UNIT-I CONTROL SURVEYING

PART A

1. Define Permanent Bench mark.

These are established by different government departments like PWD, Railways, Irrigation etc., The RL of these points are determined with reference to G.T.S Benchmarks. Points on rocks, culvert, gate,pillars etc.

2. What is Temporary Bench mark?

These are established temporarily whenever required. These are generally chosen to close the day's work and to start the next days. Points on roofs, walls, basements etc

3. Define Arbitrary Bench Mark.

When the RL of some fixed Points are assumed, they are termed a arbitrary Bench mark

4. Define Extension of baseline.

The length of baseline is usually not greater than 10 to 20 km. As it is not a often possible to sewed a favorable sight for a longer base. They usually practice is therefore to use short base & Extend it by means. Of forming well conditioned triangles.

5. What is Trigonometrical leveling?

Trigonometrical levelling is the process of determining the differences of elevation of the given station from observed vertical angles and known distance.

6. What is meant by Axis Signal correction?

If the height of the signed is not the same as that of height of the instrument axis above the station, a correction known as the axis signal correction or eye & objective correction is to be applied.

7. What is Geodetic Surveying?

In this surveying, the shape of the earth is taken into account and all the lines lying in the surface are curved lines. It is used for area greater than 250km. It is accurate. It is conducted by great geometrical survey of India.

8. Define Baseline.

The Base line is laid down with great accuracy of measurement & alignment as it forms the basis for the computations of triangulation system the length of the base line depends upon the grades of the triangulation

9. Define Laplace Station.

At certain station, astronomical observations for azimuth & longitude are also made on the station is called Laplace station

10. What is Triangulation?

Triangulation is nothing but the system consists of not of interconnected triangles. In this method, knowing the length of one side and three angles, the length of other two sides of each triangle can be computed.

11. Define Signals

A Signal any object such as a pole target erected at a station upon which a sight is taken by a observer at another station

12. Define Satellite Station.

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

13. What is Reduction to Centre?

If the true station were occupied by computing the corrections and apply them algebraically to the observed values is generally known as reduction of centre.

14. Define Base net.

A series of triangles connecting the baseline to the main triangulation is called base net.

15. What is control surveying?

It is a fined reference point of known elevation

16. What are the Types of Bench Mark?

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

17. What are the Equipment‟s used for base line measurement.

Marking stakes or tripod
Straining device
Supporting stakes or tripod
Steel tape
Six number of thermometer

18. What are the Methods used to measure baseline

Rigid bar method
Wheeler's method
Jaderin's method
Hunter's short base method
Tacheometric method

19. Mention the Two types of trigonometrically leveling.

Plane Trigonometrical levelling
Geodetic Trigonometrical levelling

20. 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. What are the different corrections to be applied while measuring baseline in geodetic surveying?

2. A steel tape 30m long, standardized at 10 o c with a pull of 100N was used for measuring a baseline. Find the correction per tape length, if the temperature at the time of measurement was 20oc and pull applied was 150 N. Density of steel = 3000 kg/m3. Weight of tape=5.88N.

3. What is meant by a "satellite station"? Explain briefly.

4. In a trignometrical measurement of the difference in level of two stations P and Q, 10480 m apart, the following data were obtained.
Instrument at P, angle of elevation of Q = 0‟15"
Instrument at Q, angle of depression of P = 3‟ 33"
Height of instrument at P = 1.42 m.
Height of instrument at Q = 1.45 m.
Height of signal at P = 3.95 m.
Height of signal at Q = 3.92 m.
Find the difference in level between P and Q and the curvature and refraction correction.

5. From an eccentric Station S, 12.25 meters to the west of the main station B, the following angles were measured BSC = 760251; CSA = 540321 2011. The stations S and C are to the opposite sides of the line AB. Calculate the correct angle ABC if the lengths AB and BC are 5286.5 and 4932.2m respectively.

6. What are the methods of measurement of the base line and explain any two with neat sketch.

7. A steel tape is 30 m long at a temp of 15oc when lying horizontal on the ground. Its c/s area is 0.08 cm2 and weight of 18.kg (18N) and. Co-efficient of expansion is 117 x10-7/oc. The tape is stretched over 3 supports which are at the same level and at equal intervals. Calculate the actual length between the end graduations under the following conditions. Temp = 25oc, Pull -180 kg, E = 2.1 x 105 N/cm2.

8. Explain in detail about Horizontal control & its methods andVertical Control & its Methods.

9. State the factors to be considered while selecting base line and also explain with neat sketches how to extend the base line in the field.

10. Explain in detail about the Classification of triangulation system.

11. What is mean by triangulation adjustment? Explain the different conditions and cases with sketches.

12. Write short notes on: (1) selection of site for base line

(2) Satellite station

13. What are the different methods by which the difference in elevation could be determined? Name the corrections to be applied.

UNIT-II SURVEY ADJUSTMENT

PART A

1. What are the errors?
   Mistakes (or) gross Errors
   Systematic (or) Cumulative Errors
   Accidental (or) Random Errors
2. What is meant by Mistakes (or) Gauss Errors
   Depends upon the observer, a mistake cannot be corrected unless the observer get training. The mistakes are errors that arise from inattention, inexperience, carelessness and poor judgement of confusion in the mind of observer.
3. Write about the 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.
4. What do you meant by Accidental Errors
   The Accidental Errors are those which remain after mistakes and systematical errors have been eliminated and are caused by the combination of reasons beyond the ability of the observer to control.
5. Write the Classification of Observer Quantity
   An observer quantity may be classified as Independent Quantity Conditioned Quantity
6. What do you mean by Conditioned Quantity
   It is the one whose value is dependent upon the values of one (or) more quantities. Its values bear a rigid relation to some other quantities. It is also called "dependent quantities".
7. What do you mean by Conditioned Equation
   The conditioned equation is the equation expressing the relation existing b/w the several dependent quantities. eg. In a ABC A+B+C= 180 . It is a conditioned equation.
8. What do you mean by Observation
   An observation is a numerical value of the measured quantity and may be either direct (or) indirect.
9. DefineDirect Observation
   A direct observation is the one made directly on the quantity being determined. Eg: Measurement of base line.
10. Define Indirect Observation
    An indirect observation is one in which the observed value is deduced from the measurement of some related quantities. Eg: Measurement of Angle by repetition method.
11. Define Weight of an Observation

The weight of an observation is a number giving an indication of its precision and trust worthiness, when making a comparison between several quantities of different worth. If a certain observation of weight 4 it means that it is 4 times as much reliable as an observation of weight 1. When two quantities (or) observations are assumed to be equally reliable, the observed values are said to be of equal weight (or) of unit weight.

12. Define Weighted Observations
Observations are weighted when different weights are assigned to them. Eg: A=300 40'-wt 3 It means A is measured 3 times
13. Define Observed value of a Quantity
An observed value of a quantity is a value obtained when it is corrected for all the known errors. Observed value = Measured value ± errors (or) corrections.
15. Define True value of Quantity
It is the value which is obsolute free from all the errors.
16. Define 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 then any other value.
17. What do you mean 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.
18. Define Residual Error
It is diff b/w the most probable value of the quantity and its observed value. Residual Errors = most probable value – observed value
19. DefineObservation Equation
It is the relation b/w the observed quantity and its numerical value.
20 Write about Normal Equation
It is the education which is formed by the multiplying each equation by the co-efficient of the unknown, whose normal equation is to be formed out by adding the equation thus formed..

PART B

1. What are the temporary adjustments of dumpy level? How is it done?
2. What is reciprocal leveling and why is it employed? What errors will be eliminated by this?
3. Enumerate the principle of least squares as applied to observations of equal weight and to those for which different weights are assigned
4. Explain the methods of correlates.
5. What do you mean by station adjustment? Explain.
6. The following are the three angles α β and γ observed at a station P closing the horizon, along with their probable errors of measurement. Determine their corrected values
α = 78o 12‟ 12” ± 2” β = 136o 48‟ 30” ± 4” γ = 144o 59‟ 08” ± 5”
7. What do you mean by figure adjustment? Explain

8. Find the most probable values of the angles A, B and C from the following observations

at a station P using method of differences.
a. A = 38o 25‟ 20” wt.1
b. B = 32o 36‟ 12” wt.1
c. A +B = 71o 01‟ 29” wt .2
d. A + B+ C = 119 o 10‟ 43” wt.1
e. B + C = 80o 45‟ 28 wt.2
9. Form the normal equation for x, y, z in the following equations.
a. 3X+3Y+Z-4=0
b. X+2Y+2Z-6=0
c. 5X+Y+4Z-21=0
10. Also form the normal equation, if weights of the equations are 2, 3 and 1 respectively.
11. The following angles were measured at a station O so as to close the horizon
a. A=8304212811.75 wt.3
b. B=10201514311.26 wt.2
c. C=9403812711.22 wt.4
d. D=7902312311.77 wt.2
12. Adjust the angles by method of correlates.
13. Explain in detail about errors sources and error classification.
14. What are the precautions and correction can be applied in error reduction.
15. How are normal equations formed in theory of errors?

UNIT-III TOTAL STAION SURVEYING

1. Define Total Station.
   total station or an electronic tacheometer is a combination of an electronic theodolite , an electronic distance measuring device and a microprocessor with memory unit .With device one can determine angles and distances from the instrument to the points to be surveyed.
2. Name the parts of a total station.
   Telesccope, plate level,keyboard and display window,tribach,vertical tangent screw,power switch,vertical motion clamp,horizontal screw and horizontal screw.
3. List the disadvantages of a total station
   Hard copies of feild notes are not provided
   The cost of equipment is very high.
4. What is a carrier waave?
   EDM consist of a transmitter set up at on 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 moduated and the length determined.
5. What is electromagnetic wave?
   A light source,infra red light,optical parts,photomultiplier,phasemeter and red out unit.
6. D efine Celestial sphere
   It is an imaginary sphere on which the stars appear to lie or to be studded is known as the Celestial sphere.

7. D efine Zenith (z) : It is the point on the upper portion of the celestial sphere marked by plumb line above the observer. It is the point on the celestial sphere immediately above the observer's station.
8. D efine Nadir (Z', or, N): It is the point on the lower portion of the celestial sphere marked by plumb line below the observer. It is the point on the celestial sphere vertically below the observer's station.
9. D efine Celestial Horizon: It is also called true or Rational horizon or geocentric horizon. It 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 centre of the earth.
10. D efine The terrestrial poles and equator : The terrestrial poles are the two points in which the earth's axis of notation meets the earth's sphere. The terrestrial equator is the greet circle of the earth, the plane of which is at right angles to the axis of notation. The two poles are equidistant from it.
11. D efine The celestial poles and equator
    If the earth's axis of rotation is produced indefinitely, it will meet the celestial sphere in two points called the North & South celestial poles (P and P'). The celestial equator is the great circle of the celestial sphere in which it is intersected by he plane or terrestrial equator.
7. Define Sensible horizon
    It is a circle in which a plane passing through the point of observation and tangential to the earth's surface intersects with celestial sphere. The line of sight of an accurately leveled telescope lies in this plane.
8. Define Visible horizon
    It is a circle of contact, with the earth, of the cone of visual rays passing through the point of observation
9. Define Vertical circle
    A vertical circle of the celestial sphere is great circle passing through the zenith and nadir. They all cut the celestial horizon at right angles.
10. Define The Observers Meridian
    The meridian of any particular point is that circle which passes through the zenith and nadir of the point as well as through the poles.
12. Define Prime vertical:
    It is the particular vertical circle which is at right angles to the meridian and which therefore passes through the east & west points of horizon.
13. Define Latitude (θ)
    It is the 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 also defined as the angle between the zenith and the celestial equator.
14. Define co-latitude
    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 ($900 - \theta$).
15. Define longitude (Φ): The longitude of a place is the angle between a fixed reference meridian called the prime or first meridian and the meridian of the place.
16. Define altitude (α)
    The altitude of celestial or heavenly body (i.e., a sun or star) is its angular distance above the horizon, measured on the vertical circle passing through the body.

17. Define co-altitude or zenith distance (z)

It is the angular distance of heavenly body from the zenith. It is the complement of the altitude.

18 Define Azimuth

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

18. Define Declination

The declination f a celestial body is angular distance from the plane of the equator, measured along the star's meridian generally called the declination circle. Declination varies from 00 to 900 , and is marked + or – according as the body is north or south of the equator.

19. Define Hour circle

Hour circles are great circles passing through the north and south celestial poles. The declination circle of a heavenly body is thus its hour circle.

20. Define hour angle: The hour angle of a heavenly body is the angle between the observer's meridian and the declination circle passing through the body. The hour angle is always measured westwards.

PART B

1. Explain in detail about Electromagnetic Spectrum and its applications
2. Explain in detail about the properties of electromagnetic waves. How are they useful in measuring of distances?
3. Explain in detail about the different types of EDM
4. Explain the working principle of EDM
5. Why phase comparison and modulation is preferred over time measurement in EDM
6. Explain the working principle of "Tellurometer"
7. Explain the working principle of "Geodimeter"
8. Explain the working principle of "Wild Distomats"
9. Explain in detail about the sources of errors in Total station and EDM.
10. How is Traversing and Trilateration done using Total station?

UNIT-IV GPS SURVYING

1. What is GPS?

It 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.

2. List the advantages of GPS surveys.

Three dimensional
Site intervisibility
Weather independent
Common reference system

3. What is multipath error?

As the signal arrives at the surface of the earth may get reflected by local obstructions and goes to the receiver antenna through more than one path.

4. Write the principles of GPS.

5. What is GPS?

What is GPS? The Global Positioning System (GPS) is a U.S. space-based global navigation satellite system. It provides reliable positioning, navigation, and timing services to worldwide users on a continuous basis in all weather, day and night, anywhere on or near the Earth. GPS is made up of three parts: between 24 and 32 satellites orbiting the Earth, four control and monitoring stations on Earth, and the GPS receivers owned by users. GPS satellites broadcast signals from space that are used by GPS receivers to provide three-dimensional location (latitude, longitude, and altitude) plus the time.

6. Explain about P and C/A codes.

Binary data that is modulated or "superimposed" on the carrier signal is referred to as Code. Two main forms of code are used with NAVSTAR GPS: C/A or Coarse/Acquisition Code (also known as the civilian code), is modulated and repeated on the L1 wave every millisecond; the P-Code, or Precise Code, is modulated on both the L1 and L2 waves and is repeated every seven days. The (Y) code is a special form of P code used to protect against false transmissions; special hardware, available only to the U.S.government, must be used to decrypt the P(Y) code.

7. What is Flight control system?

An aircraft flight control system consists of flight control surfaces, the respective cockpit controls, connecting linkages, and the necessary operating mechanisms to control an aircraft's direction in flight. Aircraft engine controls are also considered as flight controls as they change speed.

8. What is Actuator?

An actuator is a mechanical device for moving or controlling a mechanism or system. An actuator typically is a mechanical device that takes energy, usually created by air, electricity, or liquid, and converts that into some kind of motion.

9. Explain different types of actuator

• plasma actuators • pneumatic actuators • electric actuators • hydraulic cylinders

10. Explain RADAR.

Radar is an object detection system that uses electromagnetic waves to identify the range, altitude, direction, or speed of both moving and fixed objects such as aircraft, ships, motor vehicles, weather formations, and terrain. The term RADAR was coined in 1941 as an acronym for RAdio Detection And Ranging. A radar system has a transmitter that emits microwaves or radio waves.

11. How GPS works

GPS signals do not contain positional data. The position reported by the receiver on the ground is a calculated position based on range-finding triangulation. GPS positioning is achieved by measuring the time taken for a signal to reach a receiver.

12. Write factor which affects gps accuracy

Local Effects Atmospheric Effects ,Receiver Clock Error Ionospheric Effects, Percentage Sky Visible Tropospheric Effects ,Satellite Geometry Multipath Error Ellipsoid.

13. Define Ionospheric Effects

All GPS signals travel through the charged plasma of the ionosphere. This can cause the signal to be attenuated (slowed down). Any changes in the signal involve changes in the travel time and thus affect calculated positions similar to multipath errors.

14.Write the advantages of track points

No interaction with the set is necessary

Large numbers can be stored to create accurate routes.

15.Write the advantages of Waypoints

It can be recorded when accuracy is high.

Additional data such as a name and comment can be put with the point.

16. Write the disadvantages of track points

Although you can set a time or distance interval for the tracklog it automatically records position regardless of satellite geometry and visibility

17. Write the disadvantages of waypoints

The set must be handled repeatedly. Only a small number of points are likely to be recorded making routes less detailed.

18. 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.

19. 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.

20. 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

1. What are the space, control and user segments of GPS and their functions?
2. Explain the history of GPS and technical specifications of its orbits.
3. How is co-ordinates determined using GPS?
4. Explain in detail about the signal structure of GPS
5. Explain in detail Anti-spoofing and Selective availability.
6. Explain the requirements of GPS signals.
7. What are the types of GPS receivers? Explain in detail.
8. Distinguish between single frequency receivers and Double frequency receivers.
9. How the traversing and triangulation is to be done using GPS?
10. Explain the main components of GPS receiver.
11. What is SAASM? Explain.
12. Explain the Characteristics of GPS Navigation and Satellite navigation.

UNIT-V-ADVANCED TOPICS IN SURVEYING

1. Define Hydrographic Survey

   Hydrographic Survey is that branch of surveying which deals with the measurement of bodies of water. It is the art of delineating the submarine levels, contours and features of seas, gulfs, rivers and lakes.
2. What do you mean by Sounding

   The measurement of depth below the water surface is called sounding.
3. DefineTides

   All celestial bodies exert a gravitational force on each other. These forces of attraction between earth & other celestial bodies cause periodical variations in the level of water surface, known as tides.
4. Explain Equilibrium Theory

The earth is covered all around by the ocean of uniform depth. The ocean is capable of assuming the equilibrium.

5. DefineMean sea level
   Mean sea level may be defined as the mean level of the sea, obtained by taking the mean of all the height of the tide as measured at hourly intervals over some states period covering a whole number of complete tides.
6. DefineFathometer
   A fathometer is used for ocean sounding where the depth of water is too much and to make a continuous and accurate record of depth of water below the boat or ship at which it is installed
7. Explain Photographic Survey
   It is also called photogrametry. It is a method of surveying in which plant or maps are prepar from photographs taken from Suitable camera station. It is divided into two. Terrestrial photography Aerial photography
8. Explain Photo theodolite
   It is the combination of photo with theodolite and is used for taking photographs & measuring the angles which the vertical plane of collimation makes with the base line.
9. Explain Stereoscopic pairs
   It means two photos are obtained for a Single object from two point one at each.
   Parallax: In normal binocular vision the apparent movement of a point viewed first with one eye and then the other is known a parallax.
10. Explain Angle of Parallax
    It is the angle of convergence of the two rays of vision.
11. Explain Stereoscopic fusion
    If a pair of photographs is taken of an object from two slightly different positions of the camera and then viewed by an apparatus which ensures that the left eye sees only the left-hand picture & right eye is directed to the right hand picture, the two separate images of the object will fuse together is the brain to provide the observer with spatial impression. This is known as a Stereoscopic fusion.
12. Explain Stereo pair
    The pair of two such photographs is known as stereo pair. The effect of distortions exist in a single photograph may be eliminated through a large extend of stereo pairs.
13. Explain Parallax bar
    A parallax bar used to measure difference of two points, consists of a bar which holds a fixed plate of transparent material near the left end and a movable plate to the right end.
14. Explain Floating mark
    In parallax bar, when the two dots are viewed properly under a stereoscope they fuse into a single dot called floating mark.
15. Explain Mosaics
    Such an assembly of getting series of overlapping photograph is called mosaic.
    Cartography : It is the marking and study of maps in all their aspects. It is an important branch of graphics, since it is an extremely efficient way of manipulating, analyzing, & expressing ideas, forms & relationships that occur in two & three dimensional space.
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17.Define Cadastral survey :

Cadastral means, "Registration concern Land Survey". It is of one of based on national land survey based on land survey law.

18. D efine Modulation

Amplitude modulation Frequency modulation In amplitude modulation, the carrier wave has constant frequency & the modulating wave (the measurement wave) in formation is conveyed by the amplitude of the carrier wave. In the frequency modulation the carrier wave has constant amplitude, while the frequency varies in proportion to the amplitude of the modulation wave.

19. W rite the Methods of Measuring Velocity flow

Surface float Sub surface float Velocity ropes Picot tube method &Current meter mean

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21 Write the Methods of Measuring Velocity flow

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PART B

1. Explain briefly components of hydrographic survey?
2. Comparison between Aerial photographs and maps
3. List the different methods of locating soundings. Explain any two methods.
4. Define stereoscope and list out the types of stereoscopes?
5. State the equipment used for soundings and explain them.
6. State stereoscope and explain briefly the basic types of stereoscopes.
7. Explain briefly about the Electro-Magnetic Distance measurement.
8. What is a three point problem in hydrographic surveying? What are the various solution for the Problems? Explain any one method.
9. Explain briefly the different methods of prediction of tides
10. What is Echo-sounding? Explain their advantages.
11. What do you understand by tides? How do they form? Explain the effects of tides.
12. Explain in detail displacement on vertical photograph.
13. What are the types of measurement of time? Explain.
14. Explain the types of co-ordinate systems.
15. What is reconnaissance survey? Explain
16. Briefly explain „reverse curves" and „shift of a transition curve"