitting the analytic lens is to reduce the additive constant to zero.

16) Define Substance bar:

A Substance bar is manufactured by Mr. Kern. The length of the substance bar is 2m (6ft) for measurement of comparatively short distance in a traverse. A Substance bar may be used as a substance base. The length of the bar is made equal to the distance between the two targets.

17) What is the objective of geodetic surveying?

Geodetic surveying is also called as trigonometrical surveying which deals with long distances and larger areas. The objects of geodetic survey is to establish absolute and relative positions of a number of widely separated points on the earth`s surface.

18) Distinguish between triangulation and trilateration.

Triangulation is a survey by which position of several stations are fixed very accurately on the surface of the earth at large intervals which serve as basis or reference points.

Trilateration is based on the principle that a triangle can be solved by knowing its three sides; Instruments like geodimeter and tellurometer are employed. In geodetic survey this method is extensively used and the accuracy of the results is comparable to that of triangulation.

19) What are the different classifications of triangulation system?

Classification of a triangulation system is based on the accuracy with which the length and angle of a line of a triangulation are determined. The following are the classification based on the order of grades:

(i) First order or primary triangulation.
(ii) Second order or secondary triangulation.
(iii) Third order or tertiary triangulation.

20) What is meant by phase of a signal?

When a cylindrical signal is partly illuminated and partly in shade, the observer sees only the illuminated portion and bisects it. The error of bisection thus introduced is called phase. It is the apparent displacement of the centre of the signal.

21) What is a base net?

Some site conditions may not be favourable to get the required length of a base line. In such a situation a short base line is selected and the same is then extended. Such group of triangles which are meant for extending the base is known as base net.

22) What are the different kinds of bench marks?

GTS bench marks: These bench-marks are established all over the country at large interval by the survey of India Department.

Permanent bench marks: These are fixed points or marks set up by different Govt. Department. The reduced levels of these points are determined with references to GTS bench marks.

Arbitrary bench marks: When reduced levels of some fixed points are assumed they are called as arbitrary bench marks. These are adopted in small survey operations.

Temporary bench marks: When bench marks are set up temporarily at the end of a day`s work, they are referred to as temporary bench-marks.

23) Define base line.

Base line forms the basis for the entire computations of triangulation system. The length of base line to be adopted depends on the magnitude of triangulation work, i.e., the grade of the triangulation.

24) Define Satellite Station.

In order to form well conditioned triangles of triangulation and also to have better visibility objects such as church spirals, towers of temples, flag poles, etc are selected. But the instrument cannot be set up over these true stations for the measurements of angles and a subsidiary station called as satellite station or eccentric station or false station.

25) Define reduction to centre.

Angles taken from satellite 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.

26) What are the Methods used to measure baseline.

The field work for the base line measurements is carried out by two parties,

(i) Setting out party

This party consists of two surveyors and a number of porters. The duty of the porters is to place the measuring tripods., at correct intervals, in alignment in advance.

(ii) Measuring Party

This party consists of two observers, recorder, leveller and staff man for actual measurements.

27) State the principle of method of least squares.

In observations of equal precision the most probable values of the observed quantities are those that render the sum of the squares of the residual errors a minimum.

28) What are the kinds of errors possible in survey work?

Error made on an observation may be due to some reason. Error may be classified in a more general form as (i) mistakes, (ii) systematic error and (iii) accidental error. Value of an error is also assigned as true, most probable and residual.

29) What is the weight of an observation?

Weight of an observation is a measure of its relative worth which may be indicated by a number. Thus if a certain observation is said to have weight age 5, it is meant to say that it is five times as much as an observation of weight 1.

30) Explain level net.

A level net is an interconnecting net work of level circuits formed by level lines interconnecting three or more bench marks. In adjusting a level net, the method of least squares may be adopted.

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UNIT-IV
ADVANCED TOPICS IN SURVEYING

1.What are the equipments used for sounding. (April/May 2018) (Nov/Dec 2012)

- Sounding rods or poles
- Sounding cables or lead lines
- Eco-sounder or Fathometer

2.Define points of tangency. (Nov/Dec 2017)

In geometry, the tangent line (or simply tangent) to a plane curve at a given point is the straight line that "just touches" the curve at that point. Leibniz defined it as the line through a pair of infinitely close points on the curve.

3.What do you understand by echo-sounding? (Nov/Dec 2017) (May/June 2014)

- This is also called as fathometer which is used for measuring depth of large rivers and of seas with depth more than 10m.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.

4.What are the main functions of transition curve? (April/May 2017)

Primary functions of a transition curves (or easement curves) are: To accomplish gradual transition from the straight to circular curve, so that curvature changes from zero to a finite value. ... To changing curvature in compound and reverse curve cases, so that gradual change of curvature introduced from curve to curve.

5.Define hydrographic surveying. (April/May 2017)

- Hydrographic survey is the science of measurement and description of features which affect maritime navigation, marine construction, dredging, offshore oil exploration/offshore oil drilling and related activities. Strong emphasis is placed on soundings, shorelines, tides, currents, seabed and submerged obstructions that relate to the previously mentioned activities.

6.What is the three point problem in hydrographic surveying? (Nov/Dec 2016)

- In surveying, a method used to orient underground workings via three plumb lines suspended in a vertical shaft. The problem of determining dip and strike of a plane from elevations determined at three known points not in a straight line.

7.What is the meant by scale of photograph? (Nov/Dec 2016)

- Scale is an important describing factor of vertical aerial photography. It is important to know the scale of the image under examination, as this can affect how you perceive or interpret what appears in the image. Scale also allows features in the image to be measured.

8.Define MSL. (April/May 2015)

- Mean sea level is the sea level obtained considering the average heights of all the tides being measured at hourly intervals over some stated period covering the entire complete tides. For all major works the datum selected is the mean sea level (MSL).

9.What is meant by three point problem in hydrographic surveying? (Nov/Dec 2014)

- If a sounding is located by two angles from the boat by observations to three known points on the shore, the plotting can be done adopting three-point problem. The three point problem may be solved by mechanical, graphical or analytical methods.

10.Define Azimuth. (May/June 2013)

- Azimuth of a heavenly body is the angle between the observer's meridian and the vertical circle passing through the body.

11.Distinguish between the Zenith and the Nadir.(April/May 2011)

- Zenith is the point on the upper portion of celestial sphere immediately above the overhead of an observer.
- Nadir is the intersection of a97ertical line through the observer's station to the lower portion of the celestial sphere.

12.Distinguish between terrestrial photogrammetry and aerial photogrammetry. (April/May 2011)

- Photographs are taken either from ground station or from the air. Photographs taken from a fixed position on or near the ground and the branch deals on such aspects is called terrestrial photogrammetry.
- Aerial photogrammetry is that type of photogrammetry wherein the photographs are taken by cameras mounted on an aircraft flying over the area.

13. Distinguish between a compound curve and a reverse curve.

- A compound curve consists of a combination of two circular of different radius with a common junction. The different of change of curvature is on the same side.
- A reverse curve is basically a compound curve with a common tangent at the junction. It consists of two circular arcs turning in opposite directions with the common at the junction.

14. What is super elevation?

In order to counter balance the centrifugal force the outer edge of the road is raised which is known as the super-elevation or cant or banking. This traverse slope is provided throughout the length of the horizontal curve. The super elevation is expressed as the ratio of the height of the outer edge with respect to the horizontal width.

15. What is a transition curve?

Transition curve is also called as an basement curve which is an arc introduced between a straight and a circular curve or between two arcs of a compound curve. The radius of a transition curve varies from infinity to a fixed value.

16. Write down the requirements of an ideal transition curve.

- The transition should be tangential to the straight.

- The curvature of the transition curve should be zero at the origin of the straight.
- The exact amount of super elevation should be attained at the junction with the circular curve.
- The curvature of the transition curve should increase at the same rate as that of the super elevation

17. What is a summit curve and how it occurs.

A vertical curve with convexity upwards is called a summit curve.

- An ascending of gradient meets another ascending gradient.
- An ascending gradient intersects a descending gradient.
- A descending gradient meets another descending gradient.
- An ascending gradient meets a horizontal.

18. What is a route survey? What is its purpose?

Route surveying is applied to the surveys required to establish the horizontal and vertical alignments for transport facilities. The transport facilities may be highways, railway, aqua ducts, canals, water pipeline oil and gas lines, cableways, waterways, power, telephone and waste water disposal.

19. What is Reconnaissance survey?

Preliminary inspection of an area to be surveys is called reconnaissance or a reconnoitre. During the survey a proper planning should be done such that the work will be better and effectively executed.

20. What are lunar and solar tides?

- The periodical variations in natural water level are called as tides. The resultant force between the earth and moon causes lunar tides. Lunar tides may be super lunar tide or inferior lunar tides depending on the moon`s transit.
- The phenomenon of production of solar tides is due to force of attraction between earth and sun which is similar to the lunar tides. Thus there will be superior solar tide or inferior solar tide.

21. What is meant by sounding?

The measurements of depths below the water surface are called soundings. This is synonymous to the depth measurement in land with reference to a datum. The aim in making soundings is to determine the configuration of the subaqueous source.

22. What are three point problems in hydro graphic surveying?

If a sounding is located by two angles from the boat by observations to three known points on the shore, the plotting can be done adopting three-point problem. The three point problem may be solved by mechanical, graphical or analytical methods.

23. What is a great circle?

If the earth is considered as a sphere any plane passing through its centre traces out upon the surface a circle called great circle. For example equator is a great circle.

24. What is meant by celestial sphere?

For an observer upon the earth the fixed starts seem to be studded over the surface of a vast sphere, known as the celestial sphere at the centre of which the earth is approximately situated.

Because of the real rotation of the earth about its polar axis every twenty four hours, the celestial sphere appears to rotate about the same axis during that time. The centre sphere the earth may be taken as the centre of the celestial sphere.

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25. 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 h to 24 h. The right ascension (R.A.) of the meridian of a place is known as the local sidereal time (L.S.T)

L.S.T = (R.A. of a star) + (westerly hour angle of a star)

26. What is meant by Mean Solar Time?

In order to circumvent the non-uniformity of apparent solar time, a fictitious body called the mean sun is introduced.

UNIT-V

MODERN SURVEYING

1. Compare between microwave and electro-optical EDM systems. (April/May 2018)

Microwave EDM system	Electro-optical EDM system
• Microwave used as carrier wave	• Infra red beam used as carrier wave
• Used to measure distances varying from 50m to 50km	• Measur lengths varying from 1km to 60km
• Comparatively less accurate	• More accurate system

2. What is space segment? (April/May 2018)

i)The space segments(SS) is composed of the orbiting GPS satellite, or space vehicles(SV).

ii)This was modified to six planes with four satellite each.

iii)The GPS design originally called for 24SVeight each in three circular orbital planes.

3. What is multipath error? (April/May 2018)

i) A signal that bounces of a smooth object and hits the receiver antenna.

ii)It increases the length of time for a signal to reach the receiver.

4. List the components of an electro-optical EDM system. (April/May 2018) (Nov/Dec 2014)

- Visible light produced by a tungsten lamp
- Xeon flash tube or laser light or infra-red light
- A light modulator
- Optical parts for transmitting and receiving the modulated light
- Photomultiplier
- Phase meter
- A readout unit

5. Define total station and basic principles of Total Station. (April/May 2018) (Nov/Dec 2017) (April/May 2017)

The total station or electronic tacheometer is a combination of an electronic theodolite, an electronic distance measuring device and a microprocessor unit. With this device one can determine angles and distances from the instrument to the points to be surveyed. With the

application of trigonometry the angles and distances may be used to compute the actual positions of surveyed points in absolute terms.

6. What is mean by Selective Availability? (Nov/Dec 2017)

Selective Availability (SA) was an intentional degradation of public GPS signals implemented for national security reasons.

7. What is called anti spoofing?(Nov/Dec 2017) (Nov/Dec 2015) (April/May 2015)

- The process of S/A dither is adopted where by some of the satellite clocks are placed out of phase by amounts known only to the military. The process of S/A epsilon is applied so that the satellite returns an incorrect position for itself. These effects can reduce the accuracy of positon fixing with the C/A code. In addition, since 1994, it has been made available to military users only. This is acheieved by a process known as anti-spoofing in which the code is encrypted to a secret Y-code.

8. Define GPS. (April/May 2017)

- Global positioning system is a space based all weather radio navigation system that provides quickly, accurately and in-expensively the time, position and velocity of the object any where on the globe at any time.

9. What do you understand from the satellite configuration?(April/May 2017) (Nov/Dec 2015)

- Depending on the model and configuration of your GSG unit, and the scenario chosen, several satellite systems can be simulated in a scenario, each of which you may want to configure in accordance with the requirements for your receiver-under-test.

10. List out the various segments in GPS? (April/May 2015)

- Satellite constellation or space segment
- Operational control segment
- User equipment segment

11. What sorces of error in GPS? (Nov/Dec 2016)

- Satellite-related errors
- Propogation-medium related errors
- Receiver-related errors

12. Write short notes on hand-held receivers. (April/May 2013)

- Handheld receiver is a data recorder which may be capable of tracing up to six satellites. The Leica MX 8600 series is a typical of this type of equipment.For differential work this must be used with the MX 8650 base station, which has the capability of tracking 12 satellites or any other compatible unit. Typical uses are for asset mapping by utilities and local authorities, where the base station would be permanently mounted at the office or depot

13. What is a Total Station?

A Total Station or an Electronic Tachometer is a combination of an Electronic Theodolite, an Electronic Distance Measuring Device (EDM) and a microprocessor with memory unit. With this device are can determine angles (both horizontal and vertical) and distance from the instrument to the points to be surveyed.

14. What is a carrier wave?

EDMs consist of a transmitter set up at one end of the lengths to be measured, sending out a continuous wave to the receiver at the other end. This wave, termed the carrier wave, is then modulated and the length determined.

15. List the components of an Electro-optical EDM system.

Main components of Electro-optical EDM instruments are:

- Visible light produced by a tungsten lamp, xenon flash tube or laser light or infra-red light.
- Optical parts for transmitting and receiving the modulated light.
- Photomultiplier.
- Phase meter and
- A read out unit.
- A light source.

16. Compare the microwave and the electro-optical systems adopted in total station.

Electro-optical instruments are more accurate than the microwave instruments, because the shorter the carrier wave length, the better is the accuracy of the total station. In bad atmospheric conditions and for long distance measurements, microwave instruments may be utilized for better penetration through fog and haze.

17. What are the salient parameters of a total station?

A total station comprises of an electronic theodolite with an EDM and a microprocessor. The theodolite measures the horizontal angle (Hz) and the vertical angle (V) of the line of sight from the centre of the total station to the centre of a target on point to measure. The intersection of the rotation of the axis of the horizontal and vertical circles in the centre of the station.

18. What is meant by EDM?

The total station or electronic tacheometer is a combination of an electronic theodolite, an electronic distance measuring device (EDM) and a microprocessor with memory unit. With this device one can determine angles and distances from the instrument to the points to be surveyed.

19. What are the software applications can be done by total station?

The software applications available on may total stations include the following:

- Slope correction and reduced orientation.
- Horizontal circle orientation.
- Co-ordinate measurement.
- Traverse measurements.
- Resection.
- Remote elevation measurement.

20. List out the sources of error in total station.

- Horizontal collimation or line of sight error.
- Tilting axis error.
- Compensator index error.
- Vertical collimation or vertical axis error.

21. List out the different types of Total stations.

- Manual total station.
- Semi-automatic total station.
- Automatic total station.
- Servo-driven total station.

22. What is GPS?

Global Positioning System (GPS) is a space-based all weather radio navigation system that provides quickly, accurately and in-expensively the time, position and velocity of the object anywhere on the globe at any time.