

This set of Surveying Multiple Choice Questions & Answers (MCQs) focuses on “Introduction” Methods of Linear Measurement.

1. Which of the following is not among the methods of linear measurements?

- a) Direct measurements
- b) Measurements by optical means
- c) Indirect measurements
- d) Electromagnetic methods or EDM

Answer: c

Explanation: Linear measurements are mainly divided into three heads. They are direct measurements, measurements by optical means, EDM.

2. Which of the following is not a method of measuring the distances directly?

- a) Pacing
- b) Measurement with passometer
- c) Measurement with pedometer
- d) Measurement with theodolite

Answer: d

Explanation: Measurements with theodolite is optical means. Measurement with passometer, measurement with pedometer, pacing are based on the method of measuring the distances directly.

3. In which method measurements of distances are chiefly confined to the preliminary surveys and explorations where a surveyor is called upon to make a rough survey as quickly as possible?

- a) Chaining
- b) Pacing
- c) Measurements with passometer
- d) Measurements with theodolite

Answer: b

Explanation: Pacing also used to roughly check the distances measured by other means. Chaining is an accurate way of measurement under direct measurement.

4. Which of the following measurements varies with an individual before computing the length of line?

- a) Chaining
- b) Pacing
- c) Levelling
- d) Contouring

Answer: b

Explanation: Length of a line is computed by knowing the average length of pace. Pacing is a rough surveying. Chaining gives almost accurate readings. Taping gives accurate readings.

5. Which method consists in counting the number of paces between the two points of a line?

- a) Chaining
- b) Pacing
- c) Levelling
- d) Contouring

Answer: b

Explanation: By definition of pacing chaining is measuring using different chains. Levelling is a method used to estimate elevation of ground which is 2 dimensional. Contouring gives three dimensional view of the site.

6. Pacing is difficult in _____

- a) Smooth surfaces
- b) Plain areas
- c) Rough ground
- d) Plateaus

Answer: c

Explanation: Pacing is difficult in uneven grounds due to different slopes. That is because it becomes different as well as difficult to measure length of irregular ground accurately.

7. Instrument shaped like a watch and is carried in pocket or attached to one leg is _____

- a) Pedometer
- b) Odometer

- c) Passometer
- d) Speedometer

Answer: c

Explanation: Passometer is an instrument shaped like a watch and is carried in pocket or attached to one leg. Pedometer advantage on the passometer is that it registers total distance covered unlike a number of paces in passometer.

8. Which instrument mechanism is operated by motion of the body and it automatically registers the number of paces, thus avoiding the monotony and strain of counting the paces, by the surveyor?

- a) Passometer
- b) Pedometer
- c) Odometer
- d) Chaining

Answer: a

Explanation: Pedometer is a device similar to the passometer except that, adjusted to the length of the pace of the person carrying it. Passometer avoids the monotony and strain of counting the paces.

9. Which instrument registers total distance covered by any number of pace?

- a) Passometer
- b) Pedometer
- c) Odometer
- d) Chaining

Answer: b

Explanation: Pedometer advantage on passometer is that it registers total distance covered unlike number of paces in passometer.

10. Instrument for registering the number of revolutions of a wheel is _____

- a) Odometer
- b) Pedometer
- c) Pedometer
- d) Chaining

Answer: a

Explanation: Number of revolutions registered by Odometer can then be multiplied by the circumference of the wheel to get the distance. Pedometer advantage on passometer is it registers total distance covered unlike number of paces in passometer.

11. Most accurate method of direct measuring is with _____

- a) Passometer
- b) Pedometer
- c) Theodolite
- d) Chaining

Answer: d

Explanation: Theodolite measurement is not under direct measurements. Measurement with passometer, measurement with pedometer, pacing is based on the method of measuring the distances directly.

12. Which of the following is not under direct measurement?

- a) Pacing
- b) Chaining
- c) Taping
- d) Triangulation

Answer: d

Explanation: Triangulation is by optical means. Pacing is rough surveying. Chaining gives almost accurate readings. Taping gives accurate readings.

13. What is required to transfer points to the ground, while chaining along the sloping ground?

- a) Spirit level
- b) Plumb bob
- c) Butt rod
- d) Pegs

Answer: b

Explanation: It also transfers points from line ranger to the ground. Spirit level is the instrument used to level the plane table by adjusting the spirit bubble in it to center.

14. What is used for measuring offsets, but it is often used by building surveyors or architects?

- a) Plum bob
- b) Butt rod
- c) Pegs
- d) Laths

Answer: b

Explanation: It generally consists of two laths, each of 1 yard or 1 m in length loosely tiered together. Plumb bob is suspended at the center of the plane table to transfer the points on the plan to ground.

15. What is used in centering aid in theodolites, compass, plane table and variety of other surveying instruments?

- a) Butt rod
- b) Whites
- c) Laths
- d) Plumb bob

Answer: d

Explanation: Plumb bob transfers points to the ground so it is used for centering. Butt are used for measuring offsets.

This set of Surveying Multiple Choice Questions & Answers (MCQs) focuses on “Introduction” Accessories For Linear Measurement.

1. Chains are made up of _____

- a) High steel carbon
- b) Galvanized mild steel
- c) Copper coated iron
- d) Iron

Answer: b

Explanation: Straight links are bent into rings at the end and joined each other. Only galvanized mild steel is suitable for bending and cost effective.

2. The distance between the centers of two consecutive middle rings is _____

- a) Chain length
- b) Chain effective length
- c) Effective link length
- d) Link length

Answer: d

Explanation: Number of links is multiplied to the length of link to give chain length. Chain length is the sum of lengths of all links. Link length is always considered between the centers of two consecutive middle rings.

3. The length of the chain is measured from the outside of one handle to the _____ of the other handle.

- a) Inside
- b) Outside
- c) Centre
- d) Before one link

Answer: b

Explanation: Length of chain is the end to end distance of complete chain. Chain length is the sum of lengths of all links.

4. Metric chains are generally available in _____

- a) 15m
- b) 120m
- c) 20m
- d) 25m

Answer: c

Explanation: Metric chains are available in 5, 10, 20 and 30 metres. These are as per Indian Standard Codes, it may vary with country such as American Standard codes etc.

5. Tallies are fixed at every _____ metre length for chains of 10m length.

- a) 1

- b) 2
- c) 2.5
- d) 0.5

Answer: a

Explanation: Tallies are provided at every one meter in case of 5 and 10 meter chains. These are also provided at every 5 meters in case of 20m and 30m chains.

6. What is provided at every meter in case of 20m and 30m chains?

- a) Tallies
- b) Pegs
- c) Arrows
- d) Brass rings

Answer: d

Explanation: Tallies are provided at every 5m in case of 20m and 30m chains. Brass rings are used as a mark for required distance. In this case, small brass rings are provided at every meter.

7. The letter 'M' marked on the tallies refers to _____

- a) Metre
- b) Metric chain
- c) Non Metric chain
- d) Mild steel

Answer: b

Explanation: The tallies used for marking distances in the metric chains are marked with the letter 'M' in order to distinguish them from non-metric chains.

8. Length of each link in metric chain is _____

- a) 1m
- b) 2m
- c) 0.5m
- d) 0.1m

Answer: a

Explanation: 5m, 10m and 20m length chains have 5, 10 and 20 links respectively. These are as per Indian Standard Codes, it may vary with a country such as America Standard codes etc.

9. Length of Gunter's chain is _____

- a) 10ft
- b) 33ft
- c) 66ft
- d) 100ft

Answer: c

Explanation: Gunter's chains are used to measure lengths or distances in fields. Gunter's chain is 66ft long and was originally adopted for convenience in land measurement since 10 sq chains are equal to 1 acre.

10. Length of each link in Gunter's chain is _____

- a) 7.92 ft
- b) 0.6 inch
- c) 7.92 inch
- d) 0.6 m

Answer: c

Explanation: 0.6ft or 7.92 inch is the length of each link in the case of Gunter's chain. Length of Gunter's chain is always considered in ft. The total length of Gunter's chain is 66ft.

11. One furlong is equal to _____ Gunter's chains.

- a) 1
- b) 10
- c) 66
- d) 80

Answer: b

Explanation: One furlong is equal to 660 ft. Gunter's chain length is 66ft. Therefore one furlong is equal to 10 Gunter's chains.

12. How many numbers of links in the case of Gunter's chain?

- a) 66
- b) 100
- c) 50
- d) 80

Answer: b

Explanation: Each link length is 0.6ft and chain length is 66ft. Therefore 100 links of each 0.6ft make one Gunter's chain.

13. One mile is equal to _____ Gunter's chains.

- a) 10
- b) 66
- c) 80
- d) 79

Answer: c

Explanation: 80 Gunter's chains = 1 mile. Length of each Gunter's chain is 66ft. 5280 ft is approximately equal to one mile. Therefore, to measure one mile distance 80 Gunter chains are required.

14. Length of engineer's chain _____

- a) 66ft
- b) 100ft
- c) 66m
- d) 100m

Answer: b

Explanation: Length of one link is one ft. Total 100 links forms a chain of length 100ft. Engineer's chain is always measured in ft.

15. How many number of links are there in engineer's chain?

- a) 10
- b) 100
- c) 50
- d) 66

Answer: b

Explanation: Length of each link is one ft. Length of the engineer's chain is 100ft. Therefore, dividing total length of chain by length of each chain gives the total number of links.

This set of Surveying Multiple Choice Questions & Answers (MCQs) focuses on "Classification of Surveying".

1. Which of the following is made in connection with the construction of streets, water supply systems, sewers?

- a) Traverse surveying
- b) Hydrographic surveying
- c) Cadastral surveying
- d) City surveying

Answer: d

Explanation: City surveying is made in connection with the construction of streets, water supply systems and sewers. A survey which deals with bodies of water for the purpose of navigation, water supply, harbor works or for the determination of mean sea level is hydrographic surveying.

2. Which of the following is a classification based on the instrument used?

- a) Topographic surveying
- b) Hydrographic surveying
- c) Cadastral surveying
- d) Traverse surveying

Answer: d

Explanation: Topographic surveying, Hydrographic surveying, Cadastral surveying classification is based on the nature of field survey. Traverse surveying, chain surveying is classified based on the type of instrument used.

3. Determining points of strategic importance are called _____

- a) Topographic surveying
- b) City surveying
- c) Military surveying

d) Traverse surveying

Answer: c

Explanation: Determining points of strategic importance is military surveying. City surveying is made in connection with the construction of streets, water supply systems and sewers.

4. For exploring mineral wealth which type of surveying is used?

- a) Topographic surveying
- b) Engineering surveying
- c) Military surveying
- d) Mine surveying

Answer: d

Explanation: For exploring mineral wealth mine surveying is used. Determining points of strategic importance is military surveying.

5. Determining quantities or afford sufficient data for the designing of works such as roads and reservoirs is called

- a) Topographic surveying
- b) Engineering surveying
- c) City surveying
- d) Cadastral surveying

Answer: b

Explanation: Determining quantities or afford sufficient data for the designing of works such as roads and reservoirs is engineering surveying. City surveying is made in connection with the construction of streets, water supply systems and sewers.

6. What consists of a horizontal and vertical location of certain points by linear and angular measurements and is made to determine the natural features of a country such as rivers, streams?

- a) Topographic surveying
- b) Engineering surveying
- c) City surveying
- d) Cadastral surveying

Answer: a

Explanation: Topographic surveying consists of the horizontal and vertical location of certain points by linear and angular measurements and is made to determine the natural features of a country such as rivers, streams etc. City surveying is made in connection with the construction of streets, water supply systems and sewers.

7. Which of the following is a classification based on the nature of the field survey?

- a) Topographic surveying
- b) Mine surveying
- c) Military surveying
- d) Chain surveying

Answer: a

Explanation: Chain surveying classification is based on instruments used. For exploring mineral wealth mine surveying is used.

8. Which of the following is not a classification based on instruments used or methods employed?

- a) Chain surveying
- b) Topographic surveying
- c) Traverse surveying
- d) Aerial surveying

Answer: b

Explanation: Topographic surveying classification is based upon the nature of the field survey. Chain surveying is classified based on the instrument used. Aerial surveying is classified based on the type of method employed.

9. A survey which deals with bodies of water for the purpose of navigation, water supply, harbor works or for the determination of mean sea level is _____

- a) Topographic surveying
- b) Hydrographic surveying
- c) Cadastral surveying
- d) City surveying

Answer: b

Explanation: Survey which deals with bodies of water for the purpose of navigation, water supply, harbor works or for the determination of mean sea level is hydrographic surveying.

This set of Surveying Multiple Choice Questions & Answers (MCQs) focuses on “Definition”.

1. Determining the relative positions of points on above or beneath the surface of the earth by means of direct or indirect measurements of distance and direction and elevation is called as _____

- a) Surveying
- b) Levelling
- c) Measuring
- d) Contouring

Answer: a

Explanation: Surveying is defined as determining the relative positions of points above or beneath the surface of the earth by means of direct or indirect measurements of distance and direction and elevation.

2. Finding the elevations of a point with respect to a given or assumed and establish points given elevation or at different elevations with respect to given or assumed dactum is _____

- a) Surveying
- b) Levelling
- c) Bearing
- d) Contouring

Answer: b

Explanation: Finding the elevations of a point with respect to a given or assumed and establish points given elevation or at different elevations with respect to given or assumed dactum is levelling.

3. Type of surveying in which the mean surface of the earth is considered as a plane and the spheroidal shape is neglected called as _____

- a) Topographic Surveying
- b) Hydrographic Surveying
- c) Geodetic Surveying
- d) Plane Surveying

Answer: d

Explanation: Type of surveying in which the mean surface of the earth is considered as a plane and the spheroidal shape is neglected is plane surveying.

4. Type of surveying in which the shape of the earth taken into account is _____

- a) Topographic Surveying
- b) Hydrographic Surveying
- c) Geodetic Surveying
- d) Plane Surveying

Answer: c

Explanation: Type of surveying in which the shape of the earth taken into account is geodetic surveying. The survey which deals with bodies of water for purpose of navigation, water supply, harbor works or for the determination of mean sea level is hydrographic surveying.

5. Horizontal projection of an area and shows only horizontal distances of the points is _____

- a) Contour lines
- b) Levelling
- c) Surveying
- d) Plan

Answer: d

Explanation: Horizontal projection of an area and shows only horizontal distances of the points is plan or map. Finding the elevations of a point with respect to a given or assumed and establish points given elevation or at different elevations with respect to given or assumed dactum is levelling.

6. What type of surveys needs to fix the boundaries of municipalities and of state and federal jurisdictions?

- a) Topographic Surveying
- b) Hydrographic Surveying
- c) Cadastral Surveying
- d) City Surveying

Answer: c

Explanation: The surveys need to fix the boundaries of municipalities and of state and federal jurisdictions are cadastral surveying. Survey which deals with bodies of water for purpose of navigation, water supply, harbor works or for the determination of mean sea level is hydrographic surveying.

7. Determining the absolute location of any point or the absolute location and direction of any line on the surface of the earth is called _____

- a) Topographic Surveying
- b) Astronomical Surveying
- c) Cadastral Surveying
- d) Hydrographic Surveying

Answer: b

Explanation: Determining the absolute location of any point or the absolute location and direction of any line on the surface of the earth is astronomical surveying.

8. Determining different strata in the earth's crust is called as _____

- a) Mine Survey
- b) Geological Survey
- c) Geodetic Survey
- d) Archaeological Survey

Answer: b

Explanation: Determining different strata in the earth's crust is the Geological Survey. Type of surveying in which the shape of the earth taken into account is geodetic surveying.

9. Determining unearthing relics of antiquity is called as _____

- a) Mine Survey
- b) Geological Survey
- c) Geodetic Survey
- d) Archaeological Survey

Answer: d

Explanation: Determining the unearthing relics of antiquity is an archaeological survey. Determining different strata in the earth's crust is the geological survey.

10. In which surveying, shape of earth is taken into consideration?

- a) Plane surveying
- b) Geodetic surveying
- c) Topographic surveying
- d) Geological surveying

Answer: b

Explanation: In Geodetic surveying, shape of the earth is considered for carrying out high precise work. In case of Plane surveying, spheroid shape is neglected and entire area is considered in the form of triangles. Topographic surveying consists of vertical and horizontal locations of points whereas Geological surveying determines earth's strata.

11. Representing large scale on the surface of the earth is _____

- a) Plan
- b) Map
- c) Scale
- d) Area

Answer: a

Explanation: For any representation, if it consists large scale then it represents plan and for small scale it represents map.

12. Which of the following units measurement system is generally employed?

- a) Centesimal system
- b) Hours system
- c) Minutes system
- d) Sexagesimal system

Answer: d

Explanation: Since most surveying instruments are graduated according to this system, Sexagesimal system is widely used in India. Centesimal system is having a great approach in Europe for its adaptability in interpolation. Hours system is having its use in navigation.

13. The ratio of map distance to corresponding ground distance is called as _____

- a) Representative factor
- b) Representation factor
- c) Reciprocating factor
- d) Recurring factor

Answer: a

Explanation: This factor can be used for determining the ratio of map distance to ground distance which would be helpful for further calculations.

14. Which among the following scales is used to determine the original scale when the plan on the drawing sheet shrinks due to atmospheric conditions?

- a) Vernier scale
- b) Plane scale
- c) Shrunk scale
- d) Diagonal scale

Answer: c

Explanation: Shrunk scale is used to determine the original scale when any plan shrinks due to atmospheric conditions, which can be determined by a formula. By using the original scale further calculations can be done.

15. Which among the following methods is used for determining the precise position on the earth surface?

- a) Geological surveying
- b) Geodic surveying
- c) Land surveying
- d) Plane Surveying

Answer: b

Explanation: In Geodic surveying, spheroid surface of the earth is considered which might be possible for determining the precise position by avoiding any further assumptions.

16. Which among the following is one of the principles of surveying?

- a) Taking measurements
- b) Covering entire area
- c) Determining the elevation differences
- d) Working from whole to part

Answer: d

Explanation: By working from whole to part, it is possible to eliminate the errors and to localise the errors. Otherwise, it might expand in magnitude.

17. Design a vernier for a theodolite circle divided into degrees and one fourth degrees to read to 20'.

- a) 55
- b) 45
- c) 65
- d) 35

Answer: b

Explanation: W.K.T, $L.C = s/n$

$S = (1/4)^{\circ} = 15'$ and $L.C = 20' = 20/60 \text{ min.}$

So, $20/60 = 15/n$

$n = 45.$

18. Horizontal angle measured clockwise from geographic meridian to the direction of progress of a line is known as _____

- a) Horizontal meridian
- b) Vertical meridian
- c) Azimuth
- d) Horizontal bearing

Answer: c

Explanation: Azimuth is the angle measured from geographic meridian which is quite different from bearing as it is measured w.r.t north direction.

19. The formula for shrunk scale can be given as _____

- a) Original scale*shrinking factor
- b) Shrunk scale*shrinking factor
- c) Vernier scale* shrinking factor

d) Diagonal scale* shrinking factor

Answer: a

Explanation: The shrinkage factor obtained by the ratio of shrunk length to actual length multiplied by the original scale will give the shrunk scale formula.

This set of Surveying Interview Questions and Answers focuses on “Introduction” Accessories For Linear Measurement “ 2”.

1. What is the length of the revenue chain?

- a) 100ft
- b) 33ft
- c) 66ft
- d) 50ft

Answer: b

Explanation: Revenue chain is the type of chain which is mainly used for Cadastral surveying. Length of the revenue chain is 33ft. Length of each link is approximately 2 ft.

2. How many numbers of links in case of revenue chain?

- a) 10
- b) 12
- c) 16
- d) 33

Answer: c

Explanation: Length of the revenue chain is 33ft long. It consists of 16 links with each link length approximately 2 ft.

3. What is the length of each link in case of revenue chain?

- a) 1 ft
- b) 2 ft
- c) 2.0625 ft
- d) 1.0625ft

Answer: c

Explanation: Length of the revenue chain is 33ft. It contains 16 links then each link length is $33/16$ which gives 2.0625ft.

4. Cloth tapes of closely woven linen, 12 to 15 mm wide varnished to resist _____

- a) Shrinkage
- b) Heat due to sunlight
- c) Moisture
- d) Rusting

Answer: c

Explanation: In the case of cold places or winter seasons it can be used. In winter and rainy seasons also moisture content is more in the atmosphere. It can easily resist these conditions as it is varnished.

5. Which of the following tape is not made?

- a) Linen tape
- b) Invar tape
- c) Steel tape
- d) Iron tape

Answer: d

Explanation: Iron can easily spoil due to rusting. Steel, Invar, linen tapes are long lasting and have protective layer.

6. What are used after every chain length measured on the ground?

- a) Pegs
- b) Ranging rods
- c) Arrows
- d) Offset rods

Answer: c

Explanation: An arrow is inserted into the ground after every chain length measured on the ground. Ranging rods are nearly 4m long which are used in levelling. Wooden Pegs or pegs and offset rods are the survey instruments used in the chaining process in surveying.

7. Length of arrow may vary from _____ to _____

- a) 25 cm to 30 cm
- b) 20 cm to 50 cm
- c) 35 cm to 50 cm
- d) 25 cm to 50 cm

Answer: d

Explanation: The most common length is 40 cm, which is Indian standard. Arrows are available in lengths varying from 25cm to 50 cm and choose according to our requirement.

8. Diameter of ring of arrow is _____

- a) 50 mm
- b) 25 mm
- c) 30 mm
- d) 25 mm

Answer: a

Explanation: Diameter of the ring is 50 mm. Diameter of arrow wire is 4mm. This is as per Indian Standard codes.

9. What are used to mark the positions of the stations or terminal points of a survey line?

- a) Arrows
- b) Pegs
- c) Ranging rods
- d) Offset rods

Answer: b

Explanation: Pegs are used to mark certain points on the field which require permanent marking. They are made of stout timber, 2.5 cm or 3 cm square and 15 cm long, tapered at the end.

10. Pegs are driven in the ground with the help of a wooden hammer and kept about _____ cm projecting above the surface.

- a) 3 cm
- b) 2 cm
- c) 1 cm
- d) 4 cm

Answer: d

Explanation: Wooden Pegs length is about 15 cm and 11cm is driven into the ground. 11 cm is the optimum depth that should be driven into the ground so that it can be withheld.

11. What is the length of Ranging rod commonly used?

- a) 2 m
- b) 3 m
- c) 4 m
- d) 5 m

Answer: a

Explanation: 3 meters are also used but 2 meters is more common. It is as per Indian Standard codes.

12. What is the length of each band in ranging rod?

- a) 10 cm
- b) 20 cm
- c) 30 cm
- d) 40 cm

Answer: b

Explanation: Each band is 20 cm deep. It is used on the occasion of the rod that can be used for rough measurement of short length.

13. Rods are almost invisible at a distance of about _____

- a) 100 m
- b) 50 m
- c) 150 m
- d) 200 m

Answer: d

Explanation: Hence when used on long lines each rod should have a red, white or yellow flag, about 30 to 50 cm square, tied on near its top.

14. Which of the following is used for Ranging out a line when crossing a depression from which the forward rod is invisible, or when it is hidden by the obstacles, such as hedges?

- a) Peg
- b) Ranging rods
- c) Butt rod
- d) Latha

Answer: d

Explanation: In the open level ground, intermediate points on a line may also be lined out with straight laths. Ranging rods are generally 4m long which are used in levelling.

15. Pieces of sharpened thin sticks cut from the nearest edge, and are used for the same purpose as the laths are called _____

- a) Pegs
- b) Whites
- c) Butt rod
- d) Plumb bob

Answer: b

Explanation: These are not so satisfactory in use. Laths are commonly used in place of Whites. Pegs or wooden pegs are the survey instruments used in chaining.

This set of Surveying Questions and Answers for Freshers focuses on “Chain Folding, Unfolding, Adjustment, Degree of Accuracy” 2â€¢.

1. Slow sweep with the left hand is signal by a surveyor, action by the assistant is _____

- a) Move slowly to the left
- b) Move considerably to the left
- c) Continue to move to the left
- d) Plumb the rod to the left

Answer: a

Explanation: Slow sweep by the surveyor implies that an assistant has to move slowly. Left hand of the surveyor implies the assistant has to move left side.

2. Slow sweep with the right hand is signal by a surveyor, action by the assistant is _____

- a) Move slowly to the right
- b) Move considerably to the right
- c) Continue to move to the right
- d) Plumb the rod to the right

Answer: a

Explanation: Slow sweep by the surveyor implies that an assistant has to move slowly. Right hand of the surveyor implies an assistant has to move right side.

3. Both arms extended forward horizontally and the hands depressed briskly is the signal by surveyor then the action of the assistant should be _____

- a) Move slowly forward
- b) Fix the rod
- c) Correct
- d) Wrong

Answer: b

Explanation: Both arms extended forward horizontally and the hands depressed briskly by the surveyor imply assistant has to fix the rod. These instructions or gestures are standard ways prescribed as per Indian standards.

4. What type of ranging is done if both ends of surveying lines are visible?

- a) Direct
- b) Indirect
- c) Reciprocal
- d) Unable to do

Answer: a

Explanation: Direct ranging is done if both ends of surveying lines are visible. Indirect ranging is done when both ends are not intervisible.

5. What has resorted to when both the ends of the survey line are not intervisible?

- a) Direct

- b) Indirect
- c) Irreciprocal
- d) Unable to do

Answer: b

Explanation: Reciprocal ranging is also called indirect ranging. Indirect ranging is done when both ends are not visible.

6. Degree of accuracy for Invar tape, spring balance is _____
- a) 1 in 100
 - b) 1 in 1000
 - c) 1 in 10,000
 - d) 1 in 10

Answer: c

Explanation: In the case of Invar tape there is an error of 1 unit in the measured distance of 10,000. It may slightly vary or decrease over a period of time.

7. Degree of accuracy for steel tape, Plumb bob is _____
- a) 1 in 100
 - b) 1 in 1000
 - c) 1 in 10,000
 - d) 1 in 10

Answer: b

Explanation: In the case of steel tape there is an error of 1 unit in the measured distance of 1000. Invar tape is 10 times more accurate than steel tape.

8. Degree of accuracy for tested chain is _____
- a) 1 in 100
 - b) 1 in 1000
 - c) 1 in 10,000
 - d) 1 in 10

Answer: b

Explanation: In the case of a tested chain there is an error of 1 unit in the measured distance of 1000. It is the same as the Invar tape.

9. Degree of accuracy for chain under the average condition is _____
- a) 1 in 500
 - b) 1 in 50,000
 - c) 1 in 5000
 - d) 1 in 50

Answer: a

Explanation: In case of the tested chain there is an error of 1 unit in the measured distance of 1000 units. In case of chain in average conditions there is an error of 1 unit in the measured distance of 500 units.

10. Degree of accuracy for a chain on rough or hilly ground is _____
- a) 1 in 500
 - b) 1 in 2500
 - c) 1 in 350
 - d) 1 in 250

Answer: d

Explanation: In case of chain on the rough or hilly ground there is an error of 1 unit in the measured distance of 250. Degree of accuracy for chain decreases for chain on rough or hills areas when compared to smooth or plane surface ground due to the increase in number of irregular slopes.

This set of Surveying Multiple Choice Questions & Answers (MCQs) focuses on “Chain Folding, Unfolding, Adjustment, Degree of Accuracy”.

1. Process of fixing or establishing intermediate points is known as _____
- a) Chaining
 - b) Ranging
 - c) Contouring
 - d) Levelling

Answer: b

Explanation: If the length of the survey line exceeds the length of the chain, some intermediate points will have to establish in line with two terminal points before chaining is started. The process of fixing or establishing such intermediate points is known as Ranging.

2. Direct ranging is done when the two ends of the survey lines are _____

- a) Invisible
- b) Intervisible
- c) Visible from a particular point
- d) Faraway from each other

Answer: b

Explanation: Direct ranging is the type of ranging in which the two points for ranging are chosen in such a way that they are intervisible. If two points chosen are not intervisible then indirect ranging is done.

3. If rapid sweep with right hand signaled by surveyor then action by the assistant is _____

- a) Move slowly to the right
- b) Move considerably to the right
- c) Continue to move to the right
- d) Plumb the rod to the right

Answer: b

Explanation: Rapid sweep by the surveyor implies move considerably. Right hand of the surveyor implies that the assistant has to move right side.

4. If right hand extended by surveyor then action by the assistant should be _____

- a) Move slowly to the right
- b) Move considerably to the right
- c) Continue to move to the right
- d) Plumb the rod to the right

Answer: c

Explanation: Extended hand of the surveyor implies that the assistant should continue to move. Right hand of the surveyor implies that the assistant has to move right side.

5. Right arm up and moved to the right by the surveyor then the action of assistant should be _____

- a) Move slowly to the right
- b) Move considerably to the right
- c) Continue to move to the right
- d) Plumb the rod to the right

Answer: d

Explanation: Arm up and moved by the surveyor implies that the assistant has to plumb the rod. Right hand of the surveyor implies that assistant has to move right side.

6. If both hands above head and then brought down by the surveyor then the action of an assistant is _____

- a) Move slowly forward
- b) Move considerably backward
- c) Correct
- d) Wrong

Answer: b

Explanation: It is the signal referred by the surveyor to correct the assistant position. If both hands above head and then brought down by the surveyor then assistant should move considerably backward.

7. The more experienced of the chainmen should be _____

- a) Rear end
- b) Intermediate end
- c) Final end
- d) Leader

Answer: a

Explanation: Other chainmen holding the forward handle is known as the leader. More experienced chainmen mainly refer to the surveyor. He should always preferred to be at a rear end.

8. The chainmen keeps both the handles in the right hand and throws the rest of the portion of the chain in the forward direction with his right hand to _____

- a) Mark the chain

- b) Line the chain
- c) Unfold the chain
- d) Fold the chain

Answer: c

Explanation: To Unfold the chain, the chainmen keeps both the handles in the right hand and throws the rest of the portion of the chain in the forward direction with his right hand. The other assists in removing the knots etc and in making the chain straight.

9. If rapid sweep with left hand by surveyor then action by assistant is _____
- a) Move slowly to the left
 - b) Move considerably to the left
 - c) Continue to move to the left
 - d) Plumb the rod to the left

Answer: b

Explanation: Rapid sweep by the surveyor implies that assistant should move considerably. Left hand of the surveyor implies that assistant has to move left side.

10. If left hand is extended by surveyor then action by the assistant should be _____
- a) Move slowly to the left
 - b) Move considerably to the left
 - c) Continue to move to the left
 - d) Plumb the rod to the left

Answer: c

Explanation: Extended hand of the surveyor implies that the assistant should continue to move. Left hand of the surveyor implies that the assistant has to move left side.

11. Left arm up and moved to the left by the surveyor then action of assistant should be _____
- a) Move slowly to the left
 - b) Move considerably to the left
 - c) Continue to move to the left
 - d) Plumb the rod to the left

Answer: d

Explanation: Arm up and moved by the surveyor implies that the assistant has to plumb the rod. Left hand of the surveyor implies that the assistant has to move left side.

This set of Surveying Multiple Choice Questions & Answers (MCQs) focuses on “Introduction” Magnetic Bearing.

1. Which line passes through a point, such that plane passing that point and the north and south poles, intersects with the surface of the earth?
- a) True Meridian
 - b) Magnetic Meridian
 - c) Arbitrary Meridian
 - d) Survey line

Answer: a

Explanation: True Meridian passes through the true north and south. Magnetic meridian is the imaginary line that connects magnetic south and north poles. Survey line is the line along which surveying proceeds.

2. Horizontal angle with the true Meridian through one of the extremities of the line is called?
- a) True bearing
 - b) Magnetic Bearing
 - c) Arbitrary bearing
 - d) Bearing

Answer: a

Explanation: True bearing of a line is the horizontal angle which it makes with the true Meridian through one of the extremities of the line. Compass needle will be parallel to the magnetic meridian. Angle measured always keeping magnetic north as a reference is called magnetic bearing.

3. Direction shown by a freely floating and balanced magnetic needle free from all other attractive forces is
-
- a) True Meridian
 - b) Magnetic Meridian

- c) Arbitrary Meridian
- d) Survey line

Answer: b

Explanation: Magnetic Meridian through a point is the direction shown by a freely floating and balanced magnetic needle free from all other attractive forces. Arbitrary Meridian is any Convenient direction towards permanent and prominent mark or signal, such as top of chimney or church spire.

4. Horizontal angle with the Magnetic Meridian through one of the extremities of the line is called _____

- a) True bearing
- b) Magnetic Bearing
- c) Arbitrary bearing
- d) Magnetic Declination

Answer: b

Explanation: Magnetic bearing of a line is the horizontal angle which it makes with the Magnetic Meridian through one of the extremities of the line.

5. Convenient direction towards permanent and prominent mark or signal is _____

- a) True Meridian
- b) Magnetic Meridian
- c) Arbitrary Meridian
- d) Survey line

Answer: c

Explanation: Arbitrary Meridian is any convenient direction towards permanent and prominent mark or signals, such as top of chimney or church spire. Magnetic meridian is the imaginary line that connects magnetic south and north poles.

6. Horizontal angle with the Arbitrary Meridian through one of the extremities of the line is called _____

- a) True bearing
- b) Magnetic Bearing
- c) Arbitrary bearing
- d) Magnetic Declination

Answer: c

Explanation: Arbitrary bearing of a line is the horizontal angle which it makes with the arbitrary meridian through one of the extremities of the line. Angle measured always keeping magnetic north as reference is called magnetic bearing.

7. The Magnetic Bearing of a line is $48^{\circ}24'$ East. Calculate the true bearing if the magnetic declination is $5^{\circ}38'$ East.

- a) $54^{\circ}02'$
- b) $44^{\circ}02'$
- c) $54^{\circ}22'$
- d) $45^{\circ}02'$

Answer: a

Explanation: Magnetic Declination is the horizontal angle between true meridian and magnetic meridian.

Declination = $+5^{\circ}38'$, magnetic bearing = $48^{\circ}24'$, then here, true bearing is sum of both i.e. $48^{\circ}24' + 5^{\circ}38' = 54^{\circ}02'$.

8. The magnetic bearing of a line AB is $S 28^{\circ}30' E$. Calculate the true bearing if the declination is $7^{\circ}30'$ West.

- a) $N 36^{\circ}00' W$
- b) $S 21^{\circ}00' E$
- c) $S 36^{\circ}00' E$
- d) $N 21^{\circ}00' W$

Answer: c

Explanation: Since the declination is to be west, the magnetic meridian will be to the west of the true meridian.

Therefore, true bearing = $S 28^{\circ}30' E + 7^{\circ}30' = S 36^{\circ}00' E$.

9. Horizontal angle between true meridian and magnetic meridian is _____

- a) True bearing
- b) Magnetic Bearing
- c) Arbitrary bearing
- d) Magnetic Declination

Answer: d

Explanation: Magnetic Declination is a horizontal angle between true meridian and magnetic meridian. Arbitrary bearing of a line is the horizontal angle which it makes with the Arbitrary Meridian through one of the extremities of the line.

10. When magnetic meridian is right side to true meridian, then Magnetic Declination is said to be _____

- a) Eastern
- b) Western
- c) Southern
- d) Northern

Answer: a

Explanation: When magnetic meridian is right side to true meridian, then Magnetic Declination is said to be positive or eastern. Magnetic Declination is horizontal angle between true meridian and magnetic meridian.

11. When magnetic meridian is left side to true meridian, then Magnetic Declination is said to be _____

- a) Eastern
- b) Western
- c) Southern
- d) Northern

Answer: b

Explanation: When magnetic meridian is left side to true meridian, then Magnetic Declination is said to be negative or western. Magnetic Declination is horizontal angle between true meridian and magnetic meridian.

This set of Surveying online test focuses on “Introduction Well Conditioned Triangle”.

1. A line which joins subsidiary stations on the main line is called _____

- a) Tie line
- b) Survey lines
- c) Base lines
- d) Check lines

Answer: a

Explanation: Check lines or proof lines are the lines which are run in the field to check the accuracy of the work. A Tie line is a line which joins subsidiary or tie stations on the main line.

2. In which type of surveying only linear measurements are made?

- a) Contouring
- b) Chain surveying
- c) Theodolite surveying
- d) Dumpy level

Answer: b

Explanation: Chain surveying is the type of surveying in which only linear measurements are made in the field. This type of surveying is suitable for surveys of small extent on open take simple details.

3. A survey station is prominent on the chain line and can be either at the beginning of the chain or at the end. Such stations are known as _____

- a) Main station
- b) Tie station
- c) Subsidiary station
- d) Intermediate station

Answer: a

Explanation: However, subsidiary or tie station can also be selected anywhere on the chain line and subsidiary or tie lines may be run through them. A survey station is prominent on the chain line and can be either at the beginning of the chain or at the end. Such stations are known as the main station.

4. What is laid by joining the apex of the triangle to any point on the opposite side or by joining two points on any two sides of a triangle?

- a) Check line
- b) Base line
- c) Tie line
- d) Survey line

Answer: a

Explanation: Check line is laid by joining the apex of the triangle to any point on the opposite side or by joining two points on any two sides of a triangle. Each triangle must have a check line.

5. The accuracy in the location of the objects depends upon the accuracy in laying the _____

- a) Check line
- b) Base line
- c) Tie line
- d) Survey line

Answer: a

Explanation: Tie line is a line which joins subsidiary or tie stations on the main line. The accuracy in the location of the objects depends upon the accuracy in laying the tie line.

6. Survey stations must be mutually visible to obtain a good system of line.

- a) True
- b) False

Answer: a

Explanation: Surveyor and assistant must be visible to each other. So, survey stations must be mutually visible.

7. In case, to get a well-proportioned or well-shaped triangle, no angle should be less than _____

- a) 15°
- b) 30°
- c) 45°
- d) 25°

Answer: b

Explanation: If it is less than 30° then the chance of error increases in triangulation.

8. Each triangle or portion of a skeleton must be provided with sufficient tie lines to obtain good system of lines.

- a) True
- b) False

Answer: b

Explanation: Each triangle or portion of a skeleton must be provided with sufficient check lines to obtain good system of lines.

9. As far as possible, the main survey line should not pass through _____

- a) Road
- b) Check line
- c) Obstacles
- d) Tie line

Answer: c

Explanation: Always to obtain a good system of survey lines, main survey line should not pass through obstacles. It can pass through road if necessary.

10. Check lines should form well-conditioned triangles to obtain a good system of survey lines.

- a) True
- b) False

Answer: b

Explanation: Main lines should form well-conditioned triangles to obtain a good system of survey lines. Each triangle or portion must be provided with sufficient check lines.

This set of Surveying Multiple Choice Questions & Answers (MCQs) focuses on “Introduction” Errors and Mistakes in Chaining.

1. The length of a line measured with a 20 m chain was found to be 250 m. Calculate the true length of the line if the chain was 10 cm too long.

- a) 252.25 m
- b) 251.25 m
- c) 225.25 m
- d) 221.25 m

Answer: b

Explanation: Incorrect length of the chain is $20 + 10/100$, ie 20.1 m. Measured length is 250, hence true length of the line is $250 \times (20.1/20) = 251.25$ m.

2. The length of a survey line was measured with a 20 m chain and was found to be equal to 1200 m. If the length again measured with 25 m chain it is 1212 m. On comparing the 20 m chain with the test gauge, it was found to be 1 decimeter too long. Find the actual length of 25 m chain used.

- a) 22.25 m
- b) 21.64 m
- c) 24.25 m
- d) 24.88 m

Answer: d

Explanation: Incorrect length of 20 m line is $20 + 0.10 = 20.10$ m. True length of line = $1200 \times (20.10/20) = 1206$ m. Actual or True length of 25 m chain = $(1206 \times 25)/1212 = 24.88$ m.

3. A surveyor measured the distance between two points on the plan drawn to a scale of 1 cm is equal 40 m and the result was 468 m. But, actual scale is 1 cm = 20 m. Find the true distance between the two points.

- a) 992 m
- b) 936 m
- c) 987 m
- d) 967 m

Answer: b

Explanation: Distance between two points measured with a scale of 1 cm to 20 m is $468/20 = 23.4$ cm. Actual scale of a plan is 1 cm = 40 m. True distance between the points is $23.4 \times 40 = 936$ m.

4. If L is true length of chain and L' is incorrect length of the chain the correction to area A is _____
(Where $\delta L/L = e$, e is small and A' is measured area)

- a) $1 + 2e \times A'$
- b) $(1 + 2e)/A'$
- c) $(1 + 2e) \times A'$
- d) $(1 + e) \times A'$

Answer: c

Explanation: By using $A = A' (L'/L)^2$ and $L'/L = (L + \delta L)/L = 1 + e$ where $e = \delta L/L$.

5. If L is true length of chain and L' is incorrect length of the chain the correction to Volume V is _____
(Where $\delta L/L = e$, e is small and V' is measured area)

- a) $1 + 3e \times V'$
- b) $(1 + 3e)/V'$
- c) $(1 + 3e) \times V'$
- d) $(1 + e) \times V'$

Answer: c

Explanation: By using $V = V' (L'/L)^3$, $e = \delta L/L$ and $L'/L = (L + \delta L)/L = 1 + e$. Then $V = V' (1 + e)^3$ here e is small so $V = (1 + 3e) \times V'$.

6. The difference between a measurement and the true value of the quantity measured is _____

- a) True error
- b) Discrepancy
- c) Limit of error
- d) Accuracy

Answer: a

Explanation: The difference between a measurement and the true value of the quantity measured is the true error of the measurement. The important function of a surveyor is to secure measurements that are correct within a certain limit of error prescribed by the nature and purpose of a particular survey.

7. The difference between the two measured values of the same quantity is _____

- a) Precision
- b) Accuracy
- c) Discrepancy
- d) Error

Answer: c

Explanation: A discrepancy is a difference between two measured values of the same quantity. A discrepancy may be small, yet the error may be great if each of the two measurements contains an error that may be large.

8. Which of the following are not sources of errors?

- a) Instrumental
- b) Personal
- c) Natural
- d) Artificial

Answer: d

Explanation: Error may arise from three sources namely instrumental, personal and natural.

9. A tape may be too long or an angle measuring instrument may be out of adjustment. Then such type of error comes under which source of error?

- a) Instrumental
- b) Personal
- c) Natural
- d) Artificial

Answer: a

Explanation: Error may arise due to imperfection or faulty adjustment of the instrument with which measurement is being taken comes under an instrumental source of error.

10. Investigation of observations of various types shows that accidental errors follow a definite law. This law is called _____

- a) Law of probability
- b) Law of recurrence
- c) Law of precise
- d) Law of accuracy

Answer: a

Explanation: This law defines the occurrence of errors and can be expressed in the form of the equation which is used to compute the probable value or the probable precision of a quantity. This is also termed as a theory of probability.

This set of Surveying Multiple Choice Questions & Answers (MCQs) focuses on “Introduction” Chain Survey Equipments.

1. The simplest instrument used for setting right angles is a _____

- a) Cross staff
- b) Optical square
- c) Prism square
- d) Site square

Answer: a

Explanation: The simplest instrument used for setting out the right angles is a cross staff. It consists of either a frame or box with pairs of vertical slits and is mounted on a pole shod for fixing in the ground.

2. Which of the following is not a common form of cross staff?

- a) Open cross staff
- b) French cross staff
- c) Adjustable cross staff
- d) German cross staff

Answer: d

Explanation: The common forms of cross staff are open cross staff, french cross staff, adjustable cross staff.

3. Which cross staff consists of two cylinders of equal diameter placed one on top of the other?

- a) Open cross staff
- b) French cross staff
- c) Adjustable cross staff
- d) Optical square

Answer: c

Explanation: Adjustable cross staff consists of two cylinders of equal diameter placed one on top of the other. Both are provided with sighting sights. The upper box carries a vernier and can be rotated relatively to lower by a circular rack.

4. Prism square works on the same principle as that of _____

- a) Cross staff
- b) Open cross staff

- c) Optical square
- d) Site square

Answer: c

Explanation: It is a modern and precise instrument and is used in a similar manner as that of optical square. It has a merit that no adjustment is required since the angle between the reflecting surfaces cannot vary.

5. What are used to mark the positions of the stations or terminal points of survey line?

- a) Arrows
- b) Pegs
- c) Ranging rods
- d) Plumb bob

Answer: b

Explanation: Wooden pegs are used to mark the positions of the stations or terminal points of survey line. They are made of stout timber.

6. Which cross staff consists of two pairs of vertical slits giving two lines of sights at right angles to each other?

- a) Open cross staff
- b) French cross staff
- c) Adjustable cross staff
- d) In all types

Answer: a

Explanation: Open cross staff is provided with two pairs of vertical slits giving two lines of sights at right angles to each other.

7. Which cross staff consists of a hollow octagonal box?

- a) Open cross staff
- b) French cross staff
- c) Adjustable cross staff
- d) Optical square

Answer: b

Explanation: Adjustable cross staff consists of two cylinders of equal diameter placed one on top of the other. Both are provided with sighting slits. French cross staff consists of a hollow octagonal box.

8. How many number of arrows are required for chain surveying?

- a) 10
- b) 5
- c) 15
- d) 20

Answer: a

Explanation: These are among the list of equipment required for chain surveying they are 20 m chain, 10 arrows, ranging rods and offset rods, plumb bob etc.

9. What are used after every chain length measured on the ground?

- a) Pegs
- b) Ranging rods
- c) Arrows
- d) Offset rods

Answer: c

Explanation: An arrow is inserted into the ground after every chain length measured on the ground. Wooden Pegs or pegs and offset rods are the survey instruments used in the chaining process in surveying.

10. What can be used in conjunction with a datum rod into the base of the instrument?

- a) Cross staff
- b) Open cross staff
- c) Optical square
- d) Site square

Answer: d

Explanation: A site square designed for setting out straight lines and offset lines at 90 degrees. It can be used in conjunction with a datum rod into the base of the instrument.

This set of Surveying Multiple Choice Questions & Answers (MCQs) focuses on “Introduction” Equipments for Plotting.

1. Which of the following contains two plane mirrors or two right angles isosceles prisms placed one above the other?

- a) Prism square
- b) Line ranger
- c) French staff
- d) Optical square

Answer: b

Explanation: A line ranger consists of either two plane mirrors or two right angles isosceles prisms placed one above the other. The diagonals of the two prisms are silvered so as to reflect the incident rays.

2. Which of the following consists of two laths, each of 1 yard or 1 m in length loosely riveted together?

- a) Whites
- b) Laths
- c) Butt rod
- d) Offset rods

Answer: c

Explanation: A Butt rod is used for measuring offsets, but it is often used by building surveyor or architects. It generally consists of two laths, each of 1 yard or 1 m in length loosely riveted together.

3. Which of the following is not required for chain surveying?

- a) 20 m chain
- b) Arrows
- c) Dumpy level
- d) Pegs

Answer: c

Explanation: Dumpy level is used in levelling not in chain surveying. 20 m chain, arrows, pegs etc are mandatory for chain surveying.

4. Marking the survey stations in soft ground is done by _____

- a) Nails
- b) Spikes
- c) Wooden pegs
- d) Butt rods

Answer: c

Explanation: After having selected the survey stations, they should be marked to enable them to be easily discovered during the progress of the survey. In soft ground, wooden pegs may drive, leaving a small projection above the ground.

5. Which of the following is the sighting device?

- a) Compass
- b) Spirit level
- c) Plumbing fork
- d) Alidade

Answer: d

Explanation: Alidade is a sighting device and used for ordinary work. It generally consists of a metal or wooden rule with two vanes at the end.

6. Which of the following is not a sighting device?

- a) Theodolite
- b) Alidade
- c) Dumpy level
- d) Spirit level

Answer: d

Explanation: A small spirit level may be used for ascertaining if the table is properly level. It has a bubble that should be adjusted between the two lines provided exactly at centre.

7. Which of the following is used for the orientation of the table?

- a) Compass
- b) Spirit level

- c) Dumpy level
- d) Alidade

Answer: a

Explanation: The Compass is used for the orientation of a plane table. It is used to ensure that the table is oriented to magnetic north or not.

8. What is the size of the Johnson table?

- a) 45 x 60 cm
- b) 55 x 60 cm
- c) 45 x 50 cm
- d) 55 x 50 cm

Answer: a

Explanation: This consists of a drawing board 45 x 60 cm or 60 x 75 cm. The head consists of a ball and socket joint and a vertical spindle with two thumb screws on the underside.

9. What instrument is used for centering the table?

- a) Compass
- b) Spirit level
- c) Plumbing fork
- d) Alidade

Answer: c

Explanation: The Plumbing fork used in large scale work, is meant for centering the table over the point or station occupied by the plane table when the plotted position of that point is already known on the sheet.

10. Which of the following is the superior table?

- a) Traverse table
- b) Johnson table
- c) Coast survey table
- d) Plane table

Answer: c

Explanation: The coast survey table is the superior table. It is generally used for work of high precision.

This set of Basic Surveying Questions and Answers focuses on “Introduction” Survey Stations Selection.

1. In which of the following case to mark a survey station, a portion may be dug and filled with cement mortar?

- a) Soft grounds
- b) Hard grounds
- c) Pavements
- d) In all cases

Answer: b

Explanation: Spikes and nails have very less pointing areas. Hence the small amount force exerts high pressure to drive easily into the hard ground.

2. In soft ground, spikes or nails are driven into the ground it comes under which step of surveying?

- a) Running survey line
- b) Reconnaissance
- c) Selecting
- d) Marking

Answer: d

Explanation: After having selected the survey stations, they should be marked to enable them to be easily discovered during the progress of the survey. In soft ground, wooden pegs may be driven, leaving a small projection above the ground.

3. What is the first principle of surveying?

- a) Part to whole
- b) Whole to part
- c) Whole to whole
- d) Part to part

Answer: b

Explanation: The first principle of surveying is to work from whole to part. Before starting the actual survey

measurements, the surveying is to work from around the area to fix the best positions of survey lines and survey stations.

4. In which of the following steps does a reference sketch of the ground should be prepared?

- a) Marking
- b) Fixing survey stations
- c) Reconnaissance
- d) Running survey lines

Answer: c

Explanation: During reconnaissance, a reference sketch of the ground should be prepared. A general arrangement of lines, principal features such as buildings, roads etc should be shown.

5. Which of the following should be examined by a surveyor before selecting the stations?

- a) Intervisibility
- b) Shearing stress
- c) Ultimate strength
- d) Porousness

Answer: a

Explanation: Before selecting the stations, the surveyor should examine the Intervisibility of the stations. He should note the positions of buildings, roads, streams etc.

6. What is the immediate procedure after selecting survey stations?

- a) Reconnaissance
- b) Marking
- c) Fixing
- d) Running survey lines

Answer: b

Explanation: The requirements for the selection of survey stations are examined by the surveyor. After having selected the survey stations, they should be marked to enable them to be easily discovered during the process of the survey.

7. What is driven or filled in the soft ground during the marking of survey stations?

- a) Wooden pegs
- b) Spikes
- c) Nails
- d) Cement mortar

Answer: a

Explanation: In soft ground, wooden pegs may be driven, leaving a small projection above the ground. The name of the stations may be written on the top.

8. What is driven or filled or embedded in the roads during the marking of survey stations?

- a) Wooden pegs
- b) Spikes
- c) Standard shape
- d) Cement mortar

Answer: b

Explanation: Nails and spikes may be used in the case of roads or streets. They should be flush with the pavement.

9. What is used for marking the stations which can be used for a very long time?

- a) Wooden pegs
- b) Spikes
- c) Standard shape stone
- d) Cement mortar

Answer: c

Explanation: For a station to be used for a very long time, a stone of any standard shape may be embedded in the ground and fixed with mortar etc. On the top of the stone, description of the station may be written.

10. What is the last step in chain surveying?

- a) Reconnaissance
- b) Marking
- c) Fixing
- d) Running survey lines

Answer: d

Explanation: After having completed the preliminary work, the chaining may be started from the base line. The work in running a survey line is twofold, to chain the line and to locate the adjacent details.

This set of Tricky Surveying Questions and Answers focuses on “Introduction” Conventional Symbols.

1. Identity the below symbol.



- a) Well
- b) Dam
- c) Boundary pillar
- d) Statue

Answer: a

Explanation: Generally, wells are circular in shape. Hence, ISO standard symbol for well in Topographic surveying is solid circle.

2. Identity the following symbol.



- a) Well
- b) Dam
- c) Boundary pillar
- d) Statue

Answer: c

Explanation: Generally, boundary pillars are square in shape. Hence, ISO standard symbol for boundary pillars in Topographic surveying is solid square.

3. Identity the following symbol.



- a) Well
- b) Earthwork dam
- c) Boundary pillar
- d) Statue

Answer: b

Explanation: The above symbol is standard conventional sign for earthwork dam. This symbol is used to represent the earthwork dam in topographic map.

4. Identity the following symbol.

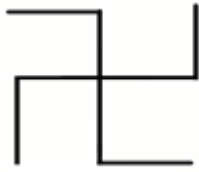


- a) Well
- b) Earthwork dam
- c) Boundary pillar
- d) Statue

Answer: d

Explanation: The above symbol is standard conventional sign for statue. This symbol is used to represent the statue in topographic map.

5. Identity the following symbol.



- a) Temple
- b) Church
- c) Police station
- d) Statue

Answer: a

Explanation: The above symbol is standard conventional sign for temple. This symbol is used to represent the temple in topographic map.

6. Identity the following symbol.

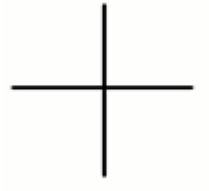


- a) Temple
- b) Church
- c) Police station
- d) Statue

Answer: c

Explanation: The above symbol is standard conventional sign for police station. This symbol is used to represent the police station in topographic map.

7. Identity the following symbol.



- a) Temple
- b) Church
- c) Police station
- d) Statue

Answer: b

Explanation: The above symbol is standard conventional sign for church. This symbol is used to represent the church in topographic map.

8. Identity the following symbol.



- a) Railway track
- b) Stone steps
- c) Road
- d) Ladder

Answer: b

Explanation: The above symbol is standard conventional sign for stone steps. This symbol is used to represent the stone steps in topographic map.

9. Identity the below symbol.

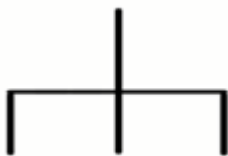


- a) Temple
- b) Mosque
- c) Church
- d) Grave

Answer: d

Explanation: The above symbol is standard conventional sign for grave. This symbol is used to represent the grave in topographic map.

10. Identity the below symbol.



- a) Boundary pillar
- b) Boundary pillars
- c) Boundary marker
- d) Mosque

Answer: c

Explanation: The above symbol is standard conventional sign for boundary marker. This symbol is used to represent the boundary marker in topographic map.

This set of Surveying Multiple Choice Questions & Answers (MCQs) focuses on “Introduction” Field Work Procedure.

1. What is the prominent point on the chain line and can be either at the beginning of the chain line or at the end?
- a) Subsidiary station
 - b) Surveyor station
 - c) Main station
 - d) Tie stations

Answer: c

Explanation: A survey station is a prominent point on the chain line and can be either at the beginning of the chain line or at the end. Such station is known as the Main station.

2. The book in which the chain or tape measurements are entered is called the _____
- a) Assistant book
 - b) Surveyor book
 - c) Field book
 - d) Survey book

Answer: c

Explanation: The book in which the chain or tape measurements are entered is called the field book. It is an oblong book of size about 20 cm x 20 cm and opens lengthwise.

3. What is the size of a field book?
- a) 20 cm x 20 cm
 - b) 25 cm x 20 cm
 - c) 20 cm x 25 cm
 - d) 25 cm x 25 cm

Answer: a

Explanation: The size of the field book is about 20 cm x 20 cm and opens lengthwise. The main requirements of the field book are that it should contain good quality stout opaque paper.

4. The chain line may be represented either by a single line or by two lines spaced about ____ to ____ cm apart.

- a) 1.5 to 2
- b) 2 to 3
- c) 1.5 to 2.5
- d) 2.5 to 3.5

Answer: a

Explanation: The chain line may be represented either by a single line or by two lines spaced about 1.5 to 2 cm apart.

5. Which of the following details need not be given at the beginning of a particular chain survey?

- a) Date of survey
- b) Names of surveyors
- c) Details of survey lines
- d) Type of soil

Answer: d

Explanation: At the beginning of a particular survey, the following details must be given, date of survey and names of surveyors, general sketch of the layout of survey lines, details of survey lines, page index of survey lines, location sketches of survey lines.

6. Which of the following details need not be given at the beginning of a particular chain survey lines?

- a) Name of the line
- b) Name of the station marked
- c) Bearing of the line
- d) Length of line

Answer: d

Explanation: At the starting of a chain or survey lines, the following details should be given, name of the line, name of the station marked either by an oval or by a triangle, bearing of the line (if measured), details of any other line meeting at the starting point of the survey line.

7. At what step of chain surveying surveyor should investigate various difficulties that may arise and think of their solution?

- a) Before selecting survey stations
- b) after selecting survey stations
- c) During reconnaissance
- d) After marking survey stations

Answer: a

Explanation: Before selecting survey stations, surveyor should investigate various difficulties that may arise and think of their solution and examine the Intervisibility of stations.

8. Whenever possible, a survey station must be fixed with reference to a minimum ____ number of permanent objects.

- a) 1
- b) 2
- c) 3
- d) 4

Answer: b

Explanation: Whenever possible, a survey station must be fixed with reference to two or three permanent objects.

9. The work in running a survey line is _____ fold.

- a) one
- b) two
- c) three
- d) four

Answer: b

Explanation: The work in running a survey line is two-fold, to chain the line and to locate the adjacent details. Offsets should be taken in order of their chain ages.

10. An offset is laid out 2° from its true direction on the field. If the scale of plotting is 10 m to 1 cm, find the maximum length of the offset so that the displacement of the point on the paper may not exceed 0.25 mm?

- a) 7.10 m
- b) 7.16 m
- c) 7.11 m
- d) 7.14 m

Answer: b

Explanation: Displacement of the point on the paper is $l \sin \theta / s$. This should not exceed 0.025 cm. Hence $l \sin 2^\circ / 10 = 0.025$ from here finding l we get 7.16 m.

This set of Surveying Multiple Choice Questions & Answers (MCQs) focuses on “Chain Surveying” Chain Triangulation.

1. What is the lateral distance of an object or ground feature measured from a survey line?

- a) Offset
- b) Perpendicular distance
- c) Side distance
- d) Perpendicular offset

Answer: a

Explanation: An offset is the lateral distance of an object or ground feature measured from a survey line. When the angle of the offset is 90° , it is called perpendicular offset.

2. An offset is laid out 6° from its true direction on the field. Find the resulting displacement of the plotted point on the paper in a direction parallel to the chain line? (Given the length of offset is 10 m and scale is 5 m to 1 cm)

- a) 0.209 cm
- b) 0.260 cm
- c) 0.0109 cm
- d) 0.910 cm

Answer: a

Explanation: Distance parallel to the chain = $l \sin \theta / s = 10 \sin 6^\circ / 5 = 0.209$ cm.

3. An offset is laid out 6° from its true direction on the field. Find the resulting displacement of the plotted point on the paper in a direction perpendicular to the chain line? (Given length of offset is 10 m and scale is 5 m to 1 cm)

- a) 0.209 cm
- b) 0.260 cm
- c) 0.0109 cm
- d) 0.910 cm

Answer: c

Explanation: Distance perpendicular to the chain = $l (1 - \cos \theta) / s = 10 (1 - \cos 6^\circ) / 5$. By simplifying we get 0.0109 cm.

4. An offset is laid out $1^\circ 30'$ from its true direction on the field. Find the degree of accuracy with which the offset should be measured so that the maximum displacement of the point on the paper from both sources may be equal?

- a) 1 in 38
- b) 1 in 39
- c) 1 in 36
- d) 1 in 37

Answer: b

Explanation: Displacement due to angular error is $l \sin \theta$. Displacement due to linear error l/r . Equating both $r = 38.20$. Hence, the offset should be measured with an accuracy of 1 in 39.

5. An offset is measured with an accuracy of 1 in 40. If the scale of plotting is 1 cm = 20 m, find the limiting length of the offset so that the displacement of the point on the paper from both sources of error may not exceed 0.25 mm?

- a) 14.10 m
- b) 14.14 m
- c) 14.40 m
- d) 14.44 m

Answer: b

Explanation: The total displacement of the paper = $\frac{1}{r} \sqrt{l^2}$. From this we can simply for $l = (0.025 / \sqrt{2}) * 40 * 20 = 14.14$ m.

6. What triangles are generally preferred to get good results in plotting?

- a) Isosceles
- b) Obtuse angled
- c) Equilateral
- d) Acute angle

Answer: c

Explanation: To get good results in plotting, the frame work should consist of triangles which are as nearly equilateral as possible.

7. The line must run through level ground as possible is the condition to be fulfilled by survey lines or survey stations.

- a) True
- b) False

Answer: a

Explanation: The survey stations should be so selected that a good system of lines is obtained fulfilling the following conditions such as survey stations must be mutually visible, the lines must run through level ground as possible etc.

8. The main lines should form well-conditioned triangles is the condition to be fulfilled by survey lines or survey stations.

- a) True
- b) False

Answer: a

Explanation: The survey stations should be so selected that a good system of lines is obtained fulfilling the following conditions such as the lines must run through the level ground as possible, the main lines should form well-conditioned triangles etc.

9. Survey lines must be as few as possible is the condition to be fulfilled by survey lines or survey stations.

- a) True
- b) False

Answer: a

Explanation: The survey stations should be so selected that a good system of lines is obtained fulfilling the following conditions such as the lines must run through the level ground as possible, survey lines must be as few as possible so that the frame work can be plotted conveniently, the main lines should form well-conditioned triangles etc.

10. As far as possible main survey lines should pass through the obstacles to get know how many obstacles present.

- a) True
- b) False

Answer: b

Explanation: The survey stations should be so selected that a good system of lines is obtained fulfilling the following conditions such as the lines must run through the level ground as possible, as far as possible, the main survey lines should not pass through obstacles.

This set of Surveying Questions and Answers for Aptitude test focuses on “Chain Surveying” Obstacles in Chaining.

1. How many kinds of obstacles of chaining are there?

- a) 2
- b) 3
- c) 4
- d) 5

Answer: b

Explanation: Obstacles of chaining are of three kinds. They are obstacles to ranging, obstacles to chaining, obstacles to both chaining and ranging.

2. Which of the following is not one among the three major kinds of obstacles of chaining?

- a) obstacles to ranging
- b) obstacles to chaining
- c) obstacles to levelling
- d) obstacles to ranging and chaining

Answer: c

Explanation: Obstacles to levelling is not a kind of obstacles to chaining. Obstacles of chaining are of three kinds. They are obstacles to ranging, obstacles to chaining, obstacles to both chaining and ranging.

3. Both ends of the lines may be visible from intermediate points on the line. This case comes under which among the three kinds of obstacles to chaining?

- a) obstacles to ranging but not chaining
- b) obstacles to chaining but not ranging
- c) obstacles to levelling
- d) obstacles to ranging and chaining

Answer: a

Explanation: Obstacles to ranging but not ranging is a type of obstacle, in which the ends are not Intervisible, is quite expected in a flat country. There may be two cases of this obstacle, both ends of the lines may be visible from intermediate points on the line and both ends of the line may not be visible from intermediate points on the line.

4. When it is possible to chain round the obstacle, i.e a pond, hedge etc. This case comes under which among the three kinds of obstacles to chaining?

- a) obstacles to ranging but not chaining
- b) obstacles to chaining but not ranging
- c) obstacles to levelling
- d) obstacles to ranging and chaining

Answer: b

Explanation: There may be two cases of this obstacle i.e obstacle to chaining but not ranging, when it is possible to chain round the obstacle, i.e a pond, hedge etc and when it is not possible to chain round the obstacle e.g. a river.

5. Both ends of the line may not be visible from intermediate points on the line. This case comes under which among the three kinds of obstacles to chaining?

- a) obstacles to ranging but not chaining
- b) obstacles to chaining but not ranging
- c) obstacles to levelling
- d) obstacles to ranging and chaining

Answer: a

Explanation: There may be two cases of this obstacle, both ends of the lines may be visible from intermediate points on the line and both ends of the line may not be visible from intermediate points on the line.

6. When it is not possible to chain round the obstacle e.g. a river. This case comes under which among the three kinds of obstacles to chaining?

- a) obstacles to ranging but not chaining
- b) obstacles to chaining but not ranging
- c) obstacles to levelling
- d) obstacles to ranging and chaining

Answer: b

Explanation: There may be two cases of this obstacle i.e obstacle to chaining but not ranging, when it is possible to chain round the obstacle, i.e a pond, hedge etc and when it is not possible to chain round the obstacle e.g. a river.

7. To continue a survey line AB past an obstacle, a line BC 100 m long was set out perpendicular to AB and from C angles BCD and BCE were set out at 60° and 45° respectively. Determine the lengths which must be chained off along CD in order that ED may be in AB produced?

- a) 100 m
- b) 200 m
- c) 300 m
- d) 400 m

Answer: b

Explanation: Here angle ABC is 90° . From, $\triangle BCD$, $CD = BC \sec 60^\circ = 100 \sqrt{3} = 173.2$ m.

8. To continue a survey line AB past an obstacle, a line BC 100 m long was set out perpendicular to AB and from C angles BCD and BCE were set out at 60° and 45° respectively. Determine the lengths which must be chained off along CE in order that ED may be in AB produced?

- a) 141.42 m
- b) 282.84 m
- c) 140.14 m
- d) 267.7 m

Answer: a

Explanation: Angle ABC is 90° . From $\triangle BCE$, and $CE = BC \sec 45^\circ = 100 \sqrt{2} = 1.4142 \times 100 = 141.42$ m.

9. To continue a survey line AB past an obstacle, a line BC 300 m long was set out perpendicular to AB and from C angles BCD and BCE were set out at 60° and 45° respectively. Determine the obstructed length BE?

- a) 250 m
- b) 600 m
- c) 452.28 m
- d) 300 m

Answer: d

Explanation: Here angle ABC is 90° . $BE = BC \tan 45^\circ = 300 \times 1 = 300$ m.

10. If we select two points A and B on either side of the obstacle and equal perpendiculars AC and BD are set out. Then AB is equal to?

- a) AC
- b) CD
- c) DA
- d) BD

Answer: b

Explanation: Since AC and BD are two perpendiculars set either side of the obstacle of equal length. Therefore CD is parallel and equal to AB. Therefore, $AB = CD$.

This set of Surveying Multiple Choice Questions & Answers (MCQs) focuses on “Compass” Bearings and Angles.

1. The direction of a survey line can either be established with relation to _____

- a) each other
- b) main station
- c) arrows
- d) tie station

Answer: a

Explanation: The direction of a survey line can either be established in relation to each other or with relation to any meridian.

2. What is the direction of line relative to a given meridian?

- a) Bearing of a line
- b) Length of a line
- c) Slope of a line
- d) Reciprocal of slope of a line

Answer: a

Explanation: Bearing of a line is the direction of line relative to a given meridian. A meridian is any direction such as true meridian, magnetic meridian, arbitrary meridian.

3. Which line passes through true north and true south?

- a) True Meridian
- b) Magnetic Meridian
- c) Arbitrary Meridian
- d) Dip

Answer: a

Explanation: True Meridian through a point is the line in which a plane passing that point and the north and the south poles, intersects with the surface of the earth. It, thus, passes through the true north and south.

4. Which meridian direction can be established with the help of a magnetic compass?

- a) True Meridian
- b) Magnetic Meridian
- c) Arbitrary Meridian
- d) All meridians

Answer: b

Explanation: Magnetic meridian through a point in the direction shown by a freely floating and balanced magnetic needle free from all other attractive forces. The direction of magnetic meridian can be established with the help of a magnetic compass.

5. Which meridians are used to determine the relative positions of the lines in a small area?

- a) True Meridian
- b) Magnetic Meridian
- c) Arbitrary Meridian
- d) All meridians

Answer: c

Explanation: Arbitrary Meridian is any convenient direction towards a permanent and prominent mark or signal, such as a church spire etc. Such meridians are used to determine the relative positions of the lines in a small area.

6. What is the horizontal angle which it makes with the true meridian through one of the extremities of the line?

- a) True bearing
- b) Magnetic bearing
- c) Arbitrary bearing
- d) Dip

Answer: a

Explanation: True bearing is the horizontal angle which it makes with the true meridian through one of the extremities of the line. True Meridian through a point is the line in which a plane passing that point and the north and the south poles, intersects with the surface of the earth.

7. What is the horizontal angle which it makes with the magnetic meridian through one of the extremities of the line?

- a) True bearing
- b) Magnetic bearing
- c) Arbitrary bearing
- d) Dip

Answer: b

Explanation: Magnetic bearing is the horizontal angle which it makes with the magnetic meridian through one of the extremities of the line. The direction of magnetic meridian can be established with the help of a magnetic compass.

8. What is the horizontal angle which it makes with the magnetic meridian through one of the extremities of the line?

- a) True bearing
- b) Magnetic bearing
- c) Arbitrary bearing
- d) Dip

Answer: c

Explanation: Arbitrary bearing is the horizontal angle which it makes with the arbitrary meridian through one of the extremities of the line. Arbitrary meridians are used to determine the relative positions of the lines in a small area.

9. Convert $22^{\circ}30'$ whole circle bearings to quadrant bearings?

- a) $180^{\circ} - 22^{\circ}30'$
- b) $22^{\circ}30'$
- c) $360^{\circ} - 22^{\circ}30'$
- d) $270^{\circ} - 22^{\circ}30'$

Answer: b

Explanation: Reduced bearing = Whole circle bearing if R.B is less than 90° . Therefore here R.B = W.C.B = $N 22^{\circ}30' E$.

10. Convert $122^{\circ}30'$ whole circle bearings to quadrant bearings?

- a) $180^{\circ} - 122^{\circ}30'$
- b) $122^{\circ}30'$
- c) $360^{\circ} - 122^{\circ}30'$
- d) $270^{\circ} - 122^{\circ}30'$

Answer: a

Explanation: Reduced bearing = $180^{\circ} -$ Whole circle bearing if R.B is lies between 90° and 180° . Therefore here R.B = W.C.B = $N 22^{\circ}30' E$.

This set of Surveying Multiple Choice Questions & Answers (MCQs) focuses on "Prismatic Compass".

1. Prismatic compass is an instrument for measuring angles.

- a) True

b) False

Answer: b

Explanation: Prismatic compass is an instrument used for the direct measurement of direction. Instruments for measurement of angles are sextant and theodolite.

2. Which of the following is the most convenient and portable instrument for direct measurement of directions?

- a) Prismatic compass
- b) Surveyor's compass
- c) Theodolite
- d) Sextant

Answer: a

Explanation: Prismatic compass is the most convenient and portable form of a magnetic compass which can either be used as a hand instrument or can be fitted on a tripod.

3. Which of the following is not a part of the prismatic compass?

- a) Agate cap
- b) Prism cap
- c) Brake pin
- d) Jewel bearing

Answer: d

Explanation: Prism cap, prism, brake pin, spring brake, pivot, agate cap etc are parts of the prismatic compass. Jewel bearing is one of the parts of surveyor's compass.

4. In prismatic compass needle is of edge bar type.

- a) True
- b) False

Answer: b

Explanation: The needle is of broad needle type and the needle doesn't act as an index in case of a prismatic compass. Edge bar type of needle is in surveyor's compass.

5. In which of the following compass needle does not act as an index?

- a) Prismatic compass
- b) Surveyor's compass
- c) Theodolite
- d) Sextant

Answer: a

Explanation: In the case of prismatic compass needle does not act as an index. In the case of surveyors, compass needle acts as an index.

6. In which of the following compass graduated card ring is attached with the needle?

- a) Prismatic compass
- b) Surveyor's compass
- c) Theodolite
- d) Sextant

Answer: a

Explanation: The graduated card ring is attached with the needle in case of a prismatic compass. In the case of surveyor's compass, the graduated card is attached to the box and not to the needle.

7. Which of the following instruments can be used without a tripod?

- a) Prismatic compass
- b) Surveyor's compass
- c) Theodolite
- d) Sextant

Answer: a

Explanation: Prismatic compass is the most convenient and portable form of a magnetic compass which can either be used as a hand instrument or can be fitted on a tripod.

8. In prismatic compass, graduations are in W.C.B system.

- a) True
- b) False

Answer: a

Explanation: In prismatic compass, graduations are in W.C.B system, having 0° to south end, 90° at west, 180° at north and 270° at east. The graduations are engraved inverted.

9. In which of the following compass graduations are engraved inverted?

- a) Prismatic compass
- b) Surveyor's compass
- c) Theodolite
- d) Sextant

Answer: a

Explanation: In case of prismatic compass graduations are engraved inverted. In case of surveyor's compass graduations are engraved erect.

10. In which of the following compass sighting and reading taking can be done simultaneously from one position of the observer?

- a) Prismatic compass
- b) Surveyor's compass
- c) Theodolite
- d) Sextant

Answer: a

Explanation: In case of a prismatic compass, reading is taken with the help of prism provided at the eye slit. Sighting and reading taking can be done simultaneously from one position of the observer.

This set of Surveying Multiple Choice Questions & Answers (MCQs) focuses on "Surveyor's Compass".

1. Surveyor's compass is instrument for measuring angles.

- a) True
- b) False

Answer: b

Explanation: Surveyor's compass is an instrument for the direct measurement of direction. Instruments for measurement of angles are sextant and theodolite.

2. Which of the following is not the most convenient and portable instrument for direct measurement of directions?

- a) Prismatic compass
- b) Surveyor's compass
- c) Theodolite
- d) Sextant

Answer: b

Explanation: Surveyor's compass is the not most convenient and portable form of magnetic compass. Prismatic compass can be used as a hand instrument or can be fitted on a tripod also.

3. Which of the following is a part of surveyor's compass?

- a) Agate cap
- b) Prism cap
- c) Brake pin
- d) Jewel bearing

Answer: d

Explanation: Prism cap, prism, brake pin, spring brake, pivot, agate cap etc are parts of the prismatic compass. Jewel bearing is one of the part of surveyor's compass.

4. In surveyor's compass needle is of edge bar type.

- a) True
- b) False

Answer: a

Explanation: Edge bar type of needle is in surveyor's compass. The needle is of broad needle type and needle doesn't act as an index in case of a prismatic compass.

5. In which of the following compass needle acts as an index?

- a) Prismatic compass
- b) Surveyor's compass
- c) Theodolite
- d) Sextant

Answer: b

Explanation: In case of surveyors compass needle acts as an index. In the case of a prismatic compass needle doesn't acts as index.

6. In which of the following compass graduated card is attached to the box and not to the ring?

- a) Prismatic compass
- b) Surveyor's compass
- c) Theodolite
- d) Sextant

Answer: b

Explanation: The graduated card ring is attached with the needle in case of a prismatic compass. In case of surveyor's compass, the graduated card is attached to the box and not to the needle.

7. Which of the following instruments cannot be used without a tripod?

- a) Prismatic compass
- b) Surveyor's compass
- c) Theodolite
- d) Sextant

Answer: b

Explanation: Surveyor's compass cannot be used without a tripod. Prismatic compass can be used with or without a tripod.

8. In surveyor's compass, graduations are in a Q.B system.

- a) True
- b) False

Answer: a

Explanation: In Surveyor's compass, the graduations are in a Q.B system, having 0° at north and south and 90° at east and west. East and West are interchanged.

9. In which of the following compass graduations are engraved erect?

- a) Prismatic compass
- b) Surveyor's compass
- c) Theodolite
- d) Sextant

Answer: a

Explanation: In case of surveyor's compass graduations are engraved erect. Prismatic compass graduations are engraved inverted.

10. In which of the following compass sighting and reading taking cannot be done simultaneously from one position of the observer?

- a) Prismatic compass
- b) Surveyor's compass
- c) Theodolite
- d) Sextant

Answer: b

Explanation: In case of surveyor's compass, reading is taken by directly seeing through the top of the glass. Sighting and reading taking cannot be done simultaneously from one position of the observer.

This set of Surveying Multiple Choice Questions & Answers (MCQs) focuses on "Compass" Magnetic Declination.

1. The horizontal angle between the true meridian and the magnetic meridian shown by needle at the time of observation is called _____

- a) True bearing
- b) Magnetic bearing
- c) Arbitrary bearing
- d) Magnetic declination

Answer: d

Explanation: Magnetic declination at a place is the horizontal angle between the true meridian and the magnetic meridian shown by needle at the time of observation.

2. If the magnetic meridian is to the right side of the true meridian, declination is said to be _____
- a) eastern
 - b) western
 - c) southern
 - d) northern

Answer: a

Explanation: Magnetic declination at a place is the horizontal angle between the true meridian and the magnetic meridian. If the magnetic meridian is to the right side of the true meridian, declination is said to be eastern.

3. If the magnetic meridian is to the left side of the true meridian, declination is said to be _____
- a) eastern
 - b) western
 - c) southern
 - d) northern

Answer: b

Explanation: Magnetic declination at a place is the horizontal angle between the true meridian and the magnetic meridian. If the magnetic meridian is to the left side of the true meridian, declination is said to be western.

4. If the magnetic meridian is to the right side of the true meridian, declination is said to be positive.
- a) True
 - b) False

Answer: a

Explanation: Magnetic declination at a place is the horizontal angle between the true meridian and the magnetic meridian. If the magnetic meridian is to the right side of the true meridian, declination is said to be eastern or positive.

5. If the magnetic meridian is to the left side of the true meridian, declination is said to be negative.
- a) True
 - b) False

Answer: a

Explanation: Magnetic declination at a place is the horizontal angle between the true meridian and the magnetic meridian. If the magnetic meridian is to the left side of the true meridian, declination is said to be western or negative.

6. What is the systematic departure of the declination from its mean value during a period of 24 hours?
- a) Diurnal variation
 - b) Annual variation
 - c) Secular variation
 - d) Irregular variation

Answer: a

Explanation: The Diurnal variation or daily variation is the systematic departure of the declination from its mean value during a period of 24 hours. It generally varies with the phase of the sunspot period.

7. The variation which has a yearly period is known as _____ variation.
- a) Diurnal variation
 - b) Annual variation
 - c) Secular variation
 - d) Irregular variation

Answer: b

Explanation: The variation which has a yearly period is known as annual variation. The declination has a yearly swing of about 1° or 2° in amplitude. It varies from place to place.

8. Which of the following variation appears to be of the periodic character and follows a sine curve pattern?
- a) Diurnal variation
 - b) Annual variation
 - c) Secular variation
 - d) Irregular variation

Answer: c

Explanation: Due to its magnitude, secular variation is the most important in the work of the surveyor. It appears to be of periodic character and follows a roller coaster pattern.

9. Which of the following variations are due to magnetic storms?

- a) Diurnal variation
- b) Annual variation
- c) Secular variation
- d) Irregular variation

Answer: d

Explanation: The irregular variations are due to what are known as magnetic storms, earthquakes and solar influences. They may occur at any time and cannot be predicted.

10. Find the magnetic declination at a place if the magnetic bearing of the sun at noon is 188° ?

- a) 8° W
- b) 4° W
- c) 8° E
- d) 4° E

Answer: a

Explanation: At noon, the sun is exactly on the geographical meridian. Hence the true bearing of the sun at noon is zero or 180° depending upon whether it is to the north of the place or to the south of the place. Since the magnetic bearing of the sun is 188° , the true bearing will be 180° . Now, True bearing = magnetic bearing + declination then $180^\circ = 188^\circ + \text{declination}$. Simplifying we get declination = 8° W.

This set of Surveying Interview Questions and Answers for freshers focuses on "Principle of Compass Traversing".

1. In chain and compass traversing, the magnetic bearings of the survey lines are measured by a _____

- a) chain
- b) compass
- c) theodolite
- d) dumpy level

Answer: b

Explanation: In chain and compass traversing, the magnetic bearings of the survey lines are measured by a compass and the lengths of the lines are measured either with a chain or with a tape.

2. How many methods of observing the bearings of lines by fast needle method?

- a) 2
- b) 3
- c) 4
- d) 5

Answer: b

Explanation: There are three methods of observing the bearings of lines by fast needle method. They are a direct method with transiting, direct method without transiting and back bearing method.

3. Compass surveying is recommended when the area is _____

- a) Large, even and crowded with many details
- b) Small, undulating and not details are crowded
- c) Large, undulating and crowded with many details
- d) Small, even and crowded with many details

Answer: c

Explanation: Compass surveying is recommended when the area is large, undulating and crowded with many details. It is not recommended for areas where the local attraction is suspected due to the presence of a magnetic substance.

4. In which areas does compass surveying is not recommended?

- a) Local attraction suspected areas
- b) Large areas
- c) Undulating areas
- d) Crowded with many details

Answer: a

Explanation: Compass surveying is not recommended for areas where the local attraction is suspected due to the presence of a magnetic substance.

5. Which of the following presence is not affected for compass surveying?

- a) Steel structures

- b) Wooden structures
- c) Iron ore deposits
- d) Electric cables conveying currents

Answer: b

Explanation: Compass surveying is not recommended for areas where the local attraction is suspected due to the presence of magnetic substance like steel structures, iron ore de, electric cables conveying currents.

6. Which of the following term used to denote any influence which prevents the needle from pointing to the north in a given locality?

- a) Magnetic bearing
- b) Compass deflection
- c) Local attraction
- d) Magnetic declination

Answer: c

Explanation: Local attraction is the term used to denote any influence which prevents the needle from pointing to the north in a given locality.

7. Which of the following is not required in compass surveying?

- a) Bearing angles
- b) Lengths of lines
- c) Triangles
- d) Connecting lines

Answer: c

Explanation: The principle of compass surveying is traversing which involves a connection of series of lines. Magnetic bearings are measured by compass and lengths are measured by a chain.

8. In Compass traversing length of lines are measured by _____

- a) Chain
- b) Compass
- c) Theodolite
- d) Dumpy level

Answer: a

Explanation: In Compass traversing, the lengths of lines are measured by a chain and magnetic bearings are measured by compass.

9. In traversing by fast needle method, the magnetic bearings of the lines are measured with a reference so the direction of magnetic meridian established at the _____ station.

- a) first
- b) second
- c) third
- d) each station

Answer: a

Explanation: The magnetic bearings of traverse lines are measured by a theodolite fitted with a compass. The direction of the magnetic meridian is not established at each station but, the magnetic bearings of the lines are measured with a reference so the direction of magnetic meridian established at the first station.

10. Fast needle method is more accurate than the loose needle method.

- a) True
- b) False

Answer: a

Explanation: In loose needle, method lengths are measured with the chains. In fast needle, method lengths are measured with the 20 or 30 m tapes.

This set of Surveying Multiple Choice Questions & Answers (MCQs) focuses on "Errors in Compass Traversing".

1. Which of the following is not among the classification of errors in compass surveying?

- a) Instrumental errors
- b) Personal errors
- c) Errors due to the natural cause
- d) Surveyor errors

Answer: d

Explanation: The errors may be classified as instrumental errors, personal errors, errors due to natural causes. Surveyor errors may come under personal errors.

2. Which of the following is not under instrumental errors?

- a) Sluggish needle
- b) Blunt pivot joint
- c) Inaccurate centring
- d) Plane of sight not being vertical

Answer: c

Explanation: Instrumental errors are those which arise due to the faulty adjustment of the instruments. They may be due to the following reasons the needle not being perfectly straight, sluggish needle etc.

3. Line of sight not passing through the centres of the sight comes under personal errors.

- a) True
- b) False

Answer: b

Explanation: Line of sight not passing through the centres of the sight comes under instrumental errors. Instrumental errors are those which arise due to the faulty adjustment of the instruments.

4. Which of the following error comes under personal errors?

- a) The needle not being perfectly straight
- b) Pivot being bent
- c) Plane of sight not being vertical
- d) Inaccurate bisection of signals

Answer: d

Explanation: Instrumental errors are those which arise due to the faulty adjustment of the instrument e.g the needle not being perfectly straight, sluggish needle etc. Inaccurate centring, Inaccurate levelling of compass box, Inaccurate bisection of signals etc comes under personal errors.

5. Inaccurate levelling of the compass box is a personal error in compass surveying.

- a) True
- b) False

Answer: a

Explanation: Inaccurate centring, Inaccurate levelling of compass box, Inaccurate bisection of signals etc comes under personal errors. Careless in reading and recording also.

6. Local attraction due to the proximity of local attraction forces comes under instrumental errors.

- a) True
- b) False

Answer: b

Explanation: Local attraction due to the proximity of local attraction forces comes under natural errors. Variation in declination, magnetic changes in the atmosphere due to clouds and Storms etc also comes under natural errors in compass surveying.

7. Which of the following is not a natural error in compass surveying?

- a) Variation in declination
- b) Magnetic changes in the atmosphere due to clouds and Storms
- c) Local attraction due to the proximity of local attraction forces
- d) Pivot being bent

Answer: d

Explanation: Instrumental errors are those which arise due to the faulty adjustment of the instrument e.g pivot being bent, blunt pivot point etc. Variation in declination, magnetic changes in the atmosphere due to clouds and Storms etc also comes under natural errors in compass surveying.

8. Variation in declination is a natural error in compass surveying.

- a) True
- b) False

Answer: a

Explanation: Natural errors are those which are not in our hands or control to adjust. Variation in declination,

magnetic changes in the atmosphere due to clouds and Stromâ€™s etc also comes under natural errors in compass surveying.

9. Improper balancing weight comes under instrumental errors in compass surveying.

- a) True
- b) False

Answer: a

Explanation: Instrumental errors are those which arise due to the faulty adjustment of the instrument e.g pivot being bent, blunt pivot point etc.

10. Irregular variation due to magnetic storms is a _____ error.

- a) Instrumental errors
- b) Personal errors
- c) Errors due to the natural cause
- d) Surveyor errors

Answer: c

Explanation: Natural errors are those which are not in over hands or control to adjust. Variation in declination, magnetic changes in the atmosphere due to clouds and Stromâ€™s etc are some of the examples of natural causes.

This set of Surveying Interview Questions and Answers for Experienced people focuses on â€™Traversing by Fast Needle Methodâ€™.

1. In which method the magnetic bearings of traverse lines are measured by a theodolite fitted with a compass?

- a) Free needle method
- b) Fast needle method
- c) Loose needle method
- d) Direct method

Answer: b

Explanation: In fast needle method, the magnetic bearings of traverse lines are measured by a theodolite fitted with a compass. The direction of magnetic meridian is not established at each station.

2. In traversing by fast needle method, there are three methods of observing the bearings of lines by fast needle method.

- a) True
- b) False

Answer: a

Explanation: There are three methods of observing the bearings of lines by fast needle method. They are direct method with transiting, direct method without transiting, back bearing method.

3. Which of the following method is not among the methods of observing the bearings of lines by fast needle method?

- a) direct method with transiting
- b) direct method without transiting
- c) back bearing
- d) front bearing

Answer: d

Explanation: There are three methods of observing the bearings of lines by fast needle method. They are a direct method with transiting, direct method without transiting, back bearing method.

4. In which methods of observing the bearings of lines by fast needle method, the telescope will be normal at one station and inverted at the next station?

- a) direct method with transiting
- b) direct method without transiting
- c) back bearing
- d) front bearing

Answer: a

Explanation: In direct method with transiting, the telescope will be normal at one station and inverted at the next station. The method is, therefore, suitable only if the instrument is an adjustment.

5. The application of 180° correction is required in which of the following methods?

- a) direct method with transiting
- b) direct method without transiting

- c) back bearing
- d) front bearing

Answer: b

Explanation: The application of 180° correction is required in a direct method without transiting. It is always convenient to read one vernier throughout and apply the correction at alternate stations.

6. Which of the following methods is the most satisfactory method for the bearings of lines by fast needle method?

- a) direct method with transiting
- b) direct method without transiting
- c) back bearing
- d) front bearing

Answer: b

Explanation: In back bearing method the complete process should be repeated at other stations. In direct method with transiting, the telescope will be normal at one station and inverted at next station. The method is, therefore, suitable only if the instrument is an adjustment. Therefore, direct method without transiting is most satisfactory among these three methods.

7. Fast needle method is more accurate than the free needle method.

- a) True
- b) False

Answer: a

Explanation: The direction of the magnetic meridian is not established at each station. But instead, the magnetic bearings of the lines are measured with reference so the direction of magnetic meridian established at first station.

8. Chain and compass traversing is also called a fast needle method.

- a) True
- b) False

Answer: b

Explanation: Chain and compass traversing is not so called a fast needle method. Loose or free needle method is also called as chain and compass traversing.

9. Telescope is used in direct method with transiting during observing the bearings of lines by fast needle method.

- a) True
- b) False

Answer: a

Explanation: Theodolite is the instrument used in direct method with transiting for observing the bearings of lines by fast needle method. In theodolite, using lower clamp and tangent screw we can point the telescope to magnetic meridian.

10. In direct method with transiting, it is convenient to read one vernier throughout and apply the correction at alternate stations.

- a) True
- b) False

Answer: b

Explanation: In direct method without transiting, Instead of applying correction at every station, opposite vernier may be read alternatively. However, it is convenient to read one vernier throughout and apply the correction at alternate stations.

This set of Surveying Questions and Answers for Experienced people focuses on "Traversing by Direct Observation of Angles".

1. In which of the following transverse method angles are measured by theodolite?

- a) By fast needle
- b) By direct observation of angles
- c) By locating details with transit and tape
- d) By free needle

Answer: b

Explanation: In transversing by direct observation of angles, angles between the lines are directly measured by a theodolite. The method is therefore accurate in comparison to the previous three methods.

2. In transversing by direct observation of angles, magnetic bearing of any one line can also be measured if required.

- a) True
- b) False

Answer: a

Explanation: The magnetic bearings of any one line can be measured and magnetic bearing of other lines can be calculated. The angles measured at different stations may be either included angle and deflection angle.

3. Transversing by included angles comes under which of the following?

- a) Transversing by fast needle
- b) Transversing by free needle
- c) Transversing by direct observation of angles
- d) Transversing by chain and compass

Answer: c

Explanation: Transversing by included angles and transversing by deflection angles comes under transversing by direct observation of angles.

4. _____ at a station is either of the two angles by the two survey lines meeting there.

- a) Included angle
- b) Deflection angle
- c) Transverse angle
- d) Deviated angle

Answer: a

Explanation: An included angle at a station is either of the two angles formed by the two survey lines meeting there. The method consists simply in measuring each angle directly from a backsight on the preceding station.

5. Included angles can be measured _____

- a) Clockwise
- b) Counter clockwise
- c) Clockwise and counterclockwise
- d) Clockwise or counterclockwise

Answer: d

Explanation: Included angles can be measured either clockwise or counterclockwise. But it is better to measure all angles clockwise.

6. All angles are preferred to measure clockwise because of the graduations of theodolite circle increase in this direction.

- a) True
- b) False

Answer: a

Explanation: It is better to measure included angles clockwise. It is because of the graduations of theodolite circle increase in this direction.

7. A deflection angle is an angle in which a survey line makes with prolongation of back sight.

- a) True
- b) False

Answer: b

Explanation: A deflection angle is an angle in which a survey line makes with the prolongation of the preceding line.

8. Transversing by deflection angles is more suitable for surveys of roads railways, pipe lines etc.

- a) True
- b) False

Answer: a

Explanation: Transversing by deflection angles is more suitable for surveys of roads railways, pipe lines etc, where the survey lines make small deflection angles.

9. Deflection angle may vary from _____ to _____

- a) 0° to 90°
- b) 90° to 180°
- c) 0° to 180°

d) 0° to 270°

Answer: a

Explanation: A deflection angle is an angle in which a survey line makes with the prolongation of the preceding line. It may vary from 0° to 180° .

10. In following figure deflection angle at Q is θ .

- a) True
- b) False

Answer: b

Explanation: The deflection angle at Q is α and that at R is θ .

This set of Surveying test focuses on “ Traverse Surveying “ Consecutive Co-ordinates: Latitude And Departure”.

1. Co ordinate length measured parallel to an assumed meridian direction may be defined as _____

- a) Latitude of a survey line
- b) Departure of survey line
- c) Length of survey line
- d) Slope of survey line

Answer: a

Explanation: The latitude of the survey line may be defined as its coordinate length measured parallel to an assumed meridian direction. True north or magnetic north or any other reference direction.

2. The departure of the survey line may be defined as its coordinate length at right angles to the meridian direction.

- a) True
- b) False

Answer: a

Explanation: The departure of the survey line may be defined as its co ordinate length measured at right angles to the meridian direction. The departure of the survey line is positive when measured eastward.

3. In which direction latitude of the line is positive?

- a) North
- b) South
- c) East
- d) West

Answer: a

Explanation: The latitude of the line is positive when measured northward. It is termed as northing.

4. In which direction latitude of the line is negative?

- a) North
- b) South
- c) East
- d) West

Answer: b

Explanation: The latitude of the line is negative when measured southward. It is termed as southing.

5. The departure of the line is negative in east direction.

- a) True
- b) False

Answer: b

Explanation: The departure of the line is negative in westward. It is termed as westing.

6. In which direction the departure of the line is positive?

- a) North
- b) South
- c) East
- d) West

Answer: a

Explanation: The departure of the line is positive when measured eastward. It is termed as easting.

7. If l is the length of the line and angle made with y -axis is y° then latitude (L) of the line is ____
- $l \cos y^\circ$
 - $l \sin y^\circ$
 - $l \tan y^\circ$
 - $l \operatorname{cosec} y^\circ$

Answer: a

Explanation: We know $L/l = \cos y^\circ$. Then $L = l \cos y^\circ$. Therefore latitude $L = l \cos y^\circ$.

8. If l is the length of the line and angle made with y axis is y° then departure (D) of the line is ____
- $l \cos y^\circ$
 - $l \sin y^\circ$
 - $l \tan y^\circ$
 - $l \operatorname{cosec} y^\circ$

Answer: b

Explanation: We know $D/l = \sin y^\circ$. Then $D = l \sin y^\circ$. Therefore latitude $D = l \sin y^\circ$.

9. The total latitude and departure of any point with respect to a common origin are known as dependent coordinates.
- True
 - False

Answer: b

Explanation: The coordinates of transverse stations can be calculated with respect to a common origin. The total latitude and departure of any point with respect to a common origin are known as independent coordinates or total coordinates.

10. Total latitude of end point of a transverse is equal to total latitudes of the first point of transverse plus the algebraic sum of all the latitudes.
- True
 - False

Answer: a

Explanation: The independent coordinates of any point may be obtained by adding algebraically the latitudes and departure of the lines between that point and the origin.

This set of Surveying MCQs focuses on "Degree of Accuracy in Traversing".

1. When start point and end point of closed transverse not coincide then that error is called ____
- Angular error
 - Closing error
 - Adjustment error
 - Transverse error

Answer: b

Explanation: If a closed transverse is plotted according to the field measurements, the end point of the traverse will not coincide exactly with the starting point, owing to the errors in the field measurements of angles and distances. Such error is known as closing error.

2. The term used for the ratio of error of closure to a perimeter of transverse is the relative error of closure.
- True
 - False

Answer: a

Explanation: Error of closure / perimeter of transverse = e/p . The term used for the ratio of error of closure to a perimeter of transverse is the relative error of closure.

3. In a closed transverse, the sum of interior angles should be equal to $(2N - 4)$ right angles. Otherwise, the error occurred termed as ____
- Angular error
 - Closing error
 - Adjustment error
 - Transverse error

Answer: a

Explanation: If a closed traverse, the sum of interior angles should be equal to $(2N - 4)$ right angles. If the angles

are measured with the same degree of precision, the error in the sum of angles may be distributed equally to each angle of the traverse.

4. Let e be the closing error in the bearing of the last line of a closed traverse having N sides. Then what is the correction for first line?

- a) e/N
- b) $2e/N$
- c) $3e/N$
- d) e

Answer: a

Explanation: In a closed traverse in which bearings are observed, the closing error in bearing may be determined by comparing the two bearing of the last line as observed at the first and last stations of a traverse. Correction for first line $(1\hat{A}-e)/N = e/N$.

5. Let e be the closing error in the bearing of last line of a closed traverse having N sides. Then what is the correction for second line?

- a) e/N
- b) $2e/N$
- c) $3e/N$
- d) e

Answer: a

Explanation: In a closed traverse in which bearings are observed, the closing error in bearing may be determined by comparing the two bearing of the last line as observed at the first and last stations of traverse. Correction for second line $(2\hat{A}-e)/N = 2e/N$.

6. Let e be the closing error in the bearing of last line of a closed traverse having N sides. Then what is the correction for the third line?

- a) e/N
- b) $2e/N$
- c) $3e/N$
- d) e

Answer: c

Explanation: In a closed traverse in which bearings are observed, the closing error in bearing may be determined by comparing the two bearing of the last line as observed at the first and last stations of traverse. Correction for third line $(3\hat{A}-e)/N = 3e/N$.

8. Let e be the closing error in the bearing of last line of a closed traverse having N sides. Then what is the correction for the last line?

- a) e/N
- b) $2e/N$
- c) $3e/N$
- d) e

Answer: d

Explanation: In a closed traverse in which bearings are observed, the closing error in bearing may be determined by comparing the two bearing of the last line as observed at the first and last stations of traverse. Correction for second line $(N\hat{A}-e)/N = e$.

9. What is the term generally applied to the operation of applying corrections to the latitudes and departures?

- a) Adjustment
- b) Error
- c) Balancing
- d) Accuracy

Answer: c

Explanation: The term balancing is generally applied to the operation of applying corrections to the latitudes and departures. So that $\sum L = 0$ and $\sum D = 0$. This applies only when the survey forms a closed polygon.

10. Which of the following methods are not methods of adjusting a traversing?

- a) Bowditch's method
- b) Transit method
- c) Axis method
- d) Levelling method

Answer: d

Explanation: This applies only when the survey forms a closed polygon. The following are common methods of adjusting a traverse Bowditch's method, transit method, graphical method, axis method.

11. Let correction to latitude of any side be C , total error in latitude be e , length of that side be l , perimeter of traverse be p . Then what is Bowditch's rule?

- a) $C = e \times l/p$
- b) $C = e \times p/l$
- c) $C = p \times e/l$
- d) $C = l \times p/e$

Answer: a

Explanation: Correction to latitude of any side is equally to total error in latitude \times length of that side/perimeter of traverse.

12. Let correction to latitude of any side be C , total error in latitude be e , L be the latitude of that line, $\sum L$ be the arithmetic sum of latitudes then what is the transit rule?

- a) $C = e \times L/\sum L$
- b) $C = e \times \sum L/L$
- c) $C = L \times \sum L/e$
- d) $C = \sum L \times e/L$

Answer: a

Explanation: The transit rule may be employed where angular measurements are more precise than the linear measurements. According to this rule, the total error in latitudes and departures is distributed in proportion to the latitudes and departures of the sides.

This set of Surveying Multiple Choice Questions & Answers (MCQs) focuses on "Balancing the Traverse".

1. Which of the following implies the correct set of methods employed for balancing the traverse?

- a) Bowditch's method, Transit method
- b) Bowditch's method, Graphical method
- c) Axis method, Transit method, Gale's method, Co-ordinate method
- d) Bowditch's method, Axis method, Graphical method, Transit method

Answer: d

Explanation: Bowditch's and Transit method involves the usage of correction of latitude and departure formulae. Graphical method uses Bowditch's formula for solving graphically whereas Axis method is used in case of length corrections which are having accurate angles.

2. Angles are less affected by the corrections applied due to the Transit method than Bowditch's method.

- a) True
- b) False

Answer: a

Explanation: Due to distribution of total error in latitudes and departures in equal proportions, it is less affected by the corrections applied.

3. Which of the following method doesn't require the calculation of latitudes and departures?

- a) Graphical method
- b) Axis method
- c) Bowditch's method
- d) Transit method

Answer: a

Explanation: Since Graphical method involves a rough calculation and plotting of traverse directly from the field notes, it is not necessary for calculating latitudes and departures.

4. Balancing methods can be applied only when _____

- a) Survey forms a closed triangle traverse
- b) Survey forms an irregular shaped traverse
- c) Survey forms a closed polygon traverse
- d) Survey forms a closed circular traverse

Answer: c

Explanation: While traversing, in most of the cases, the traverse will be closed by polygon. It is the only way of applying corrections for latitudes and departures i.e., $\sum L=0$ and $\sum D=0$ and for eradicating closing error.

5. Which method can also be known as Compass rule?

- a) Transit method
- b) Bowditch's method
- c) Graphical method
- d) Axis method

Answer: b

Explanation: Due to the equal precision of the linear and angular measurements, it can be termed as compass rule.

6. Bowditch method can be applied even linear and angular measurements are not precise.

- a) True
- b) False

Answer: b

Explanation: Bowditch method can be applied only when linear and angular measurements are precise and so the total error can be distributed in proportions.

7. In order to complete traverse computations, which of the following steps is to be carried out first?

- a) Adjusting interior angles
- b) Calculating $\sum L$ and $\sum D$
- c) Calculating bearings of the angles
- d) Applying corrections

Answer: a

Explanation: A Traverse computation involves a lot of procedure which requires accurate values for further processing. So, first we need to check and adjust the interior angles for continuing the remaining process.

8. Sum of interior angles must be equal to _____

- a) $(2n/4)$ right angles
- b) $(2n*4)$ right angles
- c) $(2n+4)$ right angles
- d) $(2n-4)$ right angles

Answer: d

Explanation: The check applied for finding the sum of interior angles is equal to $(2n-4)$ right angles. Similarly, the check for exterior angles is equal to $(2n+4)$ right angles.

9. Independent co-ordinates can be calculated by using _____

- a) Geometric co-ordinates
- b) Cylindrical co-ordinates
- c) Consecutive co-ordinates
- d) Spherical co-ordinates

Answer: c

Explanation: The consecutive co-ordinates which are obtained from the latitudes and departures will be able to derive independent co-ordinates.

10. Among the following, the most commonly used method of balancing a traverse is _____

- a) Graphical method
- b) Transit method
- c) Axis method
- d) Bowditch's method

Answer: d

Explanation: Due to the precision of angular and linear measurements obtained by Bowditch's method, it is more commonly used, but Transit method will be able to deliver less affected measurements due to corrections applied. Axis and Graphical methods can be applied whenever rough measurements are necessary.

11. Calculate the correction for departure of BC, using Bowditch's rule.

Line	Length (m)	Consecutive co-ordinates	
		Latitude	Departure
AB	121.87	+225.87	-228.92
BC	199.85	-268.25	+326.62
CA	245.57	+43.31	-98.69

- a) 362.969
- b) 326.969
- c) 326.696
- d) 323.969

Answer: b

Explanation: Total error in departure = $-228.92 + 326.62 - 98.69 = -0.99$

Perimeter of traverse = $114.99 + 217.57 + 319.31 = 567.29$ m

Correction for departure of AB = length of AB * total error in departure / perimeter of traverse = $199.85 * -0.99 / 567.29 = -0.349$ m. Error is negative then correction is positive i.e., correction = $326.62 + 0.349 = 326.969$.

12. Using transit method, calculate the correction for latitude of BC.

Line	Length (m)	Consecutive co-ordinates	
		Latitude	Departure
AB	125.91	-264.97	+50.65
BC	198.57	+182.96	-104.62
CA	229.88	+79.62	+59.77

- a) 184.78
- b) 183.789
- c) 185.879
- d) 183.987

Answer: b

Explanation: Total error in latitude = $-264.97 + 182.96 + 79.62 = -2.39$

Total perimeter of traverse = $125.91 + 198.57 + 229.88 = 554.36$ m

Sum of latitudes = $264.97 + 182.96 + 79.62 = 527.55$

Now, correction for latitude of BC = latitude of BC * total error in departure / sum of latitudes = $182.96 * (-2.39) / 527.55 = -0.829$ m. If error is negative, correction is positive

Corrected departure = $182.96 + 0.829 = 183.789$.

This set of Surveying Multiple Choice Questions & Answers (MCQs) focuses on "Methods of Levelling".

1. Which branch of surveying is used to find the elevations of given points with respect to given or assumed datum?

- a) Levelling
- b) Contouring
- c) Traversing
- d) Plane table surveying

Answer: a

Explanation: Levelling is a branch of surveying is used to find the elevations of given points with respect to given or assumed datum.

2. Levelling is a branch of surveying objects of which is to establish points at a given elevation or at different elevations with respect to given or assumed datum.

- a) True
- b) False

Answer: a

Explanation: The first operation is required to enable the works to be designed while the second operation is required in the setting out of all kinds of engineering works.

3. Levelling deals with measurements in a _____

- a) Horizontal plane
- b) Inclined plane
- c) Vertical plane
- d) Both vertical and horizontal plane

Answer: c

Explanation: Levelling is a branch of surveying objects of which is to establish points at a given elevation or at different elevations with respect to given or assumed datum. It deals with measurements in a vertical plane.

4. _____ is defined as a curved surface which at each point is perpendicular to the direction of gravity at the point.

- a) Level surface

- b) Level line
- c) Horizontal plane
- d) Datum

Answer: a

Explanation: The surface of still water is a truly level surface. Any surface parallel to the mean spheroidal surface of the earth is, therefore, a level surface.

5. _____ is a line lying in a level surface.

- a) Level line
- b) Horizontal line
- c) Datum line
- d) Plumb line

Answer: a

Explanation: A level line is a line lying in a level surface. It is, therefore, normal to the plumb line, at all points.

6. Horizontal plane through a point is a plane tangential to the level surface at that point.

- a) True
- b) False

Answer: a

Explanation: Horizontal plane through a point is a plane tangential to the level surface at that point. It is, therefore, perpendicular to the plumb line through the point.

7. Which line is the tangential to the level line at a point?

- a) Datum line
- b) Vertical line
- c) Horizontal line
- d) Plumb line

Answer: c

Explanation: It is straight line tangential to the level line at a point. It is also perpendicular to the plumb line.

8. Which line is normal to the level line at a point?

- a) Datum line
- b) Vertical line
- c) Horizontal line
- d) Plumb line

Answer: b

Explanation: Vertical line is a line normal to the level line at a point. It is commonly considered to be the line defined by a plumb line.

9. Which term is used for the surface to which elevations are referred?

- a) Level surface
- b) Level line
- c) Horizontal plane
- d) Datum

Answer: d

Explanation: Datum is any surface to which elevations are referred. The mean sea level affords a convenient datum world over.

10. The elevations of points on or near the surface of the earth is its vertical distance above or below an arbitrary assumed level surface or datum.

- a) True
- b) False

Answer: a

Explanation: The difference in elevation between two points is the vertical distance between the two level surface in which the two points lie. Elevation simply can say vertical distance.

11. Which of the following is not a method of levelling?

- a) Barometric levelling
- b) Trigonometric levelling
- c) Spirit levelling
- d) Traverse levelling

Answer: d

Explanation: Three principal methods are used for determining a difference in elevation, namely, barometric levelling, trigonometric levelling and spirit levelling. Traversing is that type of surveying in which a number of connected survey lines form the framework.

12. Which of the following methods of levelling makes use of the phenomenon that difference in elevation between two points is proportional to the difference in atmospheric pressures at these points?

- a) Barometric levelling
- b) Trigonometric levelling
- c) Spirit levelling
- d) Traverse levelling

Answer: a

Explanation: A barometric levelling makes use of the phenomenon that difference in elevation between two points is proportional to the difference in atmospheric pressures at these points. A barometer, therefore, may be used and the readings observed at different points would yield a measure of the relative elevations of those points.

13. At a given point, the atmospheric pressure doesn't remain constant in the course of the day, even in the course of an hour.

- a) True
- b) False

Answer: a

Explanation: At a given point, the atmospheric pressure doesn't remain constant in the course of the day, even in the course of an hour. Therefore, barometric levelling relatively inaccurate.

14. Which process of levelling in which the elevations of points are computed from the vertical angles and horizontal distances measured in the field?

- a) Barometric levelling
- b) Trigonometric levelling
- c) Spirit levelling
- d) Traverse levelling

Answer: b

Explanation: Trigonometric levelling is also called indirect levelling. It is the process of levelling in which the elevations of points are computed from the vertical angles and horizontal distances measured in the field.

15. Which of the following methods of levelling is a modified form of stadia levelling?

- a) Barometric levelling
- b) Trigonometric levelling
- c) Spirit levelling
- d) Traversing

Answer: b

Explanation: Trigonometric levelling is the process of levelling in which any triangle can be computed from proper trigonometric relations. In a modified form called stadia levelling.

This set of Surveying Multiple Choice Questions & Answers (MCQs) focuses on "Levelling" Surveying Telescope.

1. Surveyor's telescope is an adaptation of Kepler's telescope.

- a) True
- b) False

Answer: a

Explanation: The surveyor's telescope is an adaptation of Kepler's telescope. It employs two convex lenses. The one nearest to the object is called the objective and the other near the eye is called eyepiece.

2. The optical principles of the surveying telescope are based on the fact that all parallel rays of light reaching a convex lens are bent when they leave it in such a manner that they intersect at a common point, called the focus.

- a) True
- b) False

Answer: a

Explanation: The optical principles of the surveying telescope are based on the fact that all parallel rays of light reaching a convex lens are bent when they leave it in such a manner that they intersect at a common point, called the focus and that all the rays passing through another point called the optical centre pass through the geometric centre of lens without bending.

3. In surveyor's telescope, the convex lens nearest to the object is called _____

- a) Eye piece
- b) Objective
- c) Diaphragm
- d) Surveyor lens

Answer: b

Explanation: The surveyor's telescope is an adaptation of Kepler's telescope. It employs two convex lenses. The one nearest to the object is called the objective and the other near the eye is called eyepiece.

4. In surveyor's telescope, the convex lens nearest to the eye is called _____

- a) Eye piece
- b) Objective
- c) Diaphragm
- d) Surveyor lens

Answer: a

Explanation: The surveyor's telescope is an adaptation of Kepler's telescope. It employs two convex lenses. The one nearest to the object is called the objective and the other near the eye is called eyepiece.

5. The object glass provides a virtual inverted image in front of the eyepiece which in turn magnifies the image to produce a real erect image in surveyors telescope.

- a) True
- b) False

Answer: b

Explanation: The object glass provides a real inverted image in front of the eyepiece which, in turn, magnifies the image to produce an inverted virtual image.

6. The line of sight is also called _____

- a) line of telescope
- b) line of centre of axis
- c) line of collimation
- d) line of objective

Answer: c

Explanation: The line of sight is a line which passes through the optical centre of the objective and the intersection of cross hairs. This is also called line of collimation.

7. What is the line which passes through the optical centres of objective and eye piece?

- a) axis of the telescope
- b) centre of axis line
- c) line of collimation
- d) line of objective

Answer: a

Explanation: The axis of the telescope is the line which passes through the optical centres of objective and eye piece.

8. The eyepiece magnifies the cross hairs.

- a) True
- b) False

Answer: a

Explanation: The cross hairs are placed in front of the eyepiece and in the plane where the real inverted image is produced by the objective. Thus, the eyepiece magnifies the cross hairs also.

9. The focal length of an objective varies with eyepiece.

- a) True
- b) False

Answer: b

Explanation: The focal length of an objective is constant. Focal length is independent to the particular lens.

10. The establishment of line of sight, therefore, involves the following two essential conditions, the real image must be formed in front of the eyepiece, the plane of the image must coincide with that of the cross hairs.

- a) True
- b) False

Answer: a

Explanation: The establishment of a line of sight, therefore, involves the following two essential conditions, the real image must be formed in front of the eyepiece, the plane of the image must coincide with that of the cross hairs.

11. The operation of forming or bringing the clear image of the object in the plane of cross hairs is known as _____

- a) Centering
- b) Adjusting
- c) Parallax correcting
- d) Focusing

Answer: d

Explanation: For quantitative measurements, it is essential that the image should always be formed in the fixed plane in the telescope where the cross hairs are situated. The operation of forming or bringing the clear image of the object in the plane of cross hairs is known as focusing.

This set of Surveying Quiz focuses on "Theory of Direct Levelling(Spirit Levelling)".

1. A level provides a vertical line of sight, a line tangential to a Level surface at the point where the instrument stands.

- a) True
- b) False

Answer: b

Explanation: A level provides a horizontal line of sight. A line tangential to a Level surface at the point where the instrument stands.

2. The theory of direct levelling neglects _____

- a) curvature of the earth
- b) refraction
- c) both curvature of earth and refraction
- d) radius of the earth

Answer: c

Explanation: Neglecting the curvature of earth and refraction, therefore, the theory of direct levelling is very simple. Radius of the earth doesn't have any criteria.

3. Which of the following methods of spirit levelling is, levelling the object of which is solely to determine the difference in elevation of two points regardless of the horizontal position of the points with respect to each other?

- a) Profile levelling
- b) Cross levelling
- c) Differential levelling
- d) Reciprocal levelling

Answer: c

Explanation: Differential levelling is the method of direct levelling the object of which is solely to determine the difference in elevation of two points regardless of the horizontal position of the points with respect to each other. This type of levelling is also called fly levelling.

4. Fly levelling is another name of _____

- a) Profile levelling
- b) Cross levelling
- c) Differential levelling
- d) Reciprocal levelling

Answer: c

Explanation: Differential levelling is the method of direct levelling the object of which is solely to determine the difference in elevation of two points regardless of the horizontal position of the points with respect to each other. This type of levelling is also called fly levelling.

5. Which of the following methods of spirit levelling is, levelling the object of which is solely to determine the elevations of points at measured intervals along a given line?

- a) Profile levelling
- b) Cross levelling
- c) Differential levelling
- d) Reciprocal levelling

Answer: a

Explanation: Profile levelling is a direct levelling the object of which is solely to determine the elevations of points at measured intervals along a given line. It is done in order to obtain a profile of the surface along that line.

6. Cross sectioning is the process of taking levels on each side of a main line tangential to that line.

- a) True
- b) False

Answer: b

Explanation: Cross sectioning is the process of taking levels on each side of the main line at right angles to that line. It is also called cross levelling.

7. Which of the following methods of spirit levelling is, levelling in which the difference in elevation between two points is accurately determined by two sets of reciprocal observations?

- a) Profile levelling
- b) Cross levelling
- c) Differential levelling
- d) Reciprocal levelling

Answer: d

Explanation: Reciprocal levelling is the method of levelling in which the difference in elevation between two points is accurately determined by two sets of reciprocal observations. It is done only when it is not possible to set up the level between the two lines.

8. Which of the following methods of spirit levelling is, levelling in which the degree of precision required is too great to be attained by ordinary methods?

- a) Profile levelling
- b) Precise levelling
- c) Differential levelling
- d) Reciprocal levelling

Answer: b

Explanation: Precise levelling is the levelling in which the degree of precision required is too great to be attained by ordinary methods. Therefore, special equipment or special precaution or both are necessary to eliminate all sources of errors as far as possible.

9. What is the height of instrument, if elevation of benchmark is 200.852 m, back sight is 2.324 m, fore sight is 1.836 m?

- a) 213.176
- b) 203.176
- c) 211.340
- d) 201.340

Answer: b

Explanation: Height of instrument is obtained by adding the elevation of benchmark and back sight. Here, $200.852 + 2.324 = 203.176$ m.

10. What is the elevation of a point, if the elevation of a benchmark is 200.852 m, back sight is 2.324 m, foresight is 1.836 m?

- a) 213.176
- b) 203.176
- c) 211.340
- d) 201.340

Answer: d

Explanation: Elevation of a point is obtained by subtracting the elevation of benchmark and foresight. Here, $200.852 - 1.836 = 201.340$ m.

This set of Surveying Questions and Answers for Campus interviews focuses on “Levelling” Balancing Backsights and Foresights♦.

1. By balancing back sight and fore sight error due to curvature can be eliminated.

- a) True
- b) False

Answer: a

Explanation: When the difference in elevation between any two points is determined from a single set up back

sighting on one point and fore sighting on the other, error due to curvature can be eliminated. Error due to refraction also be eliminated.

2. By balancing back sight and fore sight error due to non parallelism of the line of collimation can be eliminated.

- a) True
- b) False

Answer: a

Explanation: When the difference in elevation between any two points is determined from a single set up back sighting on one point and fore sighting on the other, error due to non parallelism of the line of collimation can be eliminated. Error due to refraction also is eliminated.

3. By which of the following, the difference in elevation between two points can be calculated by taking a difference between the two readings and no correction for the inclination of the line of sight is necessary?

- a) Levelling
- b) Centering
- c) Contouring
- d) Balancing

Answer: d

Explanation: If the back sight and foresight distances are balanced, the difference in elevation between two points can be directly calculated by taking a difference of two readings and no correction for the inclination of the line of sight is necessary.

4. If the observed back sight and fore sight are x_1 and x_2 . The correction back sight on A will be equal to $x_1 - y_1$, where $y_1 = D_1 \tan i^\circ$. The correct fore sight on B will be equal to $x_2 - y_2$ where, $y_2 = D_2 \tan i^\circ$. Then what is the correction difference in level between A and B.

- a) $x_1 - x_2$
- b) $x_2 - x_1$
- c) $x_1 - x_2 + (D_2 \tan i^\circ - D_1 \tan i^\circ)$
- d) $x_2 - x_1 + (D_1 \tan i^\circ + D_2 \tan i^\circ)$

Answer: c

Explanation: The correct difference in level between A and B is $(x_1 - x_2) - (x_2 - y_2) = (x_1 - x_2) + (y_2 - y_1) = x_1 - x_2 + (D_2 \tan i^\circ - D_1 \tan i^\circ)$.

5. If the observed back sight and fore sight are x_1 and x_2 . The correction back sight on A will be equal to $x_1 - y_1$, where $y_1 = D_1 \tan i^\circ$. The correct fore sight on B will be equal to $x_2 - y_2$ where, $y_2 = D_2 \tan i^\circ$. Then what is the correction difference in level between A and B, if $D_1 = D_2$?

- a) $x_1 - x_2$
- b) $x_2 + x_1$
- c) $x_1 - x_2 + (D_2 \tan i^\circ - D_1 \tan i^\circ)$
- d) $x_2 - x_1 + (D_1 \tan i^\circ + D_2 \tan i^\circ)$

Answer: a

Explanation: The correct difference in level between A and B is $(x_1 - x_2) - (x_2 - y_2) = (x_1 - x_2) + (y_2 - y_1) = x_1 - x_2 + (D_2 \tan i^\circ - D_1 \tan i^\circ) = x_1 - x_2$.

6. If the observed back sight and fore sight are 20 m and 18 m. The correction back sight on A will be equal to 4 m, The correct fore sight on B will be equal to 14 m where then what is the correction difference in level between A and B?

- a) 4 m
- b) 3 m
- c) 2 m
- d) 6 m

Answer: c

Explanation: The correct difference in level between A and B is $(20 - 4) - (18 - 4) = 20 - 18 = 2$ m.

7. If the staff reading at point A = h_a and at a point B = h_b . The correct staff reading should have been H_a and H_b , then the correction difference in elevation between A and B is given by _____

- a) $h_a - h_b$
- b) $h_a + h_b$
- c) $H_a - H_b$
- d) $H_a + H_b$

Answer: c

Explanation: The correction difference in elevation between any two points is given by taking a difference of correct staff reading. Therefore, here $H_a \hat{=} H_b$.

8. If the staff reading at point A = h_a and at a point B = h_b . The correct staff reading should have been H_a and H_b , where $H_a = h_a \hat{=} h_{a\hat{=}}$ and $H_b = h_b \hat{=} h_{b\hat{=}}$ then the correction difference in elevation between A and B is given by

- a) $h_a \hat{=} h_b \hat{=} h_{a\hat{=}} + h_{b\hat{=}}$
- b) $h_a + h_b + h_{a\hat{=}} + h_{b\hat{=}}$
- c) $H_a \hat{=} H_b + h_{a\hat{=}} \hat{=} h_{b\hat{=}}$
- d) $H_a + H_b$

Answer: a

Explanation: The correction difference in elevation between any two points is given by taking a difference of correct staff reading. Therefore, here $H_a \hat{=} H_b$.

$H_a \hat{=} H_b = (h_a \hat{=} h_{a\hat{=}}) \hat{=} (h_b \hat{=} h_{b\hat{=}}) = h_a \hat{=} h_b \hat{=} h_{a\hat{=}} + h_{b\hat{=}}$.

9. If the back sight and fore sight distances are balanced, the elevation between two points is equal to the difference between the rod readings taken to the two points and correction for curvature and refraction is necessary.

- a) True
- b) False

Answer: b

Explanation: If the back sight and fore sight distances are balanced, the elevation between two points is equal to the difference between the rod readings taken to the two points. No correction for curvature and refraction is necessary.

10. Turning point is also called _____

- a) intermediate point
- b) level point
- c) change point
- d) end point

Answer: c

Explanation: Turning point is a point on which both minus sight and plus sight are taken on a line of direct levels. It is also called a change point.

This set of Surveying Multiple Choice Questions & Answers (MCQs) focuses on "Levelling" Curvature and Refraction.

1. Horizontal line departs from a level surface because of _____

- a) Refraction
- b) Radius of earth
- c) Curvature of earth
- d) Parallelism

Answer: c

Explanation: From the definition of level surface and a horizontal line it is evident that a horizontal line departs from a level surface because of the curvature of the earth.

2. In the long sights, the horizontal line of sight doesn't remain straight but it slightly bends downwards having concavity towards earth due to _____

- a) Refraction
- b) Radius of earth
- c) Curvature of earth
- d) Parallelism

Answer: a

Explanation: Due to refraction, in the long sights, the horizontal line of sight doesn't remain straight but it slightly bends downwards having concavity towards earth.

3. Find the correction for curvature for a distance 1200 m?

- a) 0.113 m
- b) 0.131 m
- c) 0.133 m
- d) 0.313 m

Answer: a

Explanation: Correction for curvature is $0.07849 d^2$. Therefore, here $0.07849 * (1.2)^2 = 0.113$ m.

4. Find correction for refraction for a distance of 1200 m?

- a) 0.0106 m
- b) 0.0160 m
- c) 0.0016 m
- d) 0.0116 m

Answer: b

Explanation: Correction for refraction is correction for curvature/7.

Therefore, here $(0.07849 * (1.2)^2)/7 = 0.016$ m.

5. Find the correction for curvature for a distance 2.48 km?

- a) 0.483 m
- b) 0.434 m
- c) 0.443 m
- d) 0.403 m

Answer: a

Explanation: Correction for curvature is $0.07849 d^2$. Therefore, here $0.07849 * (2.48)^2 = 0.483$ m.

6. Find correction for refraction for a distance of 2.48 km?

- a) 0.0066 m
- b) 0.0160 m
- c) 0.069 m
- d) 0.096 m

Answer: c

Explanation: Correction for refraction is correction for curvature/7. Therefore, here $(0.07849 * (2.48)^2)/7 = 0.069$ m.

7. Find combined correction for curvature and refraction for 3400 m?

- a) 0.078 m
- b) 0.778 m
- c) 0.709 m
- d) 0.786 m

Answer: b

Explanation: Combined correction for curvature and refraction is given by $0.06728 d^2$. Therefore, here $0.06728 (3.4)^2 = 0.778$ m.

8. Find combined correction for curvature and refraction for 1.29 km?

- a) 0.112 m
- b) 0.128 m
- c) 0.212 m
- d) 0.221 m

Answer: a

Explanation: Combined correction for curvature and refraction is given by $0.06728 d^2$. Therefore, here, $0.06728 (1.29)^2 = 0.112$ m.

9. In order to find the difference in elevation between two points P and Q, a level was set upon the line PQ, 30 m from P and 1280 m from Q. The reading obtained on staff kept at P and Q were respectively 0.545 m and 3.920 m. Find the true difference in elevation between P and Q?

- a) 3.226 m
- b) 3.343 m
- c) 3.265 m
- d) 3.345 m

Answer: c

Explanation: Since the distance of P from an instrument is small, the correction for curvature etc is negligible.

Combined correction for Q is $0.06728 (1.28)^2 = 0.110$ m. Correct staff reading at Q = $3.920 - 0.110 = 3.810$ m. Difference in elevation between P and Q = $3.810 - 0.545 = 3.265$ m.

10. A light house is visible just above the horizon at a certain station at the sea level. The distance between the station and light house is 10 km. Find the height of the light house?

- a) 0.6728 m

- b) 0.06728 m
- c) 67.280 m
- d) 6.728 m

Answer: d

Explanation: Combined correction for curvature and refraction is given by $0.06728 d^2$. Therefore, here $0.06728 (10)^2 = 6.728$ m.

This set of Surveying Multiple Choice Questions & Answers (MCQs) focuses on "Reciprocal Levelling".

1. Which of the following type of levelling is necessary across a river ravine or any obstacle requiring a long site between two points?

- a) Barometric levelling
- b) Trigonometric levelling
- c) Reciprocal levelling
- d) Spirit levelling

Answer: c

Explanation: When it is necessary to carry a levelling across a river ravine or any obstacle requiring a long site between two points so situated that no place for the level can be found from which the lens of foresight and backsight will be even approximately equal, special method that is reciprocal levelling must be used. It is used to obtain better accuracy.

2. Which of the following type of levelling is used when two points so situated that no place for the level can be found from which the lens of foresight and backsight will be even approximately equal?

- a) Barometric levelling
- b) Trigonometric levelling
- c) Reciprocal levelling
- d) Spirit levelling

Answer: c

Explanation: When it is necessary to carry a levelling across a river ravine or any obstacle requiring a long site between two points so situated that no place for the level can be found from which the lens of foresight and backsight will be even approximately equal, special method that is reciprocal levelling must be used. It is used to obtain better accuracy.

3. Which of the following error cannot be eliminated in reciprocal levelling?

- a) error in instrument adjustment
- b) combined effect of earth's curvature and refraction of atmosphere
- c) variations in average refraction
- d) variation in temperature

Answer: d

Explanation: Reciprocal levelling must be used to obtain better accuracy. It is also used to eliminate error in instrument adjustment, combined effect of earth's curvature and refraction of atmosphere, variations in average refraction.

4. When an instrument is at P the staff readings on P is 1.824 and on Q is 2.748. When the instrument at Q the staff readings on P is 0.928 and Q is 1.606. Distance between P and Q is 1010 mts. R.L. of P is 126.386. Find true R.L. of Q?

- a) 125.555
- b) 125.565
- c) 125.575
- d) 125.585

Answer: d

Explanation: When observations are taken from P the apparent difference in elevation between P and Q is $2.748 - 1.824 = 0.924$. When observations are taken from Q the apparent difference in elevation between P and Q is $1.606 - 0.928 = 0.678$. Hence true difference in elevation is $(0.924 + 0.678)/2 = 0.801$ m. Therefore true elevation of Q is $126.386 + 0.801 = 125.585$ m.

5. When instrument is at P the staff readings on P is 1.824 and on Q is 2.748. When instrument at Q the staff readings on P is 0.928 and Q is 1.606. Distance between P and Q is 1010 mts. R.L. of P is 126.386. Find combined correction for curvature and refraction?

- a) 0.057 m
- b) 0.069 m
- c) 0.058 m

d) 0.048 m

Answer: b

Explanation: Combined correction for curvature and refraction is $0.06728 d^2 = 0.06728(1.010)^2 = 0.069$ mts.

6. When an instrument is at P the staff readings on P is 1.824 and on Q is 2.748. When instrument at Q the staff readings on P is 0.928 and Q is 1.606. Distance between P and Q is 1010 mts. R.L. of P is 126.386. Find the error due to collimation?

- a) 0.058 mts
- b) 0.052 mts
- c) 0.054 mts
- d) 0.068 mts

Answer: c

Explanation: When observations are taken from P the apparent difference in elevation between P and Q is $2.748 - 1.824 = 0.924$. When observations are taken from Q the apparent difference in elevation between P and Q is $1.606 - 0.928 = 0.678$. Hence true difference in elevation is $(0.924 + 0.678)/2 = 0.801$ mts. Error in observation = $0.924 - 0.801 = 0.123$ m. Error due to curvature and refraction is 0.069 mts. Therefore error in collimation is $0.123 - 0.069 = 0.054$ m.

7. When an instrument is at P the staff readings on P is 2.748 and on Q is 1.824 when instrument at Q the staff readings on P is 1.606 and Q is 0.928. Distance between P and Q is 1010 mts. R.L. of P is 126.386. Find true R.L. of Q?

- a) 125.585
- b) 126.187
- c) 127.187
- d) 128.197

Answer: c

Explanation: When observations are taken from P the apparent difference in elevation between P and Q is $2.748 - 1.824 = 0.924$. When observations are taken from Q the apparent difference in elevation between P and Q is $1.606 - 0.928 = 0.678$. Hence true difference in elevation is $(0.924 + 0.678)/2 = 0.801$ mts. Therefore true elevation of Q is $126.386 + 0.801 = 127.187$ m.

8. When instrument is at P the staff readings on P is 2.748 and on Q is 1.824 when instrument at Q the staff readings on P is 1.606 and Q is 0.928. Distance between P and Q is 1010 mts. R.L. of P is 126.386. Find combined effect correction for curvature and refraction?

- a) 0.057 m
- b) 0.069 m
- c) 0.058 m
- d) 0.048 m

Answer: b

Explanation: Combined correction for curvature and refraction is $0.06728 d^2 = 0.06728(1.010)^2 = 0.069$ m.

9. When instrument is at P the staff readings on P is 2.748 and on Q is 1.824 when instrument at Q the staff readings on P is 1.606 and Q is 0.928. Distance between P and Q is 1010 mts. R.L. of P is 126.386. Find error due to collimation?

- a) 0.178 mts
- b) 0.192 mts
- c) 0.194 mts
- d) 0.188 mts

Answer: b

Explanation: When observations are taken from P the apparent difference in elevation between P and Q is $2.748 - 1.824 = 0.924$. When observations are taken from Q the apparent difference in elevation between P and Q is $1.606 - 0.928 = 0.678$. Hence true difference in elevation is $(0.924 + 0.678)/2 = 0.801$ mts. Error in observation = $0.924 - 0.801 = 0.123$ m. Error due to curvature and refraction is 0.069 mts. Therefore error in collimation is $0.123 + 0.069 = 0.192$ m.

10. When an instrument is at P the staff readings on P is 2.748 and on Q is 1.824 when instrument at Q the staff readings on P is 1.606 and Q is 0.928. Distance between P and Q is 1010 mts. R.L. of P is 126.386. Find the angular error in collimation adjustment of the instrument?

- a) $39''$
- b) $49''$
- c) $59''$
- d) $69''$

Answer: a

Explanation: When observations are taken from P the apparent difference in elevation between P and Q is 2.748 m. When observations are taken from Q the apparent difference in elevation between P and Q is 1.606 m. Hence true difference in elevation is $(0.924 + 0.678)/2 = 0.801$ mts. Error in observation = $0.924 - 0.801 = 0.123$ m. Error due to curvature and refraction is 0.069 mts. Therefore error in collimation is $0.123 + 0.069 = 0.192$ m. If α is the inclination of line of the site then $\tan \alpha = 0.192/1010 = 0.000190$. Therefore $\alpha = 39''$.

This set of Surveying Multiple Choice Questions & Answers (MCQs) focuses on "Errors in Levelling".

1. Which of the following is not an instrumental error?

- a) error due to imperfect adjustment
- b) error due to sluggish bubble
- c) error due to movement of objective slide
- d) settlement of tripod or turning points

Answer: d

Explanation: Error due to imperfect adjustment, error due to sluggish bubble, error due to movement of the objective slide are instrumental errors. Settlement of tripod or turning points is a natural error.

2. Which of the following is a natural error?

- a) error due to defective joint
- b) rod not of standard length
- c) variations in temperature
- d) error due to sluggish bubble

Answer: c

Explanation: Error due to a defective joint, rod not of standard length, error due to sluggish bubble are instrumental errors. Variations in temperature are a natural error.

3. Which of the following is a personal error?

- a) mistakes in manipulation
- b) atmospheric refraction
- c) settlement of tripod or turning points
- d) wind vibrations

Answer: a

Explanation: Atmospheric refraction, settlement of tripod or turning points, wind vibrations are natural errors. Mistakes in manipulation is a personal error.

4. Which of the following is not a personal error?

- a) mistake in rod handling
- b) errors in sighting
- c) mistake in reading the rod
- d) error due to defective joint

Answer: d

Explanation: Mistake in rod handling, errors in sighting, a mistake in reading the rod are personal errors. Error due to the defective joint is an instrumental error.

5. Atmospheric refraction is _____

- a) instrumental error
- b) natural error
- c) personal error
- d) it's not an error

Answer: b

Explanation: Atmospheric refraction is a natural error. Settlement of tripod or turning points, wind vibrations are also natural errors.

6. Which of the following is an instrumental error?

- a) earth's curvature
- b) mistake in rod handling
- c) mistakes in recording
- d) error due to sluggish bubble

Answer: d

Explanation: Earth's curvature is a natural error. Mistake in rod handling, mistakes in recording are personal errors. Error due to sluggish bubble is an instrumental error.

7. Which of the following is not a natural error?

- a) error due to defective joint
- b) atmospheric refraction
- c) wind vibrations
- d) earth's curvature

Answer: a

Explanation: Atmospheric refraction, wind vibrations, earth's curvature are natural errors. error due to a defective joint is an instrumental errors.

8. Which of the following is not a principle source of error in levelling?

- a) instrumental error
- b) natural error
- c) personal error
- d) Systematic error

Answer: d

Explanation: All levelling measurements are subjected to three principal source of errors. Systematic error is also called cumulative error.

9. Errors in sighting is _____

- a) instrumental error
- b) natural error
- c) personal error
- d) Systematic error

Answer: c

Explanation: Errors in sighting is a personal error. Mistakes in manipulation, mistakes in rod handling, mistakes in reading the rod etc also come under personal error.

10. Wind vibrations are natural errors.

- a) True
- b) False

Answer: a

Explanation: Wind vibrations is a natural error. Atmospheric refraction, settlement of tripod or turning points, wind vibrations are natural errors.

11. When distances are small which of the following error is negligible?

- a) error due to defective joint
- b) atmospheric refraction
- c) wind vibrations
- d) earth's curvature

Answer: d

Explanation: The effect of curvature is to increase rod reading. When the distances are small the error is negligible.

12. Due to refraction, staff reading decreases.

- a) True
- b) False

Answer: a

Explanation: Due to refraction, the ray of light bends downwards in the form of a curve with its concavity towards the earth surface, thus decreases the staff readings.

This set of Surveying Problems focuses on “Levelling” Degree of Precision.

1. The degree of precision does not depend upon the type of instrument.

- a) true
- b) false

Answer: b

Explanation: The degree of precision depends upon the type of instrument, skill of observer, character of country, atmospheric conditions.

2. For a given instrument and atmospheric conditions, the precision depends upon the number of setups.

- a) true
- b) false

Answer: a

Explanation: For a given instrument and atmospheric conditions, the precision depends upon the number of setups and also upon the length of sights.

3. The precision on plains will be less than that on hills.

- a) true
- b) false

Answer: b

Explanation: For a given instrument and atmospheric conditions, the precision depends upon the number of setups and also upon the length of sights. Thus, the precision on plains will be less than that on hills.

4. The degree of precision depends upon the skill of an observer.

- a) true
- b) false

Answer: a

Explanation: The degree of precision depends upon the type of instrument, skill of observer, character of country, atmospheric conditions.

5. What is the error in feet for rough levelling for reconnaissance or preliminary surveys?

- a) $0.4\sqrt{M}$
- b) $0.1\sqrt{M}$
- c) $0.05\sqrt{M}$
- d) $0.017\sqrt{M}$

Answer: a

Explanation: According to Indian standards error in feet for rough levelling for reconnaissance or preliminary surveys is given as $0.4\sqrt{M}$.

6. What is the error in feet for ordinary levelling for location and construction surveys?

- a) $0.4\sqrt{M}$
- b) $0.1\sqrt{M}$
- c) $0.05\sqrt{M}$
- d) $0.017\sqrt{M}$

Answer: b

Explanation: According to Indian standards the error in feet for ordinary levelling for location and construction surveys is given as $0.1\sqrt{M}$.

7. What is the error in feet for accurate levelling for principal benchmarks or for extensive surveys?

- a) $0.4\sqrt{M}$
- b) $0.1\sqrt{M}$
- c) $0.05\sqrt{M}$
- d) $0.017\sqrt{M}$

Answer: c

Explanation: According to Indian standards, the error in feet for accurate levelling for principal benchmarks or for extensive surveys is given as $0.05\sqrt{M}$.

8. What is the error in feet for precise levelling for benchmarks of widely distributed points?

- a) $0.4\sqrt{M}$
- b) $0.1\sqrt{M}$
- c) $0.05\sqrt{M}$
- d) $0.017\sqrt{M}$

Answer: d

Explanation: According to Indian standards, the error in feet for precise levelling for benchmarks of widely distributed points is given as $0.017\sqrt{M}$.

9. What is the error in mm for rough levelling for reconnaissance or preliminary surveys?

- a) $100\sqrt{K}$
- b) $24\sqrt{K}$
- c) $12.0\sqrt{K}$

d) 4 mm

Answer: a

Explanation: According to Indian standards, error in mm for rough levelling for reconnaissance or preliminary surveys is given as 100 mm.

10. What is the error in mm for ordinary levelling for location and construction surveys?

- a) 100 mm
- b) 24 mm
- c) 12.0 mm
- d) 4 mm

Answer: b

Explanation: According to Indian standards, error in mm for ordinary levelling for location and construction surveys is given as 24 mm.

11. What is the error in mm for accurate levelling for principal benchmarks or for extensive surveys?

- a) 100 mm
- b) 24 mm
- c) 12.0 mm
- d) 4 mm

Answer: c

Explanation: According to Indian standards, the error in mm for accurate levelling for principal benchmarks or for extensive surveys is given as 12.0 mm.

12. What is the error in mm for precise levelling for benchmarks of widely distributed points?

- a) 100 mm
- b) 24 mm
- c) 12.0 mm
- d) 4 mm

Answer: d

Explanation: According to Indian standards, the error in mm for precise levelling for benchmarks of widely distributed points is given as 4 mm.

This set of Surveying Multiple Choice Questions & Answers (MCQs) focuses on “Levelling” Types.

1. Which type of levelling is done on the phenomenon, the difference in elevation between two points is proportional to the difference in atmospheric pressure at these points?

- a) trigonometric levelling
- b) spirit levelling
- c) barometric levelling
- d) profile levelling

Answer: c

Explanation: Barometric levelling make use of the phenomenon that difference in elevation between two points is proportional to the difference in atmospheric pressure at these points.

2. Which of the following is not a method of levelling?

- a) Barometric levelling
- b) Trigonometric levelling
- c) Spirit levelling
- d) Traverse levelling

Answer: d

Explanation: Three principal methods are used for determining a difference in elevation, namely, barometric levelling, trigonometric levelling and spirit levelling. Traversing is the type of surveying in which a number of connected survey lines form the framework.

3. Which of the following methods of levelling makes use of the phenomenon that difference in elevation between two points is proportional to the difference in atmospheric pressures at these points?

- a) Barometric levelling
- b) Trigonometric levelling
- c) Spirit levelling
- d) Traverse levelling

Answer: a

Explanation: A barometric levelling makes use of the phenomenon that difference in elevation between two points is proportional to the difference in atmospheric pressures at these points. A barometer, therefore, may be used and the readings observed at different points would yield a measure of the relative elevations of those points.

4. At a given point, the atmospheric pressure doesn't remain constant in the course of the day, even in the course of an hour.

- a) True
- b) False

Answer: a

Explanation: At a given point, the atmospheric pressure doesn't remain constant in the course of the day, even in the course of an hour. Therefore, barometric levelling is relatively inaccurate.

5. Which process of levelling in which the elevations of points are computed from the vertical angles and horizontal distances measured in the field?

- a) Barometric levelling
- b) Trigonometric levelling
- c) Spirit levelling
- d) Traverse levelling

Answer: b

Explanation: Trigonometric levelling is also called indirect levelling. It is the process of levelling in which the elevations of points are computed from the vertical angles and horizontal distances measured in the field.

6. Which of the following methods of levelling is a modified form of stadia levelling?

- a) Barometric levelling
- b) Trigonometric levelling
- c) Spirit levelling
- d) Traversing

Answer: b

Explanation: Trigonometric levelling is the process of levelling in which any triangle can be computed from proper trigonometric relations. In a modified form called stadia levelling.

8. Which branch of surveying is used to find the elevations of given points with respect to given or assumed datum?

- a) Levelling
- b) Contouring
- c) Traversing
- d) Plane table surveying

Answer: a

Explanation: Levelling is a branch of surveying is used to find the elevations of given points with respect to given or assumed datum.

9. Determining the relative positions of points on above or beneath the surface of the earth by means of direct or indirect measurements of distance and direction and elevation is called as _____

- a) Surveying
- b) Levelling
- c) Measuring
- d) Contouring

Answer: a

Explanation: Surveying is defined as determining the relative positions of points on above or beneath the surface of the earth by means of direct or indirect measurements of distance and direction and elevation.

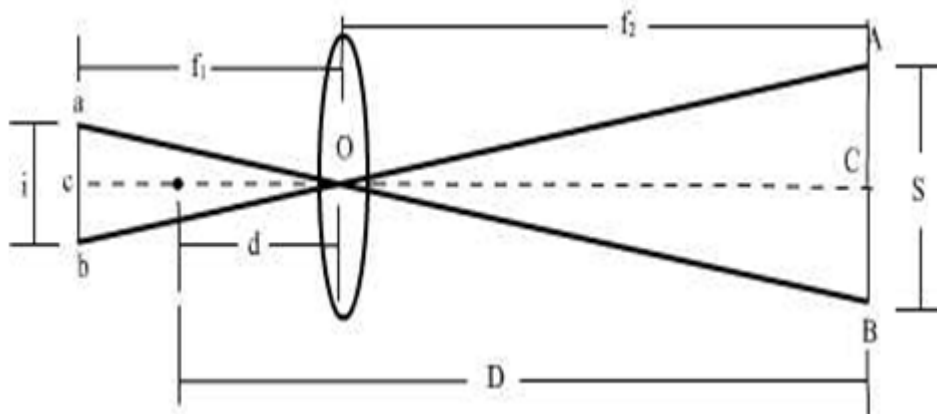
10. Finding the elevations of a point with respect to a given or assumed and establish points given elevation or at different elevations with respect to given or assumed datum is _____

- a) Surveying
- b) Levelling
- c) Bearing
- d) Contouring

Answer: b

Explanation: Finding the elevations of a point with respect to a given or assumed and establish points given elevation or at different elevations with respect to given or assumed datum is Levelling.

a) i/s

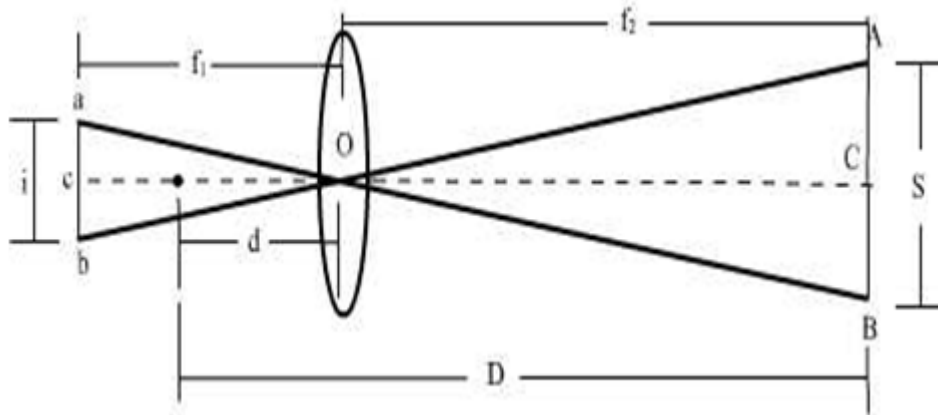


- b) s/i
- c) D/d
- d) d/D

Answer: b

Explanation: From figure, aOA and bOB passing through optical center. So, $\triangle aOb$ and $\triangle AOB$ are similar triangles, then $f_1/f_2 = s/i$.

6. From the following figure, D is?

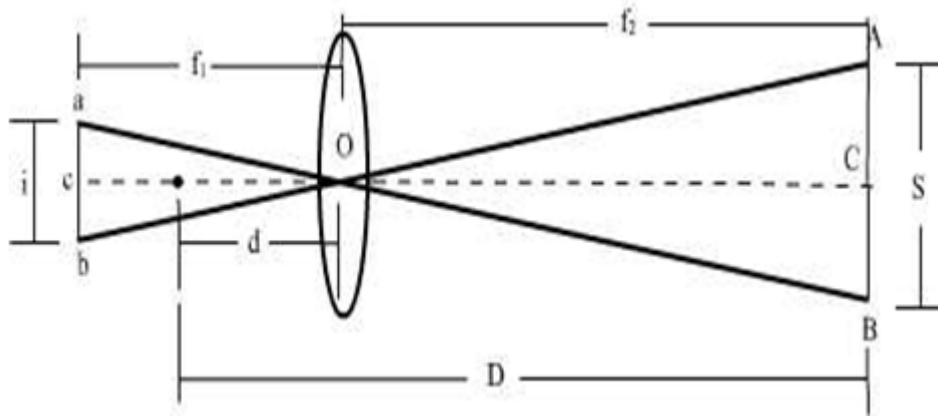


- a) $kS+c$
- b) $S + kc$
- c) $k(S+c)$
- d) $k S \hat{=} c$

Answer: a

Explanation: Horizontal distance between the axis and staff is $D = f_1 + d = f \cdot s/i + (f+d) = k \cdot s + c$, Where, $D = k \cdot s + c$ is distance equation, c is additive constant of instrument, k is multiplying constant or stadia interval factor.

7. In the following figure, $D = k S + c$, where k is additive constant.

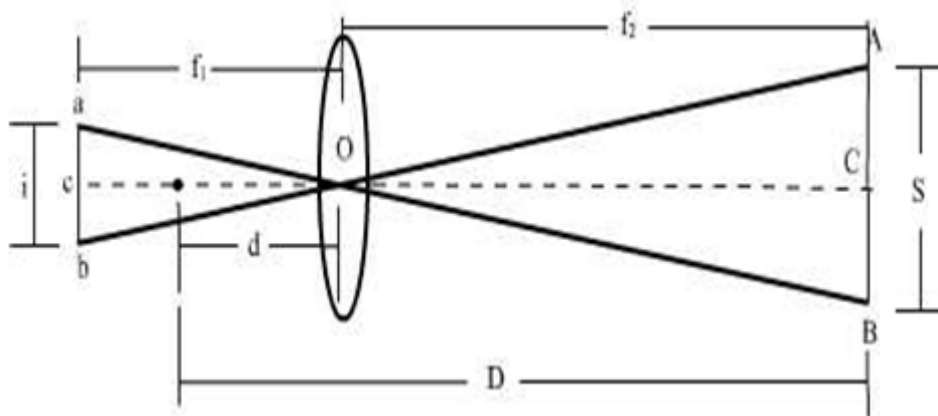


- a) True
- b) False

Answer: b

Explanation: Horizontal distance between the axis and staff is $D = f_1 + d = f_1 \frac{s}{i} + (f_1 + d) = k \cdot s + c$, Where, $D = k \cdot s + c$ is distance equation, c is additive constant of instrument, k is multiplying constant or stadia interval factor.

8. In the following figure, $D = k S + c$, where c is additive constant.

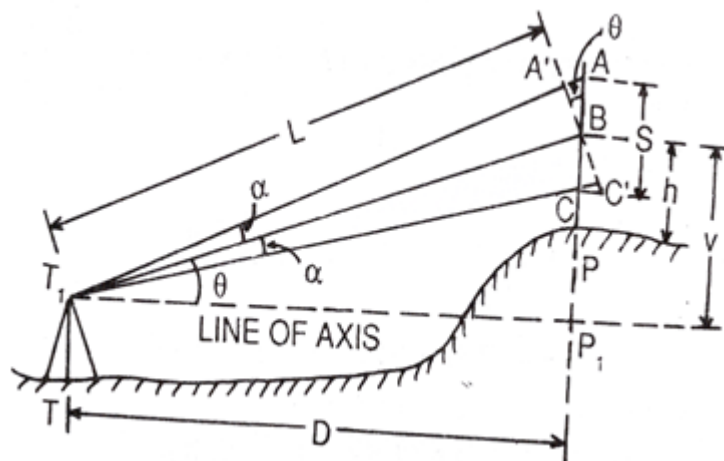


- a) True
- b) False

Answer: a

Explanation: Horizontal distance between the axis and staff is $D = f l + d = f \cdot s / i + (f + d) = k \cdot s + c$, Where, $D = k \cdot s + c$ is distance equation, c is additive constant of instrument, k is multiplying constant or stadia interval factor.

9. In the following figure, $D =$ _____

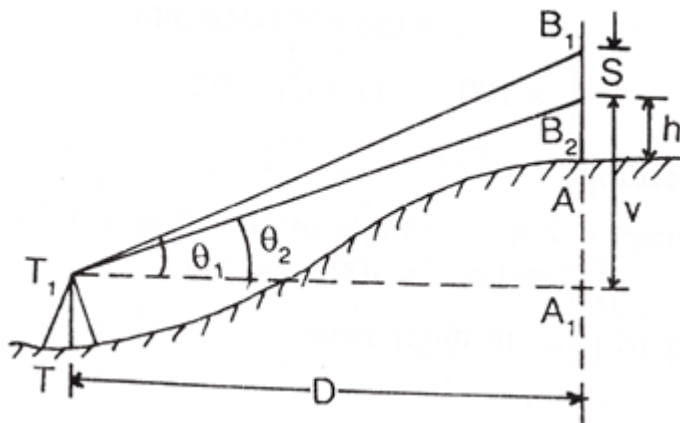


- a) $k s \cos^2 \hat{I}_1 + c \cos \hat{I}_1$
- b) $k s \cos^2 \hat{I}_2 + c \cos \hat{I}_1$
- c) $k s \cos^2 \hat{I}_1 + c \cos 2 \hat{I}_1$
- d) $k s \cos^2 \hat{I}_1 + c \cos 2 \hat{I}_1$

Answer: a

Explanation: Considering Angle of Elevation (positive), Here, $\hat{A} \hat{C}^{\text{TM}} \hat{C} \hat{A}^{\text{TM}} = S \cos \hat{I}_1$, $T_1 B = L = K A \hat{A}^{\text{TM}} \hat{C} \hat{A}^{\text{TM}} + C = k s \cos \hat{I}_1 + c$, $D = L \cos \hat{I}_1 = (k s \cos \hat{I}_1 + c) \cos \hat{I}_1$, $D = k s \cos^2 \hat{I}_1 + c \cos \hat{I}_1$.

10. In the following figure, $D =$ _____



- a) $D = 2S/(\tan \hat{I}_1 - \tan \hat{I}_2)$
- b) $D = 3S/(\tan \hat{I}_1 - \tan \hat{I}_2)$
- c) $D = S/2(\tan \hat{I}_1 - \tan \hat{I}_2)$
- d) $D = S/(\tan \hat{I}_1 - \tan \hat{I}_2)$

Answer: d

Explanation: Here, $V+S = D\tan \hat{I}_1$, $V = D\tan \hat{I}_2$, $S = D(\tan \hat{I}_1 - \tan \hat{I}_2)$. Therefore, $D = S/(\tan \hat{I}_1 - \tan \hat{I}_2)$.

This set of Surveying Question Bank focuses on “Contouring” Methods and Characteristics.

1. What is the term used for an imaginary line on the ground joining points of equal elevation?

- a) Level line
- b) Line of sight
- c) Datum
- d) Contour

Answer: d

Explanation: A Contour is an imaginary line on the ground joining the points of equal elevation. It is a line in which the surface of the ground is interested in a level surface.

2. Which of the following lines, in which surface of the ground is intersected by a level surface?

- a) Level line
- b) Line of sight
- c) Datum
- d) Contour

Answer: d

Explanation: A Contour is an imaginary line on the ground joining the points of equal elevation. It is a line in which the surface of the ground is interested in a level surface.

3. A Contour line is a line on the map representing a contour.

- a) True
- b) False

Answer: a

Explanation: A Contour is an imaginary line on the ground joining the points of equal elevation. It is a line in which the surface of the ground is interested in a level surface. A Contour line is a line on the map representing a contour.

4. Which of the following is not used to represent the relative altitudes of the points on the map?

- a) Contour lines
- b) Hachures
- c) Shading
- d) Level lines

Answer: d

Explanation: On a plan, the relative altitudes of the points can be represented by shading, Hachures, form lines or contour lines. Out of these, contour lines are most widely used because they indicate the elevations directly.

5. Which of the following indicates the elevations directly?

- a) Level line
- b) Line of sight
- c) Datum
- d) Contour

Answer: d

Explanation: A Contour is an imaginary line on the ground joining the points of equal elevation. It is a line in which the surface of the ground is interested by a level surface. On a plan, the relative altitudes of the points can be represented by shading, Hachures, form lines or contour lines. Out of these, contour lines are most widely used because they indicate the elevations directly.

6. The vertical distance between any two contours is called a contour interval.

- a) True
- b) False

Answer: b

Explanation: The vertical distance between any two consecutive contours is called a contour interval. The contour interval is kept constant for a contour plan.

7. The horizontal distance between two points in two consecutive contours is known as the vertical equivalent.

- a) True
- b) False

Answer: b

Explanation: The horizontal distance between two points in two consecutive contours is known as the horizontal equivalent. It depends on the steepness of ground.

8. For every flat ground, a small contour interval is necessary.

- a) True
- b) False

Answer: a

Explanation: A contour interval chosen for a flat ground will be highly unsuitable for undulated ground. For every flat ground, a small interval is necessary.

9. If the ground is more broken, greater contour interval should be adapted.

- a) True
- b) False

Answer: a

Explanation: A contour interval chosen for a flat ground will be highly unsuitable for undulated ground. If the ground is more broken, greater contour interval should be adapted.

10. The contour interval should be inversely proportional to the scale.

- a) True
- b) False

Answer: a

Explanation: If the scale is small, the contour interval should be large. If the scale is large, the contour interval should be small.

This set of Surveying Multiple Choice Questions & Answers (MCQs) focuses on “Reduction in Levelling”.

1. Height of the Instrument method is a less tedious and simple process.

- a) False
- b) True

Answer: b

Explanation: The above statement is true because it involves simple calculations when compared to Rise and fall method, which can be completed with minimal effort.

2. While doing construction work, which among the following is more suitable?

- a) Rise and Fall method
- b) Traversing
- c) Height of the Instrument method(H.I)
- d) Compass Surveying

Answer: c

Explanation: Height of the Instrument method is less tedious than Rise and fall method. Moreover, this process is suitable for taking numerous readings from same instrument setting. Traversing is a process of establishing control points and Compass surveying involves in finding the bearings.

3. The formula for calculating R.L can be given as _____

- a) $H.I + F.S$
- b) $H.I - F.S$
- c) $H.I - B.S$
- d) $H.I + B.S$

Answer: b

Explanation: By subtracting the fore sight value from height of the instrument, the value of reduced level for the next set of reading can be obtained.

4. Which of the following indicates the formula for arithmetic check?

- a) $\sum B.S - \sum F.S = \text{Last R.L} - \text{First R.L}$
- b) $\sum F.S - \sum B.S = \text{Last R.L} - \text{First R.L}$
- c) $\sum B.S + \sum F.S = \text{First R.L} - \text{Last R.L}$
- d) $\sum F.S + \sum B.S = \text{Last R.L} - \text{First R.L}$

Answer: a

Explanation: If the difference in summation of back sight and fore sight is equal to the difference of last R.L and first R.L, then obtained set of values for finding difference in elevation are correct.

5. Rise and fall method provides check in calculations for all sights.

- a) True
- b) False

Answer: a

Explanation: Since the check for intermediate sights is not available in H.I method, it may lead to errors while doing calculations.

6. Which of the following represents a form of Bench Mark (B.M)?

- a) True Benchmark
- b) Assumed Benchmark
- c) Datum
- d) Arbitrary Benchmark

Answer: d

Explanation: Benchmark is a point of known elevation taken as reference. It is classified as Arbitrary, G.T.S, Permanent and Temporary.

7. If the staff at the station point is not held vertically, the R.L at the observation would be _____

- a) Less than true R.L
- b) Greater than true R.L
- c) Equal to the true R.L
- d) Two times the true R.L

Answer: c

Explanation: Due to irregular holding of the staff, the values which are obtained by the levelling instrument might lead to decrease in R.L.

8. If the R.L of a B.M is 100m and back sight is 1.225m, find the H.I at the station?

- a) 101.225m
- b) -101.225m
- c) 98.775m
- d) -98.775m

Answer: a

Explanation: We know that, $H.I = R.L + B.S$

Then, $H.I = 100 + 1.225$ $H.I = 101.225$ m.

9. The combined correction for curvature and refraction can be given as _____

a) $C = 14d^2 / 6R$

b) $C = 6d^2 / 7R$

c) $C = 7d^2 / 2R$

d) $C = 6d^2 / 14R$

Answer: d

Explanation: By subtracting the correction due to curvature from correction due to refraction we can get the combined correction i.e., $(C = \frac{d^2}{2R} - (\frac{1}{7} * \frac{d^2}{2R}))$

10. Find the correction for curvature and correction for refraction, if the value of $d = 2400$ m?

a) 0.425, 0.604

b) 0.452, 0.064

c) 0.064, 0.452

d) 0.604, 0.425

Answer: b

Explanation: Correction for curvature $= (\frac{d^2}{2R} = \frac{2.4^2}{2 * 6370} * 1000 = 0.452m)$ Correction for refraction $(= \frac{1}{7} * C_c = \frac{0.452}{7} = 0.064m.)$

11. Find the value of R.L, if B.M = 400 m, B.S = 1.142 m, F.S = 2.121 by using rise and fall method?

a) 400.79 m

b) 400.97 m

c) 409.79 m

d) 399.02 m

Answer: d

Explanation: In the rise and fall method, first we must calculate the difference between B.S and F.S. We get $1.142 - 2.121 = -0.979$ m, which is negative. It means we have to subtract it from the given B.M for obtaining R.L i.e., $R.L = 400 - 0.979 = 399.021$ m.

12. If $d = 2.94$ km, what would be the combined correction for curvature and refraction?

a) 1.85 km

b) 0.85 km

c) 0.58 km

d) 1.58 km

Answer: c

Explanation: We know that combined correction for curvature can be given as $(C = \frac{6d^2}{14R})$ On substituting the value of d in the above equation we get,
 $(C = \frac{6d^2}{14R} = \frac{6 * 2.94^2}{14 * 6370} = 0.5814 \text{ km.})$

This set of Surveying Multiple Choice Questions & Answers (MCQs) focuses on "Contouring" Characteristics of Contours.

1. Two contour lines of different elevations unite to form one line only in the case of _____

a) Hills

b) Vertical cliff

c) Horizontal cliff

d) Overhanging Cliff

Answer: b

Explanation: Two contour lines of different elevations cannot cross each other. However, contour lines of different elevations can unite to form one line in case of vertical Cliff.

2. Two contour lines of different elevations cannot cross each other.

a) True

b) False

Answer: a

Explanation: Two contour lines of different elevations cannot cross each other. If they did, the point of intersection would have two different elevations which are absurd.

3. In which of the following cases contour lines of different elevations can intersect?

- 1) Caves, 2) Vertical cliffs, 3) Hills, 4) Overhanging Cliff
- a) 1) and 2)
- b) Only 1)
- c) 1), 2) and 4)
- d) 1) and 4)

Answer: d

Explanation: Two contour lines of different elevations cannot cross each other. However, contour lines of different elevations can intersect only in case of an overhanging Cliff and a cave.

4. Contour lines close together indicate _____ slope.

- a) Steep
- b) Gentle
- c) Uniform
- d) Undulated

Answer: a

Explanation: Contour lines close together indicate steep slope. They indicate a gentle slope if they are far apart.

5. A series of straight parallel and equally spaced contours represent _____

- a) Hills
- b) Ponds
- c) Plane surface
- d) Desert

Answer: c

Explanation: A series of straight, parallel and equally spaced contours represent a plane surface. Equally spaced represent uniform slope.

6. A Contour passing through any point is parallel to the line of steepest slope at that point.

- a) True
- b) False

Answer: b

Explanation: A Contour passing through any point is perpendicular to the line of steepest slope at the point. This agrees with since the perpendicular distance between contour lines is the shortest distance.

7. A closed contour line with one or more higher ones inside to represent _____

- a) Hill
- b) Pond
- c) River
- d) Cliff

Answer: a

Explanation: A closed contour line with one or more higher ones inside to represent a hill. Similarly, closed contour line with one or more lower ones inside it indicates a depression without an outlet.

8. To contour lines having the same elevations cannot unite and continue as one line.

- a) True
- b) False

Answer: a

Explanation: To contour lines having the same elevations cannot unite and continue as one line. Similarly, a single contour cannot split into two lines.

9. A single contour line can split into two in case of a change in elevations.

- a) True
- b) False

Answer: b

Explanation: To contour lines having the same elevations cannot unite and continue as one line. Similarly, a single contour cannot split into two lines.

10. A contour line must close upon itself.

- a) True
- b) False

Answer: a

Explanation: A contour line must close upon itself. Though not necessarily within the limits of the maps.

11. Contour lines cross a watershed or ridge line at _____

- a) 90°
- b) 100°
- c) 45°
- d) 30°

Answer: a

Explanation: Contour lines cross a watershed or ridge line at right angles. The form curves of U shape round it with the concave side of the curve towards the higher ground.

12. What is the shape of contour lines in case of a valley?

- a) U shape
- b) V shape
- c) W shape
- d) O shape

Answer: b

Explanation: Contour lines cross a valley line at right angles. They form sharp curves of V shape across it with the convex side of the curve towards the higher ground.

13. What is the shape of contour lines in case of a watershed?

- a) U shape
- b) V shape
- c) W shape
- d) O shape

Answer: a

Explanation: Contour lines cross a watershed or ridge line at right angles. The form curves of U shape around it with the concave side of the curve towards the higher ground.

14. The same contour appears on either sides of a ridge or valley, for the highest horizontal plane that interests the ridge must cut it on both sides.

- a) True
- b) False

Answer: a

Explanation: The same contour appears on either sides of a ridge or valley, for the highest horizontal plane that interests the ridge must cut it on both sides. The same is true in case of a lower horizontal plane that cuts a valley.

This set of Surveying Multiple Choice Questions & Answers focuses on "Interpolation of Contours".

1. What is the process of spacing the contours proportional between the plotted ground points established by indirect methods?

- a) Interpolation
- b) Tacheometric method
- c) Cross section method
- d) By squares method

Answer: a

Explanation: Interpolation of the contours is the process of spacing the contours proportionately between the plotted ground points established by indirect methods.

2. The methods of interpolation are based on the assumption that the slope of ground between the two points is uniform.

- a) True
- b) False

Answer: a

Explanation: Interpolation of the contours is the process of spacing the contours proportionately between the plotted ground points established by indirect methods. The methods of interpolation are based on the assumption that the slope of ground between the two points is uniform.

3. Which of the following is not a chief method of Interpolation?

- a) By estimation
- b) By arithmetic calculation

- c) By graphical method
- d) By cross sections

Answer: d

Explanation: The methods of interpolation are based on the assumption that the slope of ground between the two points is uniform. The chief methods of Interpolation are by estimation, by arithmetic calculations, by graphical method.

4. Which of the following methods is extremely rough and is used for small scale work only?

- a) By estimation
- b) By arithmetic calculation
- c) By graphical method
- d) By cross sections

Answer: a

Explanation: Estimation method is extremely rough and is used for small scale work only. The positions of contour points between the guide points are located by estimation.

5. The positions of contour points between the guide points are located by _____

- a) Estimation
- b) Arithmetic calculations
- c) Graphical method
- d) Cross sections

Answer: a

Explanation: Estimation method is extremely rough and is used for small scale work only. The positions of contour points between the guide points are located by estimation.

6. Which of the following Interpolation method is accurate and time consuming?

- a) by estimation
- b) by Arithmetic method
- c) by graphical method
- d) by squares

Answer: b

Explanation: Arithmetic method is accurate but time consuming. The positions of contour between the guide points are located by arithmetic calculation.

7. In which of the following methods Interpolation is done with the help of a tracing paper?

- a) by estimation
- b) by Arithmetic method
- c) by graphical method
- d) by squares

Answer: c

Explanation: In the graphical method, the Interpolation is done with the help of a tracing paper. Sometimes tracing cloth is also used.

8. In cross sections method, cross sections are run traverse to the centre line of a road, railway or canal etc.

- a) True
- b) False

Answer: a

Explanation: In this method, cross sections are run transverse to the centre line of a road, railway or canal etc. The method is most suitable for railway route surveys.

9. In the case of hilly terrain, the tacheometric method may be used with advantages.

- a) True
- b) False

Answer: a

Explanation: In the case of hilly terrain, the tacheometric method may be used with advantages. A tacheometer is a theodolite fitted with stadia diaphragm so that staff readings against all the three hairs may be taken.

10. In cross sections method, If there are irregularities in the surface between two cross lines, additional guide points may be located on intermediate cross lines.

- a) True
- b) False

Answer: a

Explanation: If there are irregularities in the surface between two cross lines, additional guide points may be located on intermediate cross lines. If required, some of the cross lines may also be chosen at any inclination other 90° to the main line.

This set of Surveying Questions and Answers for Entrance exams focuses on “Uses of Contour Maps”.

1. From a given contour plan, the section along any given direction can be drawn to know the _____

- a) Compressive strength of soil
- b) General shape of ground
- c) Density of soil
- d) Type of soil

Answer: b

Explanation: From a given contour plan, the section along any given direction can be drawn to know the general shape of ground. To use it for earth work calculations for a given communication line in the direction of the section.

2. Which the following is not a use of contour maps?

- a) Drawing of plan
- b) Determination of intervisibility between two points
- c) Tracing of contour gradient and location of route
- d) Calculation of reservoir capacity

Answer: a

Explanation: Contour maps are useful to determine the Determination of intervisibility between two points, tracing of contour gradient and location of route, calculation of reservoir capacity. It is also useful to draw section.

3. Contour maps are useful to determination of intervisibility between two points.

- a) True
- b) False

Answer: a

Explanation: Contour maps are useful to the determination of intervisibility between two points. The distance between the triangulation stations are generally several kilometres and therefore selecting their position it is necessary to determine their intervisibility.

4. Contour map is useful to determine the tracing of contour gradients and the location of route.

- a) True
- b) False

Answer: a

Explanation: A contour plan is very much useful in locating the route of highway, railway, canal and any other communication lines.

5. Contour maps are used for the measurement of drainage areas.

- a) True
- b) False

Answer: a

Explanation: A drainage area for a given point in a stream or river can be defined as the area that forms the source of all water that passes that point. A contour plan may be used to trace that line separating the basin from the rest of the area.

6. Contour maps are used to calculate the reservoir capacity.

- a) True
- b) False

Answer: a

Explanation: The contour plan may be used to calculate the capacity of a reservoir. Contour maps are also useful to determine the Determination of intervisibility between two points, tracing of contour gradient and location of the route, calculation of reservoir capacity.

7. The line that marks the limits of the drainage area should often follow the ridges.

- a) True
- b) False

Answer: a

Explanation: The line that marks the limits of the drainage area has the following characteristics it passes through every ridge or saddle that divides the drainage area from other areas. It often follows the ridges.

8. The line that marks the limits of drainage area has the following characteristics it passes through every ridge or saddle that divides the drainage area from other areas.

- a) True
- b) False

Answer: a

Explanation: The line that marks the limits of drainage area has the following characteristics it passes through every ridge or saddle that divides the drainage area from other areas. It often follows the ridges.

9. The Contour maps are useful to determine the intersection of surfaces and measurements of earthwork.

- a) True
- b) False

Answer: a

Explanation: The Contour maps are useful to determine the intersection of surfaces and measurements of earthwork. Contour maps are also useful to determine the Determination of intervisibility between two points, tracing of contour gradient and location of the route, calculation of reservoir capacity.

10. The line that marks the limits of the drainage area is always _____ degrees to contour lines.

- a) 45
- b) 90
- c) 180
- d) 0

Answer: b

Explanation: The line that marks the limits of drainage area has the following characteristics it passes through every ridge or saddle that divides the drainage area from other areas. It often follows the ridges. It is perpendicular to the contour lines.

This set of Surveying Multiple Choice Questions & Answers (MCQs) focuses on "Contour Gradient".

1. _____ is a line lying throughout on the surface of the ground and preserving a constant inclination to the horizontal.

- a) Contour gradient
- b) Contour interval
- c) Contour slope
- d) Contour inclination

Answer: a

Explanation: Contour gradient is a line lying throughout on the surface of the ground and preserving a constant inclination to the horizontal. If the inclination of such a line is given, its direction from a point may be easily located either on the map or on the ground.

2. Which of the following cannot be used to locate the contour gradient in the field?

- a) Clinometer
- b) Theodolite
- c) Level
- d) Chain

Answer: d

Explanation: The method of locating the contour gradient on the map can be done in the field by using clinometer, theodolite and level.

3. If a level is used to locate the contour gradient, it is not necessary to set the level on the contour gradient.

- a) True
- b) False

Answer: a

Explanation: Contour gradient is a line lying throughout on the surface of the ground and preserving a constant inclination to the horizontal. If a level is used to locate the contour gradient, it is not necessary to set the level on the contour gradient.

4. If the inclination of contour gradient is given, its direction from a point may be easily located either on the map or on the ground.

- a) True
- b) False

Answer: a

Explanation: Contour gradient is a line lying throughout on the surface of the ground and preserving a constant inclination to the horizontal. If the inclination of such a line is given, its direction from a point may be easily located either on the map or on the ground.

5. To locate the contour gradient, the level is set at a commanding position and reading on the staff at the second point is taken.

- a) True
- b) False

Answer: b

Explanation: To locate the contour gradient, the level is set at a commanding position and reading on the staff at the first point is taken.

6. From a single instrument station, several points at a given gradient can be located.

- a) True
- b) False

Answer: b

Explanation: To locate the contour gradient, the level is set at a commanding position and reading on the staff at the first point is taken. From a single instrument station, several points at a given gradient can be located.

7. In a direct method, the contour to be plotted is actually traced on the ground.

- a) True
- b) False

Answer: a

Explanation: In a direct method, the contour to be plotted is actually traced on the ground. Only those points are surveyed which happen to be plotted.

8. In indirect method, each contour is located by determining the positions of a series of points through which the contour passes.

- a) True
- b) False

Answer: a

Explanation: In indirect method, each contour is located by determining the positions of series of points through which the contour passes. The operation is also sometimes called tracing out contours.

9. The indirect method, guide points need not necessarily be on the contours.

- a) True
- b) False

Answer: b

Explanation: In indirect method, some suitable guide points are selected and surveyed. The guide points need not necessarily be on the contours.

10. The indirect method serves as a basis for the interpolation of contours.

- a) True
- b) False

Answer: a

Explanation: In indirect method, some suitable guide points are selected and surveyed. These guide points, having been plotted, serve as a basis for the interpolation of contours.

This set of Surveying Multiple Choice Questions & Answers (MCQs) focuses on "Transit Theodolite".

1. _____ is the most precise instrument designed for the measurement of horizontal and vertical angles.

- a) Survey chain
- b) Dumpy level
- c) Theodolite
- d) Telescope

Answer: c

Explanation: Theodolite is the most precise instrument designed for the measurement of horizontal and vertical

angles. It has wide applicability in surveying such as laying off horizontal angles, locating points on line, prolonging survey lines, establishing grades etc.

2. Which of the following cannot be done with the help of theodolite in surveying?

- a) Laying off horizontal angles
- b) Locating points on lines
- c) Prolonging survey lines
- d) Measuring horizontal distances

Answer: d

Explanation: Theodolite is the most precise instrument designed for the measurement of horizontal and vertical angles. It has wide applicability in surveying such as laying off horizontal angles, locating points on line, prolonging survey lines, establishing grades etc.

3. Which of the following cannot be done with the help of theodolite in surveying?

- a) Establishing grades
- b) Determining the difference in elevation
- c) Setting out curves
- d) Determining the area of ground

Answer: d

Explanation: Theodolite is the most precise instrument designed for the measurement of horizontal and vertical angles. It has wide applicability in surveying such as laying off horizontal angles, locating points on line, prolonging survey lines, establishing grades, determining the difference in elevation, setting out curves etc.

4. A transit theodolite is one in which the line of sight can be reversed by revolving the telescope through 180° in a vertical plane.

- a) True
- b) False

Answer: a

Explanation: Theodolite may be classified as transit and non-transit theodolite. A transit theodolite is one in which the line of sight can be reversed by revolving the telescope through 180° in a vertical plane.

5. A non-transit theodolite is one in which the line of sight can be reversed by revolving the telescope through 180° in a vertical plane.

- a) True
- b) False

Answer: b

Explanation: Theodolite may be classified as transit and non-transit theodolite. The non-transit theodolites are those in which the telescope cannot be transited.

6. The transit theodolites are also called plain theodolites.

- a) True
- b) False

Answer: b

Explanation: The non-transit theodolites are also called plain theodolites. In which the telescope cannot be transited.

7. The non-transit theodolites are also called Y- theodolites.

- a) True
- b) False

Answer: a

Explanation: The non-transit theodolites are also called plain theodolites or Y- theodolites. In which the telescope cannot be transited.

8. The transit is the term simply used for _____

- a) Telescope
- b) Transit theodolite
- c) Non- transit theodolites
- d) Dumpy level

Answer: b

Explanation: A transit theodolite is simply called transit. It is one in which the line of sight can be reversed by revolving the telescope through 180° in a vertical plane.

9. Transit is mainly used and non-transit theodolites have now become obsolete.

- a) True
- b) False

Answer: a

Explanation: Transit theodolites have more advantages over non-transit theodolites. That is why non-transit have now become obsolete.

10. How many types do theodolites classified?

- a) 2
- b) 3
- c) 4
- d) 5

Answer: a

Explanation: Theodolites are classified into two types. They are transit theodolites and non-transit theodolites.

11. Which of the following is an integral part of the theodolite and is mounted on a spindle known as a horizontal axis?

- a) Telescope
- b) Index frame
- c) Horizontal plane Vernier
- d) Horizontal circle

Answer: a

Explanation: The telescope is an integral part of the theodolite. It is mounted on a spindle known as a horizontal axis or trunnion axis.

12. Horizontal axis is also called _____

- a) Inner axis
- b) Outer axis
- c) Trunnion axis
- d) Line of sight

Answer: c

Explanation: The telescope is an integral part of the theodolite. It is mounted on a spindle known as a horizontal axis or trunnion axis.

13. The vertical circle is a circular graduated arc attached to the _____ axis of the telescope.

- a) inner axis
- b) outer axis
- c) trunnion axis
- d) line of sight

Answer: c

Explanation: The vertical circle is a circular graduated arc attached to the telescope. Consequently, the graduated arc rotates with the telescope when the latter is turned about the horizontal axis.

14. By means of vertical circle clamp and its corresponding _____ the telescope can be set accurately at any desired position in the vertical plane.

- a) tripod head
- b) focusing screw
- c) levelling head
- d) tangent screw

Answer: d

Explanation: By means of vertical circle clamp and its corresponding slow motion or tangent screw the telescope can be set accurately at any desired position in the vertical plane.

15. The index frame is _____ shaped frame.

- a) U
- b) V
- c) T
- d) A

Answer: c

Explanation: The index frame is a T shaped frame consisting of a vertical leg known as clipping arm. It is also called a Vernier frame.

16. In theodolites, two standards resemble the letter _____
- a) U
 - b) V
 - c) T
 - d) A

Answer: d

Explanation: Two standards resemble letter A are mounted on the upper plates. The trunnion axis of the telescope is supported on these.

This set of Surveying Multiple Choice Questions & Answers (MCQs) focuses on "Adjustment".

1. Which of the following is not a function of levelling head?

- a) To support the main part of the instrument
- b) To attach the theodolite to the tripod
- c) To provide a mean for levelling the theodolite
- d) To provide the exact centering over the station mark

Answer: d

Explanation: A levelling head has three distinctive functions. They are to support the main part of the instrument, to attach the theodolite to the tripod and to provide a mean for levelling the theodolite.

2. In theodolites, the upper plate carries two plate levels placed at right angles to each other.

- a) True
- b) False

Answer: a

Explanation: In theodolites, the upper plate carries two plate levels placed at right angles to each other. One of the plate levels is kept parallel to the trunnion axis.

3. The plate level can be centered with the help of _____

- a) Focusing screw
- b) Foot screw
- c) Tangent screw
- d) Clip screw

Answer: b

Explanation: The plate level can be centered with the help of foot screw. In some theodolites only one plate level is provided.

4. On clamping the upper screw and unclamping the lower clamp, the instrument can rotate on its outer axis without any relative motion between the two plates.

- a) True
- b) False

Answer: a

Explanation: On clamping the upper screw and unclamping the lower clamp, the instrument can rotate on its outer axis without any relative motion between the two plates.

5. On unclamping the upper screw and clamping the lower clamp, the instrument can rotate on its inner axis with relative motion between vernier and scale.

- a) True
- b) False

Answer: a

Explanation: The lower clamp is clamped and the upper clamp is unclamped, the upper plate and the instrument can rotate on the inner axis with a relative motion between the vernier and the scale.

6. Which of the following is used to test the horizontality of the transit axis or trunnion axis?

- a) Levelling head
- b) Levelling screw
- c) Altitude bubble
- d) Striding level

Answer: d

Explanation: Some theodolites are fitted with a striding level. It is used to test the horizontality of the transit axis or trunnion axis.

7. Temporary adjustments are those which are made at every instrument setting and preparatory to taking observations.

- a) True
- b) False

Answer: a

Explanation: Temporary adjustments are those which are made at every instrument setting and preparatory to taking observations. The temporary adjustments are setting over the station, levelling up and elimination parallax.

8. Setting up includes which of the following?

- a) Centering
- b) Appropriate levelling with the help of tripod legs
- c) Both centering and appropriate levelling with the help of tripod legs
- d) Levelling with foot screw

Answer: d

Explanation: The operation of setting up includes centering of the instrument over the station mark by a plumb Bob or by optical plummet and appropriate levelling with the help of tripod legs.

9. Parallax is a condition arising when the image formed by the object is in the plane of the cross hairs.

- a) True
- b) False

Answer: b

Explanation: Parallax is a condition arising when the image formed by the object is not in the plane of the cross hairs. Unless parallax is eliminated, accurate sighting is impossible.

10. Parallax can be eliminated by focusing the eye piece and objective.

- a) True
- b) False

Answer: a

Explanation: Parallax can be eliminated in two steps. By focusing the eyepiece for a distinct vision of the cross hairs and by focusing the objective to bring the image of the object in the plane of cross hairs.

11. For adjustment purposes, the index arm can be rotated slightly with the help of a _____ screw.

- a) tangent screw
- b) levelling screw
- c) cliff screw
- d) focusing screw

Answer: c

Explanation: For adjustment purposes, the index arm can be rotated slightly with the help of a cliff screw. It is fitted to the clipping arm at its lower end.

This set of Surveying Multiple Choice Questions & Answers (MCQs) focuses on “Theodolite Traversing Adjustment”.

1. To measure the horizontal angle which of the following is the first step?

- a) Releasing all clamps
- b) Levelling instrument
- c) Turning plates
- d) Clamping the plates

Answer: b

Explanation: To measure the horizontal angle, firstly we set up instrument and level it. Secondly, releases all clamps. Turning the upper and lower plates in opposite directions till the zero of the one of the vernier is against the zero of the scale. Next clamp the plates together by upper clamp and lower clamp and bring the two zeros into exact coincidence by turning upper tangent screw. It continues next procedure.

2. After setting up the instrument first thing done by the surveyor is _____

- a) releasing all clamps
- b) levelling instrument
- c) turning plates
- d) clamping the plates

Answer: b

Explanation: Firstly, we set up an instrument and level it. Secondly, releases all clamps.

3. The method of repetition is used to measure a horizontal angle to a finer degree of accuracy than that obtained with the least count of the vernier.

- a) True
- b) False

Answer: a

Explanation: In this method of repetition, angle is measured two or more times by allowing the vernier to remain clamped each time at the end of each measurement. Instead of setting it back at zero when sighting at previous station.

4. After levelling of an instrument is done what is the next up?

- a) Releasing all clamps
- b) Loosing the lower clamp
- c) Turning plates
- d) Clamping the plates

Answer: a

Explanation: To measure the horizontal angle, firstly we set up instrument and level it. Secondly, releases all clamps.

5. To measure a horizontal angle, after releasing all clamps, we turn the upper and lower plates in the same direction.

- a) True
- b) False

Answer: b

Explanation: After releasing all clamps. Turning the upper and lower plates in opposite directions till the zero of the one of the vernier is against the zero of the scale.

6. If one of the vernier is at 0° then another vernier reading shows / also shows _____

- a) 90°
- b) 0°
- c) 180°
- d) 45°

Answer: c

Explanation: Turning the upper and lower plates in opposite directions till the zero of the one of the vernier is against the zero of the scale. Next clamp the plates together by upper clamp and lower clamp and bring the two zeros into exact coincidence by turning upper tangent screw. Now when we take reading on another vernier it should be 180° , if there is no instrument error.

7. To measure a horizontal angle by direct method is also called a repetition method.

- a) True
- b) False

Answer: b

Explanation: To measure a horizontal angle by direct method is also called the reiteration method. It is suitable for measurements of angles of a group having a common vertex point.

8. For measuring an angle to the highest degree of precision, several sets of repetitions are usually taken.

- a) True
- b) False

Answer: a

Explanation: For measuring an angle to the highest degree of precision, several sets of repetitions are usually taken. There are two methods of taking single set.

9. In first method of taking single set, after keeping the telescope normal throughout we measure the angle clockwise by 6 repetitions. We obtain the first value of the angle by dividing the final reading by _____

- a) 2
- b) 3
- c) 4
- d) 6

Answer: d

Explanation: In first method of taking a single set, after keeping the telescope normal throughout we measure the angle clockwise by 6 repetitions. We obtain the first value of the angle by dividing the final reading by 6.

10. While measuring the set of observations, the transit should be levelled each time for high degree of precision.

- a) True
- b) False

Answer: b

Explanation: During an entire set of observations, the transit should not be re-levelled. Because it may change the reading and errors in reading occurs.

This set of Surveying Multiple Choice Questions & Answers (MCQs) focuses on “Theodolite Traversing” Methods.

1. In order to measure the magnetic bearing of a line, the theodolite should be provided with _____

- a) extra telescope
- b) spirit level
- c) compass
- d) tabular or trough compass

Answer: d

Explanation: In order to measure the magnetic bearing of a line, the theodolite should be provided with either a tabular compass or trough compass.

2. Direct angles are angles measured clockwise from the preceding line to the following line.

- a) True
- b) False

Answer: a

Explanation: Direct angles are angles measured clockwise from the preceding line to the following line. They are also known as angles to the right or azimuths from the back line.

3. In measuring direct angles, azimuths from the back line may vary from 0° to 180° .

- a) True
- b) False

Answer: b

Explanation: Direct angles are angles measured clockwise from the preceding line to the following line. They are also known as angles to the right or azimuths from the back line. They may vary from 0° to 360° .

4. A deflection angle is an angle in which a survey line makes with the prolongation of the preceding line.

- a) True
- b) False

Answer: a

Explanation: A deflection angle is an angle in which a survey line makes with the prolongation of the preceding line. It is designated as right (R) or left (L) according to its measure to the clockwise or to anti clockwise from the prolongation of the previous line.

5. How methods are there for prolongation of a straight line?

- a) 1
- b) 2
- c) 3
- d) 4

Answer: c

Explanation: There are three methods of prolonging a straight line. Those are named as first method, second method and third method.

6. To run a straight line between two points, when both ends are inter visible. We establish intermediate points through _____

- a) line of sight
- b) balancing
- c) using random line
- d) back sight

Answer: a

Explanation: Set instrument at A and take sight on B. Establish intermediate points C, D, E etc. In the line of sight. It possible only in case both ends are inter visible.

7. To locate the point of intersection of two straight lines, we stretch a thread or string between two stakes, where line of sight cuts the string is over required point of intersection.

- a) True
- b) False

Answer: a

Explanation: Let it be required to locate the point of intersection P of the two lines AB and CD. Set the instrument at A, sight B and set two stakes a and b a short distance apart on either side of the estimated position of point P. Set the instrument at C and sight D. Stretch a thread or string between ab and locate P, where the line of sight cuts the string.

8. Theodolite can be used to lay off a horizontal angle.

- a) True
- b) False

Answer: a

Explanation: Theodolite can be used to lay off a horizontal angle. It also used to locate the point of intersection, to run a straight line between two points, to prolong straight line etc.

9. The method of repetition is used when it is required to lay off an angle with greater precision than that possible by single observations.

- a) True
- b) False

Answer: a

Explanation: The method of repetition is used when it is required to lay off an angle with greater precision than that possible by single observations.

10. To measure a vertical angle, the instrument should be levelled with reference to the line of sight.

- a) True
- b) False

Answer: b

Explanation: To measure a vertical angle, the instrument should be levelled with reference to the altitude bubble. When the altitude bubble is on the index frame procedure starts.

This set of Surveying Multiple Choice Questions & Answers (MCQs) focuses on “Theodolite Traversing” Errors.

1. Which of the following errors can be eliminated by a method of repetition?

- i) errors due to eccentricity.
 - ii) errors due to in adjustments of line of collimation.
 - iii) error due to inaccurate graduations.
 - iv) error due to inaccurate bisection of the object.
- a) i only
 - b) i and ii
 - c) i, ii and 3
 - d) i, ii, iii and iv

Answer: d

Explanation: By a method of repetition the following errors can be eliminated. They are errors due to eccentricity, errors due to in adjustments of line of collimation, error due to inaccurate graduations, error due to inaccurate bisection of the object etc.

2. Sources of errors in transit work are broadly classified into _____ types.

- a) 2
- b) 3
- c) 4
- d) 5

Answer: b

Explanation: Sources of error in theodolite work are 3 types. They are instrumental, personal and natural.

3. Error due to imperfect adjustment of plate levels comes under _____ error.

- a) personal
- b) natural
- c) instrumental
- d) personal and natural

Answer: c

Explanation: Instrumental errors are due to the imperfect adjustment of an instrument, structural defects in the instrument and imperfections due to wear.

4. Error due to structural defects in the instrument comes under _____ error.

- a) personal
- b) natural
- c) instrumental
- d) personal and natural

Answer: c

Explanation: Instrumental errors are due to imperfect adjustment of an instrument, structural defects in the instrument and imperfections due to wear.

5. Error due to imperfections due to wear comes under _____ error.

- a) personal
- b) natural
- c) instrumental
- d) personal and natural

Answer: c

Explanation: Instrumental errors are due to imperfect adjustment of an instrument, structural defects in the instrument and imperfections due to wear.

6. Error due to the line of collimation not being perpendicular to the horizontal axis comes under _____ error.

- a) personal
- b) natural
- c) instrumental
- d) personal and natural

Answer: c

Explanation: Instrumental errors are due to imperfect adjustment of an instrument, structural defects in the instrument and imperfections due to wear. Error due to the line of collimation not being perpendicular to the horizontal axis also comes under instrumental error.

7. Error due to in accurate centering comes under _____ error.

- a) personal
- b) natural
- c) instrumental
- d) personal and natural

Answer: a

Explanation: The personal errors may be due to errors in manipulation, errors in sighting and reading. Inaccurate centering comes under errors in manipulation.

8. Inaccurate levelling comes under _____ error.

- a) personal
- b) natural
- c) instrumental
- d) personal and natural

Answer: a

Explanation: The personal errors may be due to errors in manipulation, errors in sighting and reading. Inaccurate levelling comes under errors in manipulation.

9. Slip comes under _____ error.

- a) personal
- b) natural
- c) instrumental
- d) personal and natural

Answer: a

Explanation: The personal errors may be due to errors in manipulation, errors in sighting and reading. Slip comes under errors in manipulation.

10. Manipulating wrong tangent screw comes under _____ error.

- a) personal
- b) natural

- c) instrumental
- d) personal and natural

Answer: a

Explanation: The personal errors may be due to errors in manipulation, errors in sighting and reading. Manipulating wrong tangent screw comes under errors in manipulation.

11. Parallax comes under _____ error.

- a) personal
- b) natural
- c) instrumental
- d) personal and natural

Answer: a

Explanation: The personal errors may be due to errors in manipulation, errors in sighting and reading. Parallax comes under errors due to sighting and reading.

12. Inaccurate bisection of points observed comes under _____ error.

- a) personal
- b) natural
- c) instrumental
- d) personal and natural

Answer: a

Explanation: The personal errors may be due to errors in manipulation, errors in sighting and reading. Inaccurate bisection of points observed comes under errors due to sighting and reading.

13. Unequal atmospheric refraction due to high temperature comes under which sources of errors?

- a) Personal
- b) Natural
- c) Instrumental
- d) Personal and natural

Answer: b

Explanation: Unequal atmospheric refraction due to high temperature comes under natural errors. Unequal settlement of tripod, wind vibrations etc., also comes under the same category.

14. Unequal settlement of tripod comes under _____ source of error.

- a) personal
- b) natural
- c) instrumental
- d) personal and natural

Answer: b

Explanation: Unequal atmospheric refraction due to high temperature comes under natural errors. Unequal settlement of tripod, wind vibrations etc., also comes under the same category.

15. Unequal expansion of parts of telescope comes under _____ source of error.

- a) personal
- b) natural
- c) instrumental
- d) personal and natural

Answer: b

Explanation: Unequal atmospheric refraction due to high temperature comes under natural errors. Unequal expansion of parts of telescope also comes under a natural source of error.

This set of Surveying Assessment Questions and Answers focuses on “Theodolite Traversing” Reduction of Readings.

1. In which of the following transverse method angles are measured by theodolite?

- a) By fast needle
- b) By direct observation of angles
- c) By locating details with transit and tape
- d) By free needle

Answer: b

Explanation: In transversing by direct observation of angles, angles between the lines are directly measured by a theodolite. The method is therefore accurate in comparison to the previous three methods.

2. In transversing by direct observation of angles, magnetic bearing of any one line can also be measured if required.

- a) True
- b) False

Answer: a

Explanation: The magnetic bearings of any one line can be measured and magnetic bearing of other lines can be calculated. The angles measured at different stations may be either included angle and deflection angle.

3. Which of the following comes under transversing by included angles?

- a) Transversing by fast needle
- b) Transversing by free needle
- c) Transversing by direct observation of angles
- d) Transversing by chain and compass

Answer: c

Explanation: Transversing by included angles and transversing by deflection angles comes under transversing by direct observation of angles.

4. _____ at a station is either of the two angles by the two survey lines meeting there.

- a) Included angle
- b) Deflection angle
- c) Transverse angle
- d) Deviated angle

Answer: a

Explanation: An included angle at a station is either of the two angles formed by the two survey lines meeting there. The method consists simply in measuring each angle directly from a backsight on the preceding station.

5. Included angles can be measured _____

- a) Clockwise
- b) Counter clockwise
- c) Clockwise and counterclockwise
- d) Clockwise or counterclockwise

Answer: d

Explanation: Included angles can be measured either clockwise or counterclockwise. But it is better to measure all angles clockwise.

6. All angles are preferred to measure clockwise because of the graduations of theodolite circle increase in this direction.

- a) True
- b) False

Answer: a

Explanation: It is better to measure included angles clockwise. It is because of graduations of theodolite circle increase in this direction.

7. A deflection angle is an angle in which a survey line makes with prolongation of back sight.

- a) True
- b) False

Answer: b

Explanation: A deflection angle is an angle in which a survey line makes with the prolongation of the preceding line.

8. Transversing by deflection angles is more suitable for surveys of roads railways, pipe lines etc.

- a) True
- b) False

Answer: a

Explanation: Transversing by deflection angles is more suitable for surveys of roads railways, pipe lines etc, where the survey lines make small deflection angles.

9. Deflection angle may vary from _____ to _____
- 0° to 90°
 - 90° to 180°
 - 0° to 180°
 - 0° to 270°

Answer: a

Explanation: A deflection angle is an angle in which a survey line makes with the prolongation of the preceding line. It may vary from 0° to 180° .

10. In following figure deflection angle at Q is α L.

- True
- False

Answer: b

Explanation: The deflection angle at Q is α R and that at R is α L.

This set of Surveying Multiple Choice Questions & Answers (MCQs) focuses on "Theodolite Traversing" and "Stadia Tacheometry".

1. The value of multiplying constant is generally taken as _____
- 60
 - 80
 - 90
 - 100

Answer: d

Explanation: In the expression $k = \frac{1}{\tan^2 \alpha} \cot^2 \alpha$, the value of α is taken as $34^\circ 22'$. On substituting the value of α in the equation, the value of k can be approximately equal to 100.

2. Stadia method can also be known as _____
- Fixed hair method
 - Movable hair method
 - Subtense method
 - Tangential method

Answer: a

Explanation: Since the stadia wires are fixed, this method is known as Fixed hair method. The stadia hair can be moved in case of Movable hair method which is also known as subtense method. In tangential method horizontal and vertical distances can be measured by the instrument which consists only of a vane.

3. Which among the following represents stadia interval factor?
- $f + d$
 - $f \sin \alpha$
 - f/i
 - i/f

Answer: c

Explanation: The horizontal distance between the axis and the staff can be given as

$$D = (f/i) \cdot s + (f+d)$$

$$D = K \cdot s + C$$

Where K is the stadia interval factor (or) the multiplying constant and C is the additive constant.

4. What is the formula for finding vertical distance if the staff is held vertical and line of sight is inclined?

- $V = Ks \left(\frac{\sin 2\alpha}{2} \right) + C \sin \alpha$,
- $V = Ks \cos^2 \alpha + C \cos \alpha$,
- $V = Cs \left(\frac{\sin 2\alpha}{2} \right) + K \cos \alpha$,
- $V = Ks \sin^2 \alpha + C \cos \alpha$,

Answer: a

Explanation: If the line of sight is inclined, the vertical distance calculated will include the values of sin which is derived from the horizontal distance formula i.e., $V = Ks \left(\frac{\sin 2\alpha}{2} \right) + C \sin \alpha$.

5. The value of additive constant lies in the range of _____
- 0.2 to 0.3m
 - 0.3 to 0.45m
 - 0.5 to 0.6m

d) 0.6 to 0.7m

Answer: b

Explanation: Since the lens is provided in the internal focussing telescope, it reduces the value of the additive constant to a minimal range.

6. Usage of anallactic lens makes the entire process more simple and reliable.

a) True

b) False

Answer: a

Explanation: Due to the absorption of more amount of incident light, the anallactic lens makes the entire process simple and reliable. But the lens is adjustable, which may be a cause for potential errors.

7. A tacheometer is setup at A and the readings on the staff at B are 1.77m, 2.12m, 2.34m and the inclination of line of sight is $+1^{\circ} 9'$. Calculate the vertical distance between A and B. Take $k = 100$, $c = 0.3$?

a) 1.51 m

b) 2.51 m

c) 2.15 m

d) 1.15 m

Answer: d

Explanation: We know that the vertical distance can be computed by using

$$V = k s \left(\frac{\sin 2\hat{l}}{2} \right) + c \sin \hat{l}$$

$$S = 2.34 - 1.77 = 0.57 \text{ m}$$

On substitution,

$$V = (100 * 0.57 * \sin(2 * 10^9 \text{ rad/s})) / 2 + (0.3 * \sin(10^9 \text{ rad/s}))$$

$$V = 1.15 \text{ m.}$$

8. What is the value of additive constant in anallactic lens?

a) 100

b) 0.3

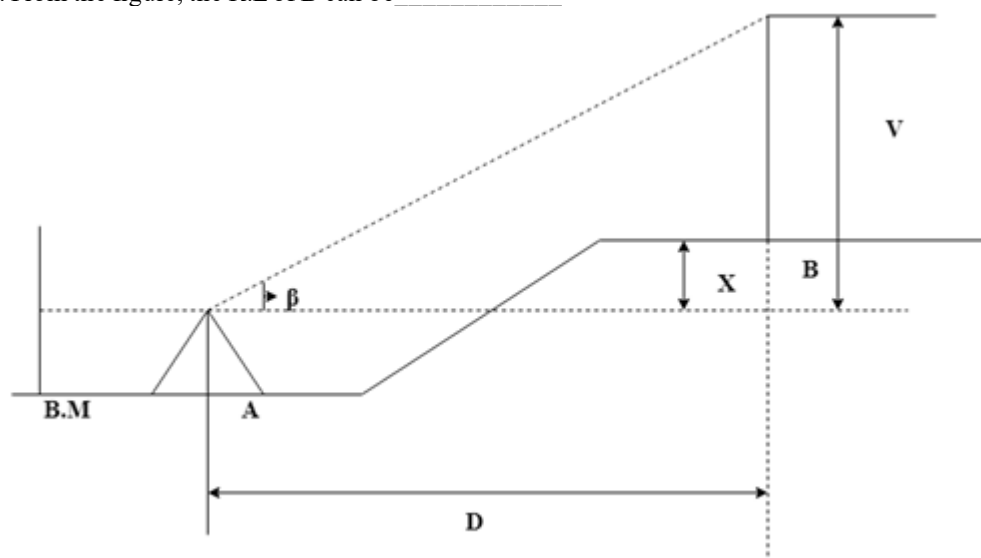
c) 0

d) 0.4

Answer: c

Explanation: If the anallactic lens has been provided in the internal focussing telescope, the additive constant can be reduced to minimal value i.e., zero due to which the computations can be make quicker.

9. From the figure, the R.L of B can be



- a) R.L of B = R.L of B.M + H.I + X + V
- b) R.L = R.L of B.M + H.I + V + X
- c) R.L = R.L of B.M + V + X
- d) R.L = R.L of B.M + V + X

Answer: b

Explanation: The R.L of B can be obtained by calculating the value of vertical distance and by substituting in the formula $R.L = R.L \text{ of B.M} + H.I + X + V$.

10. Subtense method is one of the classifications of stadia system.

- a) True
- b) False

Answer: a

Explanation: Stadia system is classified into movable hair method and fixed hair method in which, the movable hair method can also be known as sub tense method.

11. Calculate the value of K and C, if the measurements are taken between two points of 50 and 130 distant apart and the stadia readings will be 0.024, 0.824 respectively.

- a) 0, 47.6
- b) 47.6, 100
- c) 100, 47.6
- d) 47.6, 0

Answer: c

Explanation: We know that, $D = Ks + C$, on substituting the values of D, s, C we get two equations. $50 = k(0.024) + C$; $130 = k(0.824) + C$. On subtracting, we get

$80 = k(0.8)$. We get, $K = 100$. Now, substitute this value in any of the equations to get the value of C. It can be given as $50 = 100 \times 0.024 + C$, $C = 47.6$.

12. The following are the staff readings given when the staff is held normal. The line of sight of instrument is placed at an angle of $3^\circ 24'$. It being an anallactic lens, find the horizontal distance between staff and instrument station. Staff readings are 2.145 m, 1.925 m, 1.464 m.

- a) 62.082 m
- b) 58.082 m
- c) 60.082 m
- d) 68.082 m

Answer: d

Explanation: When the staff is placed normal, the value of horizontal distance can be given as $D = (Ks + C) \cos \hat{I} + r \sin \hat{I}$, on substituting the values of $s = 2.145 - 1.464 = 0.681$, $r = 1.925$, \hat{I} , $C = 0$, we get,

$$D = 100 \times 0.681 \times \cos 3^\circ 24' + 0 + 1.925 \times \sin 3^\circ 24'$$

D = 68.082 m.

13. Calculate the value of R.L for staff being vertical and possessing staff readings as follows 2.892, 2.234, 1.926. It being an anallactic lens possesses an instrumental height of 1.94 with R.L 102.34 m. Line of sight placed at an angle of $2^{\circ} 42'$.

- a) 106.591 m
- b) 105.591 m
- c) 109.951 m
- d) 100.981 m

Answer: a

Explanation: The R.L of the staff can be given as $R.L = R.L \text{ of instrument station} + H.I + v \sin^2 \theta$. The value of v can be calculated as $v = k \cdot s / 2 \cdot \sin 2\theta + c \sin^2 \theta$. On substitution we get,

$$V = 100 \cdot (2.892 - 1.926) / 2 \cdot \sin (2 \cdot 2^{\circ} 42') + 0$$

$$V = 4.545 \text{ m. R.L of staff is given as } R.L = 102.34 + 1.94 + 4.545 \sin^2 2.234 = 106.591 \text{ m.}$$

This set of Surveying Multiple Choice Questions & Answers (MCQs) focuses on "Theodolite Traversing" Closing Error and its Limitation.

1. In order to mitigate the closing error, sum of latitudes and departures must be equal to zero.

- a) True
- b) False

Answer: a

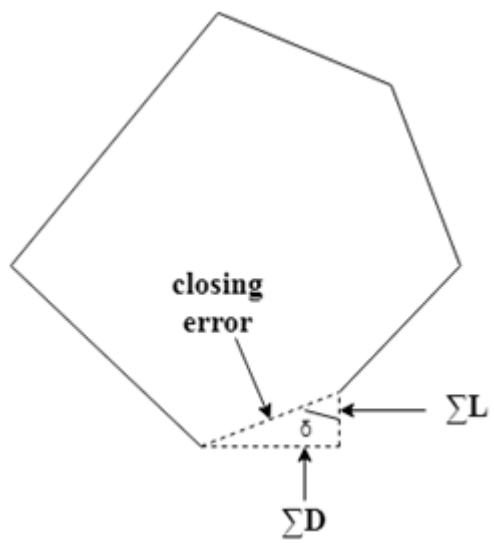
Explanation: The algebraic sum latitudes and algebraic sum of departures must be equal to zero for avoiding the closing error, which will occur when the end point don't coincide with the starting point.

2. Which among the following determines the direction of closing error?

- a) $\tan \hat{I}' = \hat{L} / \hat{D}$
- b) $\tan \hat{I}' = \hat{L}^2 / \hat{D}^2$
- c) $\tan \hat{I}' = \hat{D} / \hat{L}$
- d) $\tan \hat{I}' = \hat{D}^2 / \hat{L}^2$

Answer: c

Explanation: From the figure, $\tan \hat{I}' = \hat{D} / \hat{L}$, which will give the direction of the closing error.



3. The sum of interior angles must be equal to _____

- a) $(2N+4)$ right angles
- b) $(2N-4)$ right angles
- c) $(2N+4) * 180$
- d) $(2N-4) * 180$

Answer: b

Explanation: The theoretical sum of the interior angles of a traverse should equal to $(2N-4)$ right angles, and that of the exterior angles should equal to $(2N+4)$ right angles, where N is the number of sides of a closed traverse.

4. For adjusting the angular error, the error may be distributed equally among all the angles.

- a) False
- b) True

Answer: b

Explanation: When all angles are measured and under similar conditions, angular error is distributed equally among

all the angles. However, if the accuracy of some angle is suspected due to peculiar field conditions, the whole angular error may be assigned to that angle.

5. Closing error can be given as _____

- a) $((\sum \hat{L})^2 + (\sum \hat{D})^2)^{1/4}$
- b) $(\sum \hat{L}^2 - \sum \hat{D}^2)^{1/2}$
- c) $(\sum \hat{L}^2 * \sum \hat{D}^2)^{1/2}$
- d) $((\sum \hat{L})^2 + (\sum \hat{D})^2)^{1/2}$

Answer: d

Explanation: If a closed traverse is plotted according to the field measurements, the end point of the traverse will not coincide exactly with the starting point, due to the errors in the field observations, such as error is known as closing error. This is given as,

Closing error, $e = ((\sum \hat{L})^2 + (\sum \hat{D})^2)^{1/2}$

Where, $\sum \hat{L}$ = sum of latitudes, $\sum \hat{D}$ = sum of departures.

6. Which of the following corresponds to the correction applied to the bearing of the last side?

- a) Correction = $\sum e/N$
- b) Correction = $2\sum e/N$
- c) Correction = $3\sum e/N$
- d) Correction = e/N

Answer: a

Explanation: If e is the closing error in bearing, and N is the number of the sides of the traverse, then the correction applied to the bearing of the sides will be

Correction to the first bearing = e/N

Correction to the first bearing = $2e/N$

And so on to the last bearing = $\sum e/N = e$.

7. If traversing is done by taking bearings of the lines, the closing error in bearing may be determined by

- a) Comparing the back and fore bearings of the last line of the open traverse
- b) Comparing the back and fore bearings of the middle line of the closed traverse
- c) Comparing the back and fore bearings of the last line of the closed traverse
- d) Comparing the back and fore bearings of the first line of the closed traverse

Answer: c

Explanation: By comparing the back and fore bearings of the last line of the closed traverse, the error in bearing may be determined by finding the difference between its observed bearing and known bearing.

8. Which of the following is a method of adjusting a closed traverse?

- a) Departure method
- b) Axis method
- c) Tangential method
- d) Latitude method

Answer: b

Explanation: The methods which are used to adjust the traverse are Bowditch's rule, Transit rule, Axis method and Graphical method. These are employed based on the precision of the values obtained during surveying.

9. Relative error of closure is given as _____

- a) Perimeter of closure/error of traverse
- b) Error of perimeter/perimeter of traverse
- c) Perimeter of traverse/error of traverse
- d) Error of closure/perimeter of traverse

Answer: d

Explanation: The relative error of closure is used only in case of determination of the sign of latitudes and departures i.e., in which quadrant latitudes and departures lie.

10. Closing error can be briefly explained in which of the following set of methods?

- a) Bowditch's rule, Transit methods
- b) Transit, Axis methods
- c) Graphical, Axis methods
- d) Bowditch's rule, Graphical methods

Answer: c

Explanation: Since more amount of diagrammatic explanation is involved in Graphical and Axis methods, those are able to explain in a brief manner.

11. From the following observations, calculate closing error.

Line	Length (m)	Latitude	Departure
AB	92.96	+92.57	-217.92
BC	157.63	-317.39	+24.62
CA	131.24	+226.19	+192.36

- a) 1.66
- b) 1.55
- c) 1.44
- d) 1.99

Answer: a

Explanation: The value of closing error can be given by $e = \sqrt{(\sum L)^2 + (\sum D)^2}^{1/2}$

Where, $\sum L = 92.57 - 317.39 + 226.19 = 1.37$

$\sum D = -217.92 + 24.62 + 192.36 = 0.94$

On substituting, we get $e = \sqrt{(\sum L)^2 + (\sum D)^2}^{1/2}$

$$e = (1.37^2 + 0.94^2)^{1/2}$$

$$e = 1.661.$$

12. Calculate the direction of closing error for the following data.

Line	Length (m)	Latitude	Departure
AB	24.29	-102.31	-119.22
BC	130.32	+360.24	-204.92
CA	249.11	-257.43	+323.26

- a) $50^\circ 23' \text{E}$
- b) $60^\circ 29' \text{E}$
- c) $60^\circ 23' \text{E}$
- d) $62^\circ 23' \text{E}$

Answer: c

Explanation: The value of direction for closing error can be given as $\tan \hat{I}' = \sum D / \sum L$, where $\sum L = -102.31 + 360.24 - 257.43 = 0.5$; $\sum D = -119.22 - 204.92 + 323.26 = -0.88$. On substitution we get, $\tan \hat{I}' = 0.88 / 0.5 = 60^\circ 23' \text{E}$.

13. For a traverse containing 10 sides, what would be the correction applied for the first side, if it consists a closing error of +1.92?

- a) 19.0
- b) 19.2
- c) 1.902
- d) 0.192

Answer: d

Explanation: The correction for sides in a traverse is given as $\text{correction} = e / N$, where N is the number of sides and e is the closing error. On substitution, we get, $\text{correction} = 1.92 / 10 = 0.192$.

14. What would be the correction for any side of a traverse in axis method if it has a closing error $e = 0.93$, length of side and axis would be 243.13 and 100 respectively?

- a) 2.131
- b) 1.131
- c) 1.113
- d) 1.311

Answer: b

Explanation: In Axis method of balancing a traverse, $\text{correction} = \text{length of side} * (e/2) / \text{length of axis}$. On substitution we get,

$$\text{Correction} = 243.13 * (0.93/2) / 100 = 1.131.$$

15. Which of the following indicates the correct value of precise closing error if $e = 0.54$ and lengths of sides are 92.69 m, 119.23 m, 92.64 m, 42.96 m and 60.96 m.

- a) $1 / 766.445$
- b) $1 / 746.445$
- c) $1 / 756.445$
- d) $1 / 765.445$

Answer: c

Explanation: The precise error of closure can be given as, error of closure = e / p

Where e = closing error = 0.54 and p = perimeter of traverse = $92.69 + 119.23 + 92.64 + 42.96 + 60.96 = 408.48$ m.

Precise error is given as $0.54 / 408.48 = 1 / 756.445$.

This set of Surveying Multiple Choice Questions & Answers (MCQs) focuses on “Theodolite Traversing” Computation of Latitude and Departure.

1. Departure refers to _____

- a) Co-ordinate length measured at right angles
- b) Co-ordinate length measured at right angles to the meridian direction
- c) Co-ordinate length measured parallel to the assumed meridian direction
- d) Co-ordinate length measured parallel to the datum

Answer: b

Explanation: Departure is the Co-ordinate length measured at right angles to the meridian direction and latitude refers to the Co-ordinate length measured parallel to assumed meridian direction.

2. When measured towards southward, latitude is negative.

- a) True
- b) False

Answer: a

Explanation: Depending on the quadrant in which it lies, the latitude and departure were given signs. For latitude, it is taken as positive in north and negative towards south direction. Similarly, departure is positive when taken in east direction and negative when taken in west direction.

3. Departure can be given as _____

- a) $D = l \cos \hat{I}$,
- b) $D = l \tan \hat{I}$,
- c) $D = l \operatorname{cosec} \hat{I}$,
- d) $D = l \sin \hat{I}$,

Answer: d

Explanation: The formula for departure can be given as $D = l \sin \hat{I}$, and for latitude it is given as $L = l \cos \hat{I}$. Where, l refers to length of line.

4. Consecutive co-ordinates are also known as _____

- a) Total co-ordinates
- b) Independent co-ordinates
- c) Dependent co-ordinates
- d) Departure co-ordinates

Answer: c

Explanation: Latitude and departure co-ordinates of any point with reference to the preceding point are equal to the latitude and departure of the line joining the preceding point to the point under consideration. Such co-ordinates are known as consecutive co-ordinates or dependent co-ordinates.

5. Latitude and Departure equations will never return positive values.

- a) False
- b) True

Answer: a

Explanation: Because a bearing angle never exceeds 90° , the Latitude and Departure equations will return positive values.

$\sin (0^\circ)$ to $\sin (90^\circ)$ ranges from 0 to 1

$\cos (0^\circ)$ to $\cos (90^\circ)$ ranges from 1 to 0

The correct mathematical sign for the Latitude and Departure come from the bearing quadrant.

6. For calculating latitude and departure they must be converted into _____

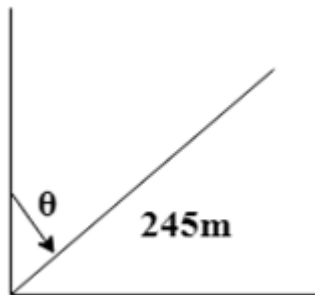
- a) Whole Circle Bearing system

- b) Reduced Bearing system
- c) True bearing system
- d) Assumed bearing system

Answer: b

Explanation: For calculating the latitudes and departure of the traverse lines, it is essential to reduce the bearing in the Quadrantal or reduced bearing system.

7. The latitude for the figure can be given as _____ ($\hat{I}_1 = 50^\circ 34' \text{E}$)



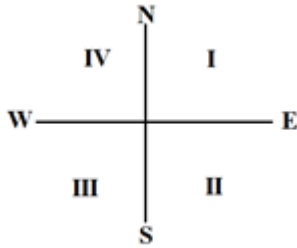
- a) 160.43m
- b) 151.34m
- c) 161.34m
- d) 165m

Answer: c

Explanation: We know that, latitude of side can be determined by the formula $L = l \cos \hat{I}$. So, on substitution we get,

$$L = l \cos \hat{I} = 245 * \cos (50^\circ 34') = 161.34\text{m}.$$

8. S-W lies in which of the following quadrant_____



- a) IV
- b) II
- c) I
- d) III

Answer: d

Explanation: From the figure it is clear that S-W lies in the Third quadrant when taken in clockwise direction.

9. By which of the following step, Independent co-ordinate can be obtained?

- a) $\hat{L} + \hat{D}$
- b) $\hat{L} \hat{D}$
- c) $\hat{L}^2 + \hat{D}^2$
- d) $\hat{L}^2 \hat{D}^2$

Answer: a

Explanation: The total latitude and departure of any point with respect to a common origin is known as

independent co-ordinate. The independent co-ordinates of any point may be obtained by adding algebraically the latitudes and the departure of the lines between the point and origin.

10. Total co-ordinate point is referred as _____

- a) Dependent co-ordinate point
- b) Independent co-ordinate point
- c) Consecutive co-ordinate point
- d) Departure co-ordinate point

Answer: b

Explanation: The total latitude and departure of any point with respect to a common origin is known as independent co-ordinates or total co-ordinate of the point.

11. If the value of $\hat{I}_1 = 72^\circ 49'$, find the value of departure for side having a length 300 m.

- a) 286.17
- b) 268.91
- c) 286.61
- d) 286.16

Answer: c

Explanation: We know that the value of departure can be given as $D = l \sin \hat{I}_1$. On substitution of the values of \hat{I}_1 and l we get,

$$D = 300 * \sin (72^\circ 49') = 286.61 \text{ m.}$$

12. The value of $\hat{I}_1 = 162^\circ 49'$ in Reduced Bearing system can be represented as _____

- a) $S17^\circ 06'$
- b) $S27^\circ 26'$
- c) $S7^\circ 26'$
- d) $S17^\circ 26'$

Answer: d

Explanation: Any angle in Whole Circle Bearing system can be transformed into reduced bearing system by using a relation, it can be given as

$$R.B = 180^\circ - W.C.B \text{ which means } R.B = 180^\circ - 162^\circ 49' = 17^\circ 26' = S17^\circ 26'$$

In R.B system, the direction of the angle is also mentioned along with the value.

13. What will be the value of total co-ordinate of B, if it is initially assumed as 100 and N latitude at A is given as 192.96?

- a) 292.96
- b) 92.96
- c) 229.69
- d) 29.69

Answer: a

Explanation: The value of total co-ordinate can be given adding the assumed value to the previously mentioned value i.e.

$$\text{Total co-ordinate} + \text{latitude at A} = 100 + 192.96 = 292.96$$

The total co-ordinate at B is given as 292.96.

This set of Surveying Multiple Choice Questions & Answers (MCQs) focuses on "Theodolite Traverse Area Calculation".

1. Which of the following doesn't involve the method of traversing?

- a) Chain surveying
- b) Theodolite surveying
- c) Plane Table surveying
- d) Tacheometric surveying

Answer: d

Explanation: Depending on the instruments used in determining the relative directions of the traverse lines. The principal methods adopted are Chain traversing, Compass traversing, Transit tape traversing, Plane-table traversing. Tacheometric surveying involves a lot of instrumental work rather than ground work.

2. Which among the following is a procedure for computation of traverse area?

- a) Calculation and adjustment of latitudes and departures

- b) Adjustment of instrument
- c) Calculation of consecutive co-ordinates
- d) Determination of R.L

Answer: a

Explanation: The procedure for traverse calculations involves Adjusting angles or directions, determining bearings or azimuths, calculation and adjustment of latitudes and departures, calculation of rectangular coordinates.

3. Adjustments applied to angles are independent of the size of the angle.

- a) False
- b) True

Answer: b

Explanation: The adjustments applied to angles are independent of the size of the angle because they depend on the direction in which they are present.

4. Which of the following is the first step for determining the azimuth or bearing?

- a) Determination of angles or bearings
- b) To determine the true direction
- c) The direction of at least one line within the traverse must be known or assumed
- d) Determining the latitudes and departures

Answer: c

Explanation: The direction of at least one line within the traverse must be known or assumed because it would be easy for calculating the bearings by taking reference from that assumed direction.

5. For calculating the traverse area, which of the following is crucial?

- a) $L = 0, D = 0$
- b) $\sum L^2 = 0, \sum D^2 = 0$
- c) $\sum L \approx 0, \sum D \approx 0$
- d) $\sum L = 0, \sum D = 0$

Answer: d

Explanation: In order to nullify the closing error, the algebraic sum of latitudes and the algebraic sum of departures must be equal to zero, which is necessary for obtaining the total traverse area.

6. For adjusting the traverse, which of the following methods can be used?

- a) Compass traversing
- b) Chain traversing
- c) Theodolite traversing
- d) Bowditch's method

Answer: d

Explanation: Adjusting is generally applied to the operation of applying corrections to latitudes and departures so that $\sum L = 0, \sum D = 0$. This applies only when the survey forms a closed polygon. The common methods of adjusting a traverse include Bowditch's method, Transit method, Graphical method and Axis method.

7. Angle and distance is one of the methods for plotting a traverse survey.

- a) True
- b) False

Answer: a

Explanation: The two principal methods of plotting a traverse survey are angle and distance method, Co-ordinate method. In this method, distances between stations are laid off to scale and angles are plotted by protractor, by tangent rule or by chords.

8. Which of the following is the accurate method for plotting traverse area?

- a) Transit method
- b) Angle and distance method
- c) Co-ordinate method
- d) Bowditch's method

Answer: c

Explanation: In Co-ordinate method, survey stations are plotted by calculating their co-ordinates. It is the most practical and accurate one for plotting traverses or any other extensive system of horizontal control. The advantage in this method of plotting is that the closing error can be eliminated by balancing.

9. Which of the following methods will give the accurate result while traversing?

- a) Loose needle method
- b) Fast needle method
- c) Chain traversing
- d) Compass traversing

Answer: b

Explanation: In fast needle method, the magnetic bearings of traverse lines are measured by a theodolite. The magnetic bearings of the lines are measured with reference so the direction of magnetic meridian is established at the first station. This method is, therefore, more accurate than the loose needle method. Fast needle method includes direct method with transiting, direct method without transiting, back bearing method.

10. Among the following, which indicates the formula for balancing angles of closed traverse?

- a) $\hat{\alpha} \text{ Interior angles} = (n+2) * 180^0$
- b) $\hat{\alpha} \text{ Interior angles} = (n-2) / 180^0$
- c) $\hat{\alpha} \text{ Exterior angles} = (n-2) * 180^0$
- d) $\hat{\alpha} \text{ Interior angles} = (n-2) * 180^0$

Answer: d

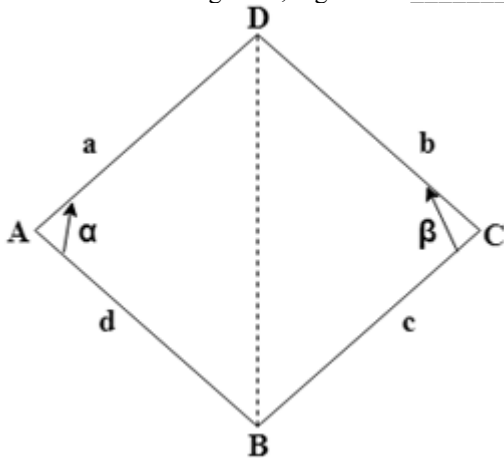
Explanation: The formula for balancing the angles of closed traverse

$$\hat{\alpha} \text{ Interior angles} = (n-2) * 180^0$$

Where, n = number of interior angles.

By using this, the error in the interior angles can be checked and can be minimised.

11. Calculate the area of traverse for the figure, if lengths of AB, BC, CD, and DA are 12.98 m, 98.23 m, 19.77 m, 34.67 m and the angles $\hat{1}$, $\hat{2}$ given as _____



- a) 1086.55sq. m
- b) 698.41sq. m
- c) 1068.91 sq. m
- d) 689.14 sq. m

Answer: a

Explanation: The figure can be divided into two triangles, which forms, ABD and BCD.

Area of triangle ABD = $(1/2) * (ad) * \sin \hat{A} = (1/2) * (12.98 * 34.67) * \sin () = 194.07$ sq. m

Area of triangle BCD = $(1/2) * (bc) * \sin \hat{B} = (1/2) * (98.23 * 19.77) * \sin () = 892.48$ sq. m

The total are can be given as $194.07 + 892.48 = 1086.55$ sq. m.

12. What will be the value of DMD for B if DMD for A is -22.87, departures for A & B will be -22.87, +89.24 respectively?

- a) 22.8
- b) 43.5
- c) -43.5
- d) -22.8

Answer: b

Explanation: DMD (Departure Median Distance) for the station B can be given as

DMD of A + Departure of A + Departure of B

= -22.87 + 22.87 + 89.24 = +43.5.

13. Calculate the value of double area if the value of latitude of A is 235.67 m and DMD is +89.26 m.

- a) 20135 sq. m
- b) 21305 sq. m
- c) 21035 sq. m

d) 20035 sq. m

Answer: c

Explanation: The value of double area can be calculated as the product of latitude and DMD. It can be given as Latitude * DMD = 235.67 * 89.26 = 21035 sq. m.

This set of Surveying Multiple Choice Questions & Answers (MCQs) focuses on “Theodolite Traversing & Trigonometrical Levelling”.

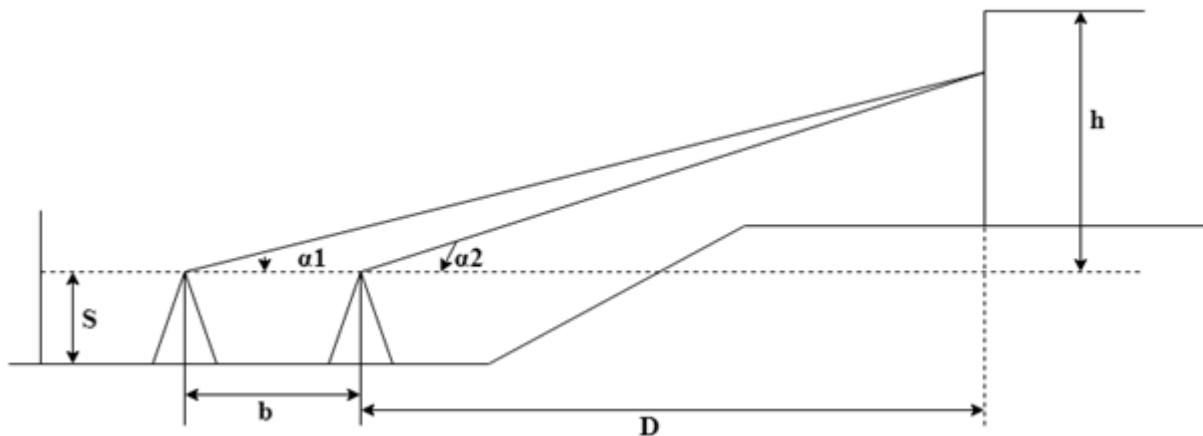
1. While taking Observations for the height and distances, which method of surveying is used?

- a) Chain surveying
- b) Compass surveying
- c) Plane surveying
- d) Geodetic surveying

Answer: c

Explanation: Geodetic surveying is used because it is assumed that the distances between the points observed are not large so that either the effect of curvature and refraction may be neglected or proper corrections may be applied linearly.

2. From the figure, the value of D can be given as _____



a) $D = (b \tan \hat{I}_1) / (\tan \hat{I}_1 - \tan \hat{I}_2)$

b) $D = (b \tan \hat{I}_2) / (\tan \hat{I}_2 - \tan \hat{I}_1)$

c) $D = (b \tan \hat{I}_1) / (\tan \hat{I}_2 - \tan \hat{I}_1)$

d) $D = (b \tan \hat{I}_2) / (\tan \hat{I}_1 - \tan \hat{I}_2)$

Answer: b

Explanation: From the figure, $h = D \tan \hat{I}_1$ and $h = (b + D) \tan \hat{I}_2$

By equating we get,

$$D \tan \hat{I}_1 = (b + D) \tan \hat{I}_2$$

$$D = (b \tan \hat{I}_2) / (\tan \hat{I}_2 - \tan \hat{I}_1).$$

3. The correction for curvature and refraction is applied when the points are having small distance between them.

- a) True
- b) False

Answer: b

Explanation: If the points are at small distance apart then there is no need to apply the correction for the curvature and refraction else you can apply the correction i.e.,

$$C = 0.06728D^2$$

Where, D is the horizontal distance between the given two points in Kilometres.

4. Which of the following indicates the value of D, when base of object is accessible?

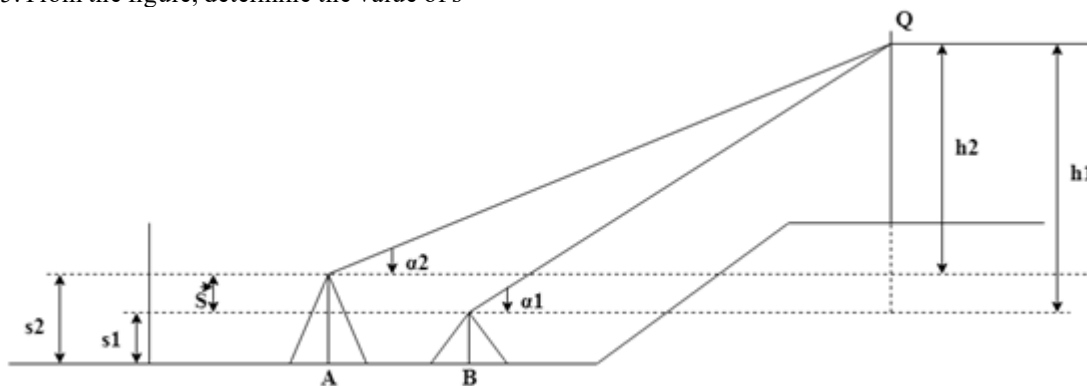
- a) $D = s / \tan \hat{I}$
- b) $D = \tan \hat{I} / s$
- c) $D = \tan \hat{I} / h$
- d) $D = h / \tan \hat{I}$

Answer: d

Explanation: When base of the object is accessible then,

$$h = D \tan \hat{I} \text{ and } D = h / \tan \hat{I}$$

5. From the figure, determine the value of s



- a) $s = D \tan \hat{I}_1 - b \tan \hat{I}_2 - D \tan \hat{I}_2$
- b) $s = D \tan \hat{I}_2 - b \tan \hat{I}_2 - D \tan \hat{I}_2$
- c) $s = D \tan \hat{I}_1 - b \tan \hat{I}_1 - D \tan \hat{I}_2$
- d) $s = D \tan \hat{I}_1 - b \tan \hat{I}_2 - D \tan \hat{I}_1$

Answer: a

Explanation: From the figure, $h_1 = D \tan \hat{I}_1$ and $h_2 = (b + D) \tan \hat{I}_2$

Subtracting, we get $h_1 - h_2 = D \tan \hat{I}_1 - b \tan \hat{I}_2 - D \tan \hat{I}_2$

$h_1 - h_2 = s$, so we get $s = D \tan \hat{I}_1 - b \tan \hat{I}_2 - D \tan \hat{I}_2$.

6. Which of the following is not a case in trigonometric levelling?

- a) Base of object is accessible
- b) Base of object is inaccessible
- c) Base of object is at accurate position

Answer: c

Case 1: Base of the object accessible.

Case 3: Base of the object inaccessible – Instrument stations not in the same vertical plane as the elevated object.

a) Indirect method

c) Recurring method

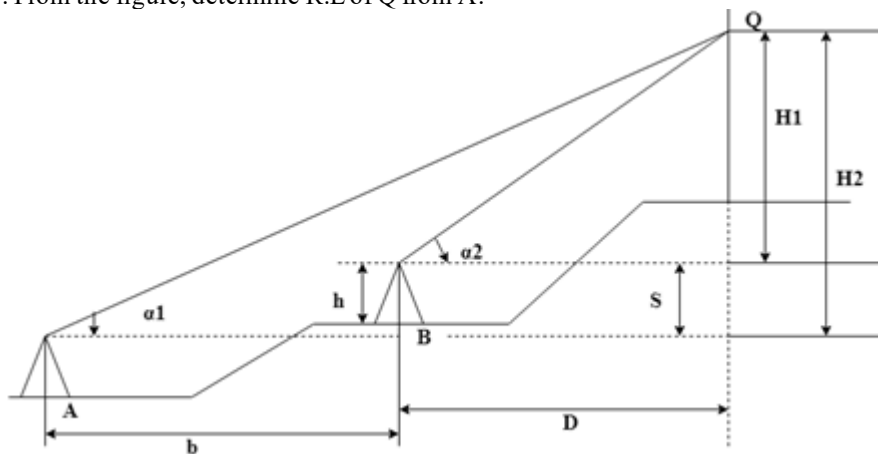
Answer: b

8. In which of the following cases, two instrument stations are used?

b) Base of the object is at accurate position

d) Base of the object is inaccessible

9. From the figure, determine R.L of Q from A?



- a) $R.L = R.L \text{ of } A + h + H_2$
- b) $R.L = R.L \text{ of } A + s + H_1$
- c) $R.L = R.L \text{ of } A + s + H_2$
- d) $R.L = R.L \text{ of } B + H_1 + h$

Answer: b

Explanation: The R.L of Q can be calculate by calculating the values of H_1 and H_2 from which it is given as $R.L = R.L \text{ of } A + s + H_1$

Where, $s = H_2 - H_1$.

10. In Geodetic surveying, correction for curvature and refraction are neglected.

- a) True
- b) False

Answer: b

Explanation: In geodetic surveying, the shape of earth is considered which implies that the correction of curvature and refraction are applied for mitigating errors.

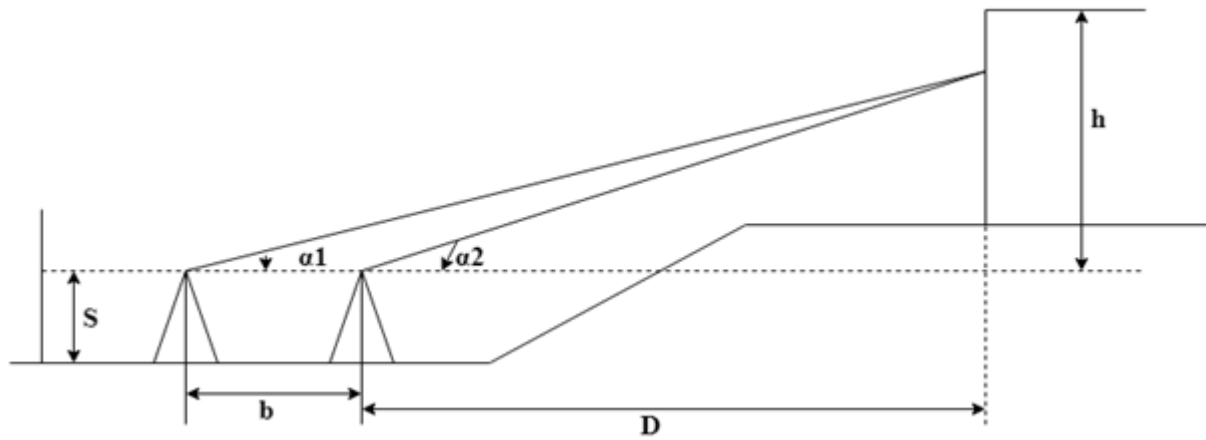
11. Calculate the R.L of B, if $D = 24.96$ m, angle for line of sight is $+4^\circ 24'$, height of the axis will be 1.29 m and the R.L of A is 400 m.

- a) 403.21 m
- b) 430.21 m
- c) 403.12 m
- d) 401.32 m

Answer: a

Explanation: The value of R.L can be given as, $R.L \text{ of } B = R.L \text{ of } A + H.I + h$. The value of h can be calculated from $h = D \cdot \tan \theta = 24.96 \cdot \tan (4^\circ 24') = 1.921$ m.
Now, $R.L = 400 + 1.29 + 1.921 = 403.21$ m.

12. From the figure, find the horizontal distance between the station and staff and consider distance between stations will be 2 m.

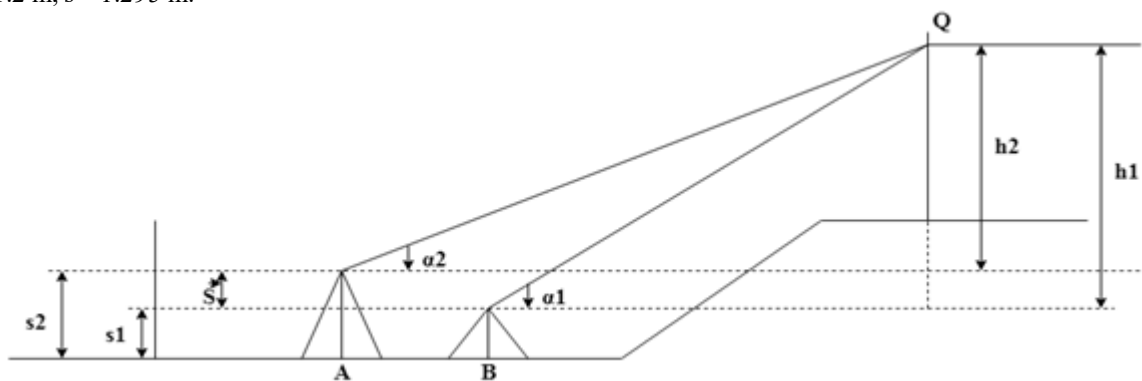


- a) 1.6 m
- b) 1.4 m
- c) 1.2 m
- d) 1.8 m

Answer: d

Explanation: While using two instrument stations, when the base is horizontal the value of horizontal distance D is given as, $D = (b * \tan \hat{\alpha}_2) / (\tan \hat{\alpha}_1 - \tan \hat{\alpha}_2)$. On substitution, we get, $D = (2 * \tan (2^\circ 52')) / (\tan (6^\circ 2') - \tan (2^\circ 52')) = 1.8$ m.

13. By using the data provided from the figure, find the value of h_1 . Where $\hat{\alpha}_1 = 9^\circ 24'$, $\hat{\alpha}_2 = 4^\circ 44'$, $b = 1.2$ m, $s = 1.295$ m.



- a) 2.66 m
- b) 2.86 m
- c) 2.79 m
- d) 2.97 m

Answer: c

Explanation: When the instrument stations are at different instrument levels, there would be two heights, off which, h_1 can be calculated by

$h_1 = (s + b \cdot \tan^2 \theta_2) \cdot \tan \theta_1 / (\tan \theta_1 - \tan \theta_2)$. By substituting the required values we get, $h_1 = (1.295 + 1.2 \cdot \tan^2 44^\circ) / (\tan 9^\circ - \tan 44^\circ) = 2.79$ m.

14. If the value of $D = 2000$ m, what would be correction for curvature?

- a) 0.629 sq. m
- b) 0.269 sq. m
- c) 0.962 sq. m
- d) 0.692 sq. m

Answer: b

Explanation: The correction for curvature can be applied as, $C_r = 0.06728 \cdot D^2$. On substituting, we get, $C_r = 0.06728 \cdot 2000^2 = 0.269$ sq. m.

This set of Surveying Multiple Choice Questions & Answers (MCQs) focuses on "Plane Table Surveying Accessories".

1. Which of the following does not belong to the instruments of plane table?

- a) Spirit level
- b) Plumb bob
- c) Compass
- d) Theodolite

Answer: d

Explanation: Spirit level is used for levelling the table at the station point. Plumb bob is used to transfer the point in sheet to the ground. Compass is used to indicate the magnetic north. Theodolite is not used in this case as the entire process is done manually without any instrumental usage.

2. In plane table surveying, plotting and recording of values are done simultaneously.

- a) True
- b) False

Answer: a

Explanation: Plane table surveying is a graphical method, in which the field observations and plotting process is done simultaneously. It involves making a map in the field while the ground can be seen by the topographer and without intermediate steps of recording in field notes.

3. What are the dimensions of Johnson table?

- a) 60*45 cm
- b) 45*60 cm
- c) 40*60 cm
- d) 45*65 cm

Answer: b

Explanation: The Johnson board usually consists of 45*60 cm dimension, which is used while doing important field works which needs precise values.

4. For obtaining high precision values, which among the following is used?

- a) Wooden table
- b) Johnson table
- c) Coast survey table
- d) Traverse table

Answer: c

Explanation: Coast survey table can be able to obtain more precise values than the remaining plane tables. Due to more accuracy in levelling, the ability of producing precise values increases.

5. Alidade is used for _____

- a) Sighting
- b) Levelling
- c) Transferring point to ground
- d) Drawing lines

Answer: a

Explanation: The presence of eye vane of object vane allows the alidade to bisect the required points which are near by the station.

6. Orientation of table involves which among the following?

- a) Traversing
- b) Fore sighting
- c) Back sighting
- d) Measuring bearings

Answer: c

Explanation: Orientation by back sighting is a process that involves setting up of the plane table when there is no possibility over the station mark.

7. Orientation by trough compass is done for obtaining precise values.

- a) True
- b) False

Answer: b

Explanation: Orientation by trough compass is low accurate method which is done when speed of the work is more important than obtaining accurate values. Orientation by means of back sighting involves in obtaining more precise values.

8. Which of the following indicates the correct set of alidade?

- a) Plain, reverse
- b) Complex, telescopic
- c) Plain, theodolite
- d) Plain, telescopic

Answer: d

Explanation: In general, two types of alidades are used. They include plain, telescopic alidades. Now-a-days telescopic alidade is fitted on the plane table which is making the work from complex to simple.

9. By plotting and recording values simultaneously, there is a possibility to occur more errors.

- a) True
- b) False

Answer: a

Explanation: It might be possible to note the wrong value while processing simultaneously, but it is one of the most accurate methods which gives the best output.

10. In which of the following cases, orientation by back sighting is used?

- a) When approximate levelling is required
- b) When second point is available for orientation
- c) When it is not possible to set instrument over station mark
- d) When speed is important than accuracy

Answer: c

Explanation: Orientation by back sighting is used when it is not possible to set instruments over station mark and also for obtaining more precise and accurate values.

This set of Surveying Multiple Choice Questions & Answers (MCQs) focuses on “Methods of Plane Tabling”.

1. Which of the following methods can be useful in having an enlarged output?

- a) Intersection
- b) Resection
- c) Traversing
- d) Radiation

Answer: d

Explanation: An enlarged output is required in case of improving accuracy in the traverse area. It can be obtained only in case of radiation, as it is used in the case of small distances and the production of large output is quite simple and easy.

2. Which of the following methods is a widely used method of plane tabling?

- a) Radiation
- b) Intersection
- c) Traversing
- d) Resection

Answer: c

Explanation: Among the following, traversing is adopted in the usual manner. It involves a very simple procedure and also gives more accurate values when compared to other processes.

3. Which of the following can give the best output?

- a) Traversing
- b) Intersection
- c) Resection
- d) Radiation

Answer: a

Explanation: Though resection involves in more accuracy, it is more time consuming. By considering the time factor usually traversing is adopted and is given at most priority. It is also capable of giving accurate results.

4. Which of the following methods is more suitable in case of small distances?

- a) Traversing
- b) Radiation
- c) Resection
- d) Intersection

Answer: b

Explanation: Radiation process involves in recreating the station to station distance in an enlarged manner. It requires a lot of time which makes it suitable only in case of small distances.

5. Which of the following methods is having a wider scope with the use of tacheometer?

- a) Resection
- b) Trisection
- c) Intersection
- d) Radiation

Answer: d

Explanation: Alidade can be used to locate the points and determining the traverse. If the point to point distance can be obtained by tacheometer, radiation method can have wider scope in case of locating details regarding the points.

6. Which of the following is used to locate only details?

- a) Radiation
- b) Trisection
- c) Resection
- d) Traversing

Answer: a

Explanation: Radiation and intersection are having a common point that they both are able to locate the details other than station points. With the information provided by these, instrument station points can be located.

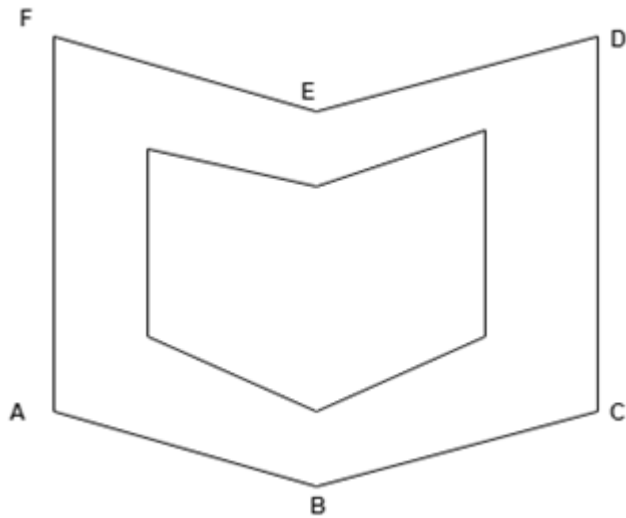
7. Which of the following describes the usage of the traversing method?

- a) Locating points
- b) Survey line placement
- c) Measuring angles
- d) Measuring bearings

Answer: b

Explanation: Traversing is a very commonly used method that is involved only in the survey line placement between the instrument stations in an open or closed traverse.

8. The figure indicates which of the following methods?



- a) Traversing

- b) Intersection
- c) Radiation
- d) Trisection

Answer: c

Explanation: The above mentioned figure indicates the process of radiation in which the station point is extended till it meets the point on the sheet provided while conducting the process.

9. Which is of the following is used for locating details of the station points?

- a) Radiation
- b) Intersection
- c) Trisection
- d) Traversing

Answer: d

Explanation: The location of plane table stations can be carried out by traversing and resection methods, which involve in determining only the station points. This key step because instrument has to be set at a definite point to continue further.

10. Which among the following set share the same working principle?

- a) Traversing and Radiation
- b) Traversing and trisection
- c) Traversing and Resection
- d) Traversing and intersection

Answer: a

Explanation: Traversing and Radiation share the same working principle. The only difference is that in the case of radiation the observations are taken to those points which are to be detailed, while in case of traversing the observations are made to those points which will subsequently be used as instrument stations.

This set of Surveying Multiple Choice Questions & Answers (MCQs) focuses on “Plane Table Surveying & Graphic Triangulation”.

1. Which among the following is not a method of plane table surveying?

- a) Radiation
- b) Trisection
- c) Intersection
- d) Resection

Answer: b

Explanation: The methods which are adopted in case of plane table surveying involve radiation, Intersection, resection and traversing, which are used based on the type of output required.

2. The method of radiation is used when distances are small.

- a) True
- b) False

Answer: a

Explanation: In the method of radiation, a ray is drawn from the instrument station towards the point, the distance is measured between the instrument station and that point by which, the point is located. This method is more suitable when the distances are small.

3. Method of Intersection is used when _____

- a) Distance between point and instrument is very small
- b) Distance between point and instrument is infinity
- c) Distance between point and instrument is small
- d) Distance between point and instrument is large

Answer: d

Explanation: Method of intersection is used when the distance between the point and the instrument station is either too large or cannot be measured accurately due to some conditions. The location of an object is determined by sighting the object from two plane table stations.

4. Which of the following methods required two instrument stations?

- a) Radiation
- b) Intersection
- c) Resection
- d) Traversing

Answer: b

Explanation: The location of an object is determined by sighting the object from two plane table stations and drawing the rays. The intersection of these rays will give a position of the object, because of this it is essential to have at least two instrument stations for locating any point.

5. Which among the following methods of plane table is most commonly used?

- a) Intersection
- b) Resection
- c) Traversing
- d) Radiation

Answer: a

Explanation: The method of intersection usually involves locating a station point and marking the remaining points, followed by changing the instrument to another point and computing the remaining points from which the required distance between the points can be found out with the minimal effort.

6. Which of the following set indicates the location of details of the survey?

- a) Resection, intersection
- b) Radiation, resection
- c) Radiation, intersection
- d) Traversing, resection

Answer: c

Explanation: The methods radiation and intersection usually involves collecting or locating the required details which accessed for computing the survey. Traversing and resection involve the location of plane table stations.

7. Method of intersection is also known as _____

- a) Resection
- b) Graphical triangulation
- c) Radiation
- d) Traversing

Answer: b

Explanation: Method of intersection is also known as graphical triangulation because it involves the formation of triangles in computed traverse and moreover this process is a graphical method.

8. The process of determining the plotted position of the station occupied by the plane table is known as _____

- a) Trisection
- b) Radiation
- c) Intersection
- d) Resection

Answer: d

Explanation: By the resection process, the plane table station points are located in which they are taken as reference for locating the remaining points of the traverse.

9. Orientation might cause a huge problem in method of resection.

- a) True
- b) False

Answer: a

Explanation: If the table is not correctly oriented at the station in the method of resection, the intersection of the two resectors will not give the correct location of the station. The problem, therefore, lies in the orienting table at the stations.

10. The observations made in method of traversing can be used as _____

- a) Bisecting point
- b) Traverse point
- c) Instrument stations
- d) Survey point

Answer: c

Explanation: The main difference between method of traversing and method of radiation is that in the case of radiation the observations are taken to those points which are to be detailed while in the case of traversing the observations are made to those points which will be subsequently used as instrument stations.

This set of Surveying Multiple Choice Questions & Answers (MCQs) focuses on “Plane Table” Three Point Problem♦.

1. In three point problem, orientation and resection are done simultaneously.

- a) True
- b) False

Answer: a

Explanation: In the process of three point problem, the intersection of the three resectors in a point gives the location of the instrument station. Thus, the orientation and resection are accomplished in the same operation.

2. Which of the following serves as a solution for three point problem?

- a) Traverse method
- b) Axis method
- c) Mechanical method
- d) Transit method

Answer: c

Explanation: The solution for three point problem can be solved by a mechanical method, graphical method and Lehman’s method. Each one can be employed based on the problem raised due to orientation.

3. Mechanical method is also known as _____

- a) Graphical method
- b) Axis method
- c) Trial and error method
- d) Tracing paper method

Answer: d

Explanation: Due to the usage of tracing paper involved in this process, mechanical method is also called as tracing paper method.

4. In graphical method, why Bessel’s method is chosen the best?

- a) Due to accuracy in result
- b) Due to quick output
- c) Due to ease in handling
- d) Due to economical issues

Answer: a

Explanation: Among the several graphical methods available, Bessel’s method is chosen the best due to its accuracy in obtaining the values which might help in producing accurate output.

5. Among the three point and two point problems, the solution from two point problem will serve better output?

- a) True
- b) False

Answer: b

Explanation: Three point problems are capable of producing precise values and accurate output than the solution from two point problem. Because speed is the only factor concerned in case of two point problem solutions.

6. Which process involves more labour work?

- a) Mechanical method
- b) Graphical method
- c) Two point problem
- d) Three point problem

Answer: c

Explanation: When compared to the three point problem, the solution obtained from two point problem involves more labour work as speed is the first priority.

7. Which among the following doesn’t serve as a solution for proper orientation of the plane table?

- a) Resection by compass
- b) Resection by three point problem
- c) Resection by two point problem
- d) Resection by graphical triangulation

Answer: d

Explanation: Graphical triangulation is a method usually involves locating a station point and marking the remaining points, followed by changing the instrument to another point and computing the remaining points from

which the required distance between the points can be found out. It doesn't come under the category of resection.

8. Which of the following methods of three point problem is a tedious one?

- a) Lehman's method
- b) Graphical method
- c) Axis method
- d) Mechanical method

Answer: a

Explanation: Lehman's process, also known as trial and error process, involves a lot of trial and error, which makes it a tedious process.

9. Which shapes are generally formed in Lehman's method?

- a) Quadrilaterals
- b) Triangles
- c) Polygons
- d) Circle

Answer: b

Explanation: A triangle is the most commonly used shape in case of surveying as it covers an entire area in a framework which makes calculations easier.

10. Usage of Lehman's method involves following certain rules.

- a) True
- b) False

Answer: a

Explanation: Lehman's method is accompanied by certain rules which must be followed for obtaining an accurate solution for solving three point problem.

This set of Surveying Multiple Choice Questions & Answers (MCQs) focuses on "Plane Table – Two Point Problem".

1. Location of points is already done while considering two point problem.

- a) False
- b) True

Answer: b

Explanation: Two point problem is only considered when station point is able to visualize two other points of the traverse. By this, other points of the traverse can be formed and the points are joined to form a traverse.

2. Error occurred due to orientation can be checked by _____

- a) Calculating table area
- b) Calculating area
- c) Measuring bearings
- d) Measuring angles

Answer: d

Explanation: Orientation is the main process in case of plane tabling. Proper orientation must be done while carrying out this process. Error due to improper orientation can be checked by measuring angles and their differences.

3. Which among the processes having more accuracy in its output?

- a) Total station
- b) Plane table surveying
- c) Chain surveying
- d) Compass surveying

Answer: a

Explanation: Plane table surveying is a rough process conducted in order to have an idea of the land and its condition for construction. Due to this, it is not capable of producing accurate output in its recording.

4. Which of the following step can affect the entire process?

- a) Traversing
- b) Alidade
- c) Orientation
- d) Chaining

Answer: c

Explanation: All the steps involved in plane tabling are quite needed and must be done with more care. But the orientation step, which is the heart of this process, must be done with at most importance and with care so that remaining steps won't get disturbed.

5. For fixing any point, auxiliary point must be chosen.

- a) True
- b) False

Answer: a

Explanation: Auxiliary point is a reference point that must be considered so that the points remaining in the traverse can be fixed. By this the entire traverse can be completed within no time.

6. Which of the following steps is involved in plane table surveying?

- a) Tacheometric surveying
- b) Measuring bearings
- c) Measuring angles
- d) Changing station points

Answer: d

Explanation: Plane table surveying involves simple steps like orientation, changing table to station points, usage of alidade etc. But these can cause a serious error which can lead to repeating the entire process.

7. Which process involves more labor work?

- a) Chaining
- b) Compass surveying
- c) Plane table surveying
- d) Theodolite surveying

Answer: c

Explanation: Plane table surveying involves more labor work due to the fact that the table present in this process needs to be shifted to the station points whenever it is necessary. It is to be done so as to cover the entire traverse.

8. How many alternatives were available in case of two point problem?

- a) No alternatives
- b) Maximum Two
- c) Minimum one
- d) Maximum one

Answer: b

Explanation: Two point and three point problems involve an alternative solution because this involves more cases as every traverse doesn't form the same polygon. Roughly two alternatives will be present in each.

9. Which process of plane table surveying is a tedious one?

- a) Resection
- b) Trisection
- c) Intersection
- d) Radiation

Answer: a

Explanation: Resection, which involves both three point and two point problems, is considered as the tedious process when compared to the remaining classifications. These are done so as to decrease the errors due to improper orientation.

10. Two point problem involves in _____

- a) Locating details
- b) Locating station points
- c) Locating angles
- d) Locating bearings

Answer: b

Explanation: Two point problem is used only in case of determining the station points by considering different procedures which involve an auxiliary point.

This set of Surveying Multiple Choice Questions & Answers (MCQs) focuses on "Errors in Plane Tabling".

1. The usage of telescopic alidade usually increases the occurrence of errors in a huge rate.

- a) False

b) True

Answer: b

Explanation: The usage of telescopic alidade has the chances of increasing the errors. It can be due to the line of sight not being perpendicular to horizontal axis, line of collimation not being perpendicular to the horizontal axis etc., which can be minimised by proper usage.

2. Degree of precision depends on _____

- a) Quality of instrument
- b) Usage of the instrument
- c) Surveyor
- d) Type of work being done

Answer: a

Explanation: The quality of the instrument used will affect the recorded values and degree of precision depends upon the character of survey, system adopted too.

3. Plain alidade will cause less error when compared to telescopic alidade.

- a) False
- b) True

Answer: b

Explanation: Telescopic alidade is a newly introduced one with a lot more benefits than plain alidade, but due to less accuracy it lacks behind plain alidade.

4. In a magnetic area, which type of surveying can be employed?

- a) Traverse surveying
- b) Compass surveying
- c) Theodolite surveying
- d) Plane table surveying

Answer: d

Explanation: Other than plane table surveying, remaining methods need a compass for initiating the work in which it is not possible to access compass in a magnetic area. Plane table surveying can be employed there as it can be done without usage of compass.

5. When the difference in elevation between points is more, which of the following would be affected more?

- a) Points plotted
- b) Alidade position
- c) Horizontality of board
- d) Level of board

Answer: c

Explanation: If the difference in elevation between the points plotted is more, then the horizontality of the board will be disturbed by which the entire process is halted until it is set right.

6. Plane table surveying is capable of providing accurate work.

- a) True
- b) False

Answer: b

Explanation: Plane table surveying involves both recording and plotting of points simultaneously which makes it less accurate.

7. Which of the following must be checked at every station?

- a) Values obtained
- b) Traverse area
- c) Points to be sighted
- d) Orientation of table

Answer: d

Explanation: Orientation is done with a compass and there is a possibility of local attraction. Errors in orientation contribute towards distortion of the survey. This orientation should be checked at as many stations as possible by sighting distant objects which are already plotted.

8. Which of the following can cause more damage while using a plane table for surveying?

- a) Climatic changes
- b) Instruments used

- c) Sighting error
- d) Inaccurate centring

Answer: a

Explanation: Except climatic change, remaining errors can be minimised by an alternative. Climatic change may increase or decrease the values from the original.

9. Which of the following errors cannot be minimised?

- a) Error in instrument
- b) Error in sighting
- c) Error while plotting
- d) Personal errors

Answer: c

Explanation: If the error is identified as an error due to plotting, there is no possibility other than re-surveying.

10. In plane table surveying, it is difficult to reproduce the map to some different scale.

- a) False
- b) True

Answer: b

Explanation: Since notes of measurements are not recorded, it is inconvenient to reproduce the map to some different scale.

This set of Surveying Multiple Choice Questions & Answers (MCQs) focuses on “Plane Table” Resection Method.

1. Before conducting the resection procedure, orientation must be performed.

- a) True
- b) False

Answer: b

Explanation: Resection is done after the table has been properly oriented. If there is any mistake in orientation, the entire process will go wrong and may end up repeating again.

2. Which of the following processes is employed in case of a small scale?

- a) Trisection
- b) Intersection
- c) Radiation
- d) Resection

Answer: d

Explanation: Resection is based on the orientation of the table which needs much more care for handling the process. Covering a large area by the resection method makes it a tedious process. So, it is adopted for small scale.

3. Which of the following indicates the procedure for plotting of points occupied by the plane table?

- a) Resection
- b) Bisection
- c) Trisection
- d) Intersection

Answer: a

Explanation: Both resection and traversing are done so as to obtain the station points. Those are used for placing the plane table and locating the remaining points.

4. The rays which are drawn from unknown location to a known location can be determined as _____

- a) Trisectors
- b) Bisectors
- c) Resectors
- d) Intersectors

Answer: c

Explanation: Resection method involves in the usage of resectors. Resectors are the rays which can be drawn from an unknown location to a known location. So, a relation can be established between the points.

5. Which among the following contains more amounts of errors in its procedure?

- a) Orientation by compass
- b) Orientation by back sighting

- c) Orientation by three point problem
- d) Orientation by two point problem

Answer: a

Explanation: Since compass gives a rough output and the orientation done by it isn't accurate enough. So the orientation by compass is employed in case of small scale works where speed of the work is considered.

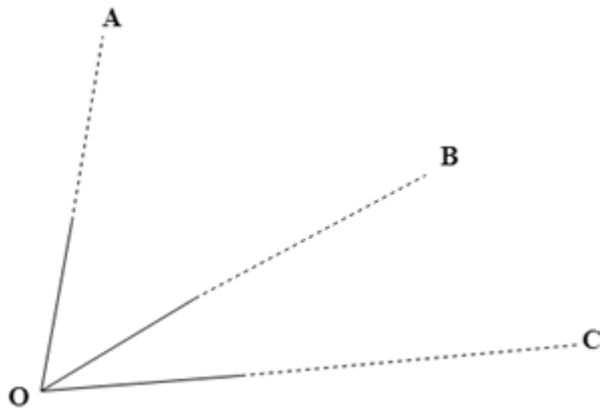
6. In which of the following methods, graphical method is employed?

- a) Back sight orientation
- b) Compass orientation
- c) Two point problem
- d) Three point problem

Answer: d

Explanation: Three point method has been further classified as mechanical method, Lehman's method and graphical method. Each of them will be employed based on the type of work being done and the visibility of points.

7. The figure indicates which of the following procedures?



- a) Two point problem
- b) Three point problem
- c) Compass orientation
- d) Back sight orientation

Answer: b

Explanation: As it can be clearly seen that the station point can visualize three individual points, which makes it fall under the category of three point problem.

8. Which of the following must be done correctly in order to prevent further errors?

- a) Usage of alidade
- b) Back sighting
- c) Orientation
- d) Traversing

Answer: c

Explanation: resection method is employed for having a clear idea about the station points. So, it requires proper orientation of the table to continue further. Error in orientation can be corrected by following the classification methods.

9. Which of the following is not a classification of the resection method?

- a) Orientation by compass
- b) Orientation by back sighting
- c) Orientation by three point problem
- d) Orientation by fore sighting

Answer: d

Explanation: Resection method involves in determining plane table station points which makes the entire process depended on the orientation of the table. It has been classified into Orientation by compass, Orientation by back sighting, Orientation by three point problem, Orientation by two point problem.

10. Which among the following procedures is used in case of visibility of points is more from table station?

- a) Three point problem
- b) Two point problem
- c) Compass orientation
- d) Back sighting orientation

Answer: a

Explanation: Though two point and three point will come under the same category, the work employed will be different. In three point problem at a time three points will be covered which makes the work to complete in a quick manner when compared to two point problem.

This set of Surveying Multiple Choice Questions & Answers (MCQs) focuses on “Plane Table” Errors and Precaution.

1. Which of the following acts as an advantage of plane table surveying?

- a) Accuracy in output
- b) Inconvenient in wet climate
- c) Heavy instruments
- d) Used in magnetic areas

Answer: d

Explanation: Plane table finds its usage in the case of magnetic areas. When remaining methods are considered, it may involve the usage of compass, which doesn't work in magnetic areas. This is its major advantage over the remaining methods.

2. Plane table surveying requires great skill.

- a) False
- b) True

Answer: a

Explanation: Plane table surveying involves very basic level principles, which doesn't need any in depth knowledge. It can be done in one setting if basics are strong enough.

3. Which of the following operation can be done clearly in case of plane table surveying?

- a) Area computation
- b) Sighting
- c) Contouring
- d) Traversing

Answer: c

Explanation: Plane table surveying involves in determining traverse of the area by which the area of the land can be

determined. Contouring can also be done with the help of plane tabling, which provides a clear and step by step procedure.

4. It is difficult for reproducing the traverse in different scale.

- a) False
- b) True

Answer: b

Explanation: Since the measurements which are obtained while doing the work aren't recorded, it is a very difficult state to reproduce the same map if required in different scale.

5. Which of the following can be a disadvantage to plane table surveying?

- a) Heavy instruments
- b) Convenient in wet climate
- c) No Accuracy in output
- d) Not used in magnetic areas

Answer: a

Explanation: Plane table involves in the usage of more amount of instruments, which makes it uncomfortable while working in wet climatic conditions like rainy season.

6. Possibility of error in plane table surveying is _____

- a) Negligible
- b) Zero
- c) More
- d) Less

Answer: d

Explanation: Error occurrence is a bit controllable in case of plane table surveying. But the usage of compass increases the errors in the output obtained.

7. Let the instrument station be V and there is a displacement of 50 cm in its placement in the direction of ray. What is the true position if the scale is 1 cm = 700 meters?

- a) 0.017 cm
- b) 0.107 cm
- c) 0.071 cm
- d) 0.170 cm

Answer: c

Explanation: The true position due to displacement can be considered as $e \cdot s$ meters. The value of s can be given as $s = 1/700$ and $e = 50$ cm. On substitution, we get $e \cdot s = 50/700 = 0.071$ cm.

8. Which of the following is an error occurred due to sighting?

- a) Instrumental errors
- b) Defective orientation
- c) Personal errors
- d) Natural errors

Answer: b

Explanation: Sighting is a process that involves in the determination of the station points. Error in sighting occurs due to manipulation, it involves non-horizontality of board, defective orientation, defective sighting, centering.

9. Which of the following makes plane table not suitable in many cases?

- a) More errors produced
- b) Less errors produced
- c) Zero errors
- d) Negligible errors

Answer: a

Explanation: Plane table surveying, though having more methods involved, is not considered as the preferable method because it may produce more amounts of errors when compared to other methods. But it is adopted when the speed of the method is considered.

10. Which of the following is more in case of plane table surveying?

- a) Mistakes
- b) Corrections
- c) Advantages

d) Disadvantages

Answer: c

Explanation: Plane table surveying involves more advantages like recording and plotting at a time, clear contouring, cheaper than theodolite etc. even though more advantages were there but it is generally not considered because it involves more instruments which makes it quite uncomfortable.

This set of Surveying Puzzles focuses on “Area Calculation” Area by Double Meridian Distances.

1. Double meridian distance of a line is equal to _____

- a) Sum of parallel distances
- b) Sum of perpendicular distances
- c) Sum of total areas
- d) Sum of meridian distances

Answer: d

Explanation: The double meridian distance of a line is equal to the sum of the meridian distances of the two extremities, which is useful for the determination of the required area of the plot.

2. Which of the following area calculation methods is mostly used?

- a) Area by double meridian
- b) Area by co-ordinates
- c) Area by planimeter
- d) Area by Simpson's rule

Answer: a

Explanation: Area by double mean distances involves more methods of obtaining the area, which actually increases the accuracy of the output. Each method is having its own importance which can be sorted out based on the inputs available.

3. The double parallel distance can be given as _____

- a) Sum of vertical distances
- b) Sum of perpendicular distances
- c) Sum of parallel distances
- d) Area of parallel distances

Answer: c

Explanation: The double parallel distance for a line can be given as sum of the parallel distances of its ends. The principles of finding area by D.M. D. method and D.P.D. method are identical.

4. Which of the following indicates the purpose of D.P.D?

- a) Checking area computed by D.P.D
- b) Checking area computed by D.M.D
- c) Checking area computed by perpendiculars
- d) Checking area computed by parallels

Answer: b

Explanation: The D.P.D method is employed for checking the area computed by D.M.D method. It is an independent area and has its own set of rules but some principles are identical.

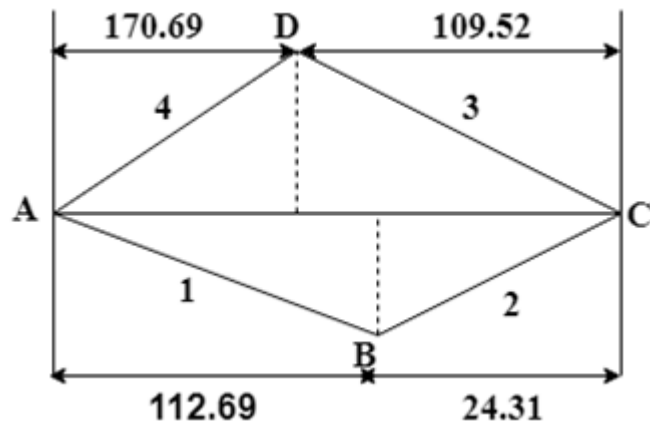
5. Which of the following describes the double meridian distance?

- a) Sum of latitudes
- b) Sum of horizontal distances
- c) Sum of parallel distances
- d) Sum of meridian distances

Answer: d

Explanation: Double meridian distance of a line is equal to sum of the meridian distances of the two extremities. It is represented by the symbol M. The area calculated by double meridian distance can be having accuracy in its output.

6. Calculate the area of the figure by using the data provided. L1 = 92.69 m, L2 = 248.96 m, L3 = 146.31m, L4 = 157.43 m.



- a) 29283.46 sq. m
- b) 29823.46 sq. m
- c) 29328.64 sq. m
- d) 29238.64 sq. m

Answer: a

Explanation: From the figure, it can be observed that it consist four triangles so the total are can be given as the summation of the area of triangles.

$$\begin{aligned}
 A &= \frac{1}{2} (D1 * L1) + \frac{1}{2} (D2 * L2) + \frac{1}{2} (D3 * L3) + \frac{1}{2} (D4 * L4) \\
 &= \frac{1}{2} (112.69 * 92.69) + \frac{1}{2} (242.96 * 24.31) + \frac{1}{2} (146.31 * 170.69) + \frac{1}{2} (157.43 * 109.52) \\
 &= 5222.61 + 2953.17 + 12486.82 + 8620.86 = 29283.46 \text{ sq. m.}
 \end{aligned}$$

7. Find the value of M2 if D1 = 24.86 m, D2 = 17.65 m.

- a) 76.37 m
- b) 67.37 m
- c) 76.73 m
- d) 37.76 m

Answer: b

Explanation: The value of M2 can calculated by $M2 = M1 + D1 + D2$. But we already know that $M1 = D1$. So, on

substitution, we get

$$M2 = 24.86 + 24.86 + 17.65 = 67.37 \text{ m.}$$

8. Find the meridian distance if $m1 = 32.76$, and $D2 = 44.56$ m.

- a) 71.24 m
- b) 17.24 m
- c) 17.42 m
- d) 71.42 m

Answer: d

Explanation: Meridian distance can be calculated by $m2 = m1 + D1/2 + D2/2$. On substitution we get,

$$m2 = 32.76 + 32.76/2 + 44.56/2$$

$$m2 = 71.42 \text{ m.}$$

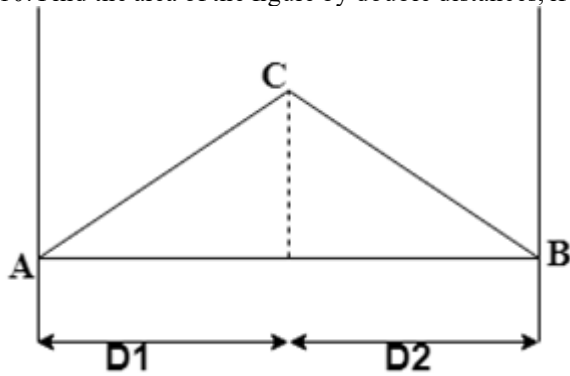
9. Find the area of a triangle if latitude distance is given as 209.96 m and meridian distance is 5.78 m.

- a) 1213.86 sq. m
- b) 1231.68 sq. m
- c) 1213.68 sq. m
- d) 1123.68 sq. m

Answer: c

Explanation: If the latitude and meridian distance are given then the area of a triangle can be calculated by the product of both i.e., Area of triangle = latitude * meridian distance = $209.96 * 5.78 = 1213.68$ sq. m.

10. Find the area of the figure by double distances, if $L1 = 13.99$ m and $L2 = 66.54$ m.



- a) 2247.17 sq. m

- b) 2274.17 sq. m
- c) 2274.71 sq. m
- d) 2247.71 sq. m

Answer: a

Explanation: The formula for area by double distances can be given as

$$A = \frac{1}{2} (M_1 \cdot L_1 + M_2 \cdot L_2). \text{ We know that, } M_1 = D_1 = 24.56 \text{ m and } M_2 = M_1 + D_1 + D_2 = 24.56 + 24.56 + 13.26 = 62.38 \text{ m. On substitution, we get}$$

$$A = \frac{1}{2} (24.56 \cdot 13.99 + 62.38 \cdot 66.54) = 2247.17 \text{ sq. m.}$$

This set of Surveying Multiple Choice Questions & Answers (MCQs) focuses on “Area Calculation” Area by Co-ordinates.

1. The method of tracing is involved in which of the following procedures?

- a) Sub-division into squares
- b) Sub-division into area figures
- c) D.M.D method
- d) Division into trapezoidal figures

Answer: d

Explanation: Area by map measurements involves calculating the area by the map details provided. It has certain classifications that use tracing paper in its procedure. Generally, the division of trapezoidal figure involves usage of tracing paper.

2. Which of the following is not a method involved in area by co-ordinate?

- a) Sub-division into area figures
- b) Co-ordinate method
- c) Meridian method
- d) D.M.D method

Answer: a

Explanation: Area by co-ordinate method contains ample classified techniques which can have its own importance. Those include co-ordinate method, meridian method, D.M.D method, and departure and total latitude method.

3. Which of the following is the main thing in the process of calculation of area by co-ordinate method?

- a) M.D
- b) Departure
- c) Latitude
- d) Parallels

Answer: c

Explanation: For the calculation of area by the methods of co-ordinates require the calculation of the length of latitude. If they are given it is quite simple. But if they are not it would be a tedious procedure.

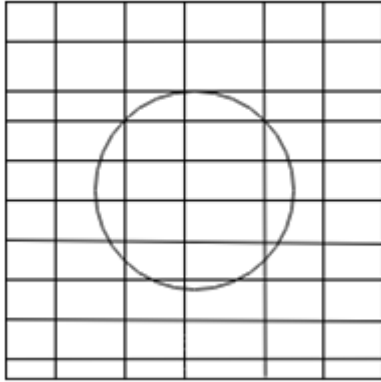
4. Which of the following shapes are generally considered when the area is computed by map measurements?

- a) Square
- b) Triangle
- c) Rectangle
- d) Pyramidal

Answer: b

Explanation: For calculation purpose, triangles are the most preferred shapes as they can be solved with ease. But in reality most of them are in their own complex shape, which may resemble a trapezoid. So, mostly trapezoid and triangles will be used.

5. The figure indicates which of the following processes?



- a) Sub-division into squares
- b) Sub-division into area figures
- c) Division into trapezoidal figures
- d) D.M.D method

Answer: a

Explanation: The area calculations by the map measurements involve three classifications, among them the sub-division into squares classification involves the creation of grid lines. It is done so as to improve the accuracy.

6. Which of the following is not a classification in area by map measurement?

- a) Division into trapezoidal figures
- b) Sub-division into area figures
- c) Sub-division into squares
- d) D.M.D method

Answer: d

Explanation: Area by map measurement method involves three classifications. They are division into trapezoidal figures, sub-division into squares and sub-division into area figures. Any of the methods can be applied.

7. If the values of latitudes are 223.5 m and 65.31 m and meridians are 16.8 m, 24.67m. Find the area using D.M.D method.

- a) 2268.99 sq. m
- b) 2862.99 sq. m
- c) 2682.99 sq. m
- d) 28865.99 sq. m

Answer: c

Explanation: Area by D.M.D method can be given as, $A = \frac{1}{2} (\sum m^*L)$

$$A = \frac{1}{2} (223.5 * 16.8 + 65.31 * 24.67)$$

$$A = 2682.99 \text{ sq. m.}$$

8. Find the area by co-ordinate method if the independent co-ordinates are (400, 400), (423, 456), (478, 498), (400, 400)

- a) 1510 cu. m
- b) 1150 cu. m
- c) 5110 cu. m
- d) 115 cu. m

Answer: a

Explanation: The formula in area by co-ordinate method can be given by,

$A = \frac{1}{2} (y_1(x_2 - x_4) + y_2(x_3 - x_4) + y_3(x_4 - x_2) + y_4(x_1 - x_3))$. On substitution of the co-ordinates in the area we get,

$$A = \frac{1}{2} (100(423 - 400) + 498(478 - 400) + 498(400 - 423) + 400(400 - 478))$$

$$A = -1510 \text{ cu. m, negative sign has no significance. So, } A = 1510 \text{ cu. M.}$$

9. The value of total latitudes and its adjoining departures were given. Calculate area by departure and total latitudes method. Total Latitudes = 110, 25, 0, 0 and adjoining departures = 245, 245, -245, -245.

- a) 15636 sq. m
- b) 16536 sq. m
- c) 16563 sq. m
- d) 15663 sq. m

Answer: b

Explanation: The formula for calculation of area by departure and latitude can be given as,

$A = \frac{1}{2} (\sum (\text{total latitude} * \text{algebraic sum of adjoining departures}))$. On substituting the given values, we get,

$$A = \frac{1}{2} (110 * 245 + 25 * 245 + 0 * -245 + 0 * -245) = 16536 \text{ sq. m.}$$

10. Calculate the area by M.D method, if the value of m1, m2, m3 are given as 233.4 m, 12.78 m, 99.98 m respectively and latitudes are 110 m, -15 m, 89 m.

- a) 43372.51 sq. m
- b) 34732.15 sq. m
- c) 34537.15 sq. m
- d) 34372.51 sq. m

Answer: d

Explanation: The formula of meridian and distance method can be given as,

$A = \sum (m^*L)$. On substitution, we get

$$A = 233.4 * 110 + 12.78 * -15 + 99.98 * 89$$

$$A = 34372.51 \text{ sq. m.}$$

This set of Surveying Multiple Choice Questions & Answers (MCQs) focuses on “Volume Measurement – Prismoidal Formula”.

1. A prismoid is a combination of which of the following?

- a) Trapezium, circle
- b) Parallelogram, trapezium
- c) Triangle, trapezium
- d) Triangle, circle

Answer: c

Explanation: The longitudinal faces of the prismoid are in the form of triangle, parallelogram or trapezium. A prismoid is a solid whose end faces lie in parallel planes, which can be used for calculating the volume of the obtained figure due to surveying.

2. The trapezoidal and prismoidal formulae were derived based on the assumption that end sections are in parallel planes.

- a) True
- b) False

Answer: a

Explanation: The prismoidal and the trapezoidal formulae were derived on the assumption that the end sections are in parallel planes. So, the centre line of an embankment is curved in plan and it is common to calculate the volume as if the end sections were in parallel planes and then apply the correction for curvature.

3. Prismoidal rule is also known as _____

- a) Simpson's rule
- b) Trapezoidal rule
- c) Curvature rule
- d) Euler's rule

Answer: a

Explanation: Prismoidal rule is also known as Simpson's rule because the formula obtained from the derivation represents the formula of Simpson's one-third rule.

4. The prismoidal formula is used for the calculation of _____

- a) Perimeter
- b) Traverse
- c) Volume
- d) Area

Answer: c

Explanation: The calculation of volume includes the following processes trapezoidal formula, prismoidal formula which can be used for better enhancement and for obtaining accurate output.

5. Calculate the total volume if number of sides = 3 and $d = 2$ m. The values of area can be given as 117.98 sq. m, 276.54 sq. m and 98.43 sq. m.

- a) 1170.26 cu. m
- b) 1710.26 cu. m
- c) 1107.26 cu. m
- d) 117.26 cu. m

Answer: a

Explanation: The total volume of any figure can be calculated by using the Simpson's formula i.e.,
 $V = \frac{d}{3} (A_1 + A_3 + 4A_2 + 2A_3 + 2A_1)$. On substitution, we get
 $V = \frac{2}{3} (117.98 + 98.43 + 4 \times 276.54 + 2 \times 98.43 + 2 \times 117.98)$
 $V = 1170.26$ cu. m.

6. In prismoidal rule, it is necessary to have odd number cross sections.

- a) False
- b) True

Answer: b

Explanation: It is not compulsory, but having odd number of cross sections makes the process simpler when compared to the presence of even number of cross sections.

7. Which of the following must be done for obtaining equivalent area?

- a) Applying correction for bearings
- b) Applying correction for angles
- c) Applying correction for curvature
- d) Applying correction for length

Answer: c

Explanation: The corrections for curvature are applied to the areas of cross-sections thus getting equivalent areas and then use them in prismoidal formula. For example, In Level section, no correction is necessary since the area is symmetrical about the central line.

8. If the area of mid section is 345.98 sq. m and the individual areas A1, A2 are 123.31 and 157.31 respectively, d = 5m. Find the volume of the pyramid.

- a) 3187.11 cu. m
- b) 1378.11 cu. m
- c) 1837.11 cu. m
- d) 1387.11 cu. m

Answer: d

Explanation: The volume of pyramid with lateral sides can be given as,

$V = d/6 (A_1 + A_2 + 4A_m)$. On substitution, we get

$$V = 5/6 (123.31 + 157.31 + 4 \times 345.98)$$

$$V = 1387.11 \text{ cu. M.}$$

9. Which of the following indicates the formula for prisomidal correction?

- a) $C_p = d n (h+h_1)^2 / 6$
- b) $C_p = d n (h-h_1)^2 / 6$
- c) $C_p = d n (h \cdot h_1)^2 / 6$
- d) $C_p = d n (h/h_1)^2 / 6$

Answer: b

Explanation: The formula for prisomidal correction is given as, $C_p = d n (h-h_1)^2 / 6$ which is used based on the type of work being done and accuracy of the output required.

10. Find the area of first prismoid if the areas of A1, A2 and A3 are 145.31, 257.43 and 59.67 respectively with a distance of 2.5 m.

- a) 1208.91 cu. m
- b) 1082.91 cu. m
- c) 1028.91 cu. m
- d) 1820.91 cu. m

Answer: c

Explanation: Volume of the first prismoid can be given as,

$$V = d/3 (A_1 + 4 \cdot A_2 + A_3)$$

$$V = 2.5/3 (145.31 + 4 \cdot 257.43 + 59.67)$$

$$V = 1028.91 \text{ cu. M.}$$

This set of Surveying Multiple Choice Questions & Answers (MCQs) focuses on “Area Calculation” Area by Planimeter.

1. Planimeter is an instrument which is used for _____

- a) Locating co-ordinates
- b) Transferring point from paper to ground
- c) Measuring area of plan
- d) Sighting parallel and perpendicular points to station

Answer: c

Explanation: By the use of planimeter, the area of the land can be measured which is used for processing. Plumb bob is used for transferring point from paper to ground and alidade for sighting parallel and perpendicular points to station.

2. The formula for finding area by the use of planimeter is _____

- a) $\hat{I}'' = M(F - I \hat{A} \pm 10N + C)$
- b) $\hat{I}'' = M(F + I \hat{A} \pm 10N + C)$
- c) $\hat{I}'' = M(F - I \hat{A} \pm 10N - C)$
- d) $\hat{I}'' = M(F - I \hat{A} \pm 10N \hat{A} \pm C)$

Answer: a

Explanation: The area of the obtained figure can be calculated by, $\hat{I}'' = M(F - I \hat{A} \pm 10N + C)$

Where, F = Final reading, I = Initial reading, N = number of times the zero mark of the dial passes the fixed index mark, M = A multiplying constant, C = Constant of the instrument which when multiplied by M.

3. Which of the following methods will give the best output for area?

- a) Area by double mean distances
- b) Area by triangles
- c) Area by co-ordinates
- d) Area by planimeter

Answer: b

Explanation: The area calculated by forming triangles will be able to give the best output because it involves formation of frame work.

4. Multiplier constant(M) is also known as _____

- a) Planimeter constant
- b) Tacheometric constant
- c) Meridian constant
- d) Simpson's constant

Answer: a

Explanation: From the formula of area by planimeter, $\hat{A} = M (F - I \pm 10N + C)$ the variable M represents multiplier constant which is required for further calculations.

5. Multiplier constant is equal to _____

- a) $A \pm \Delta$
- b) $A * \Delta$
- c) A / Δ
- d) Δ / A

Answer: c

Explanation: The value of multiplier constant is given as $M = A / \Delta$ in which, A = known area, Δ = change in wheel readings.

6. Calculate the area if I = 8.257, M = 150 sq.cm, F = 4.143, C = 31.155.

- a) 6255.15
- b) 2565.15
- c) 2655.15
- d) 2556.15

Answer: d

Explanation: The area can given by, $A = M (F - I \pm 10N + C)$

On substituting, I = 8.257, M = 150 sq.cm, F = 4.143, C = 31.155 and N = -1

$A = 150 (4.143 - 8.257 - 10 + 31.155) = 2556.15 \text{ sq.cm.}$

7. Which of the following mathematical operations can be used for area computation?

- a) Euler's equation
- b) Simpson's one-third rule
- c) Quadratic equation
- d) Simultaneous differential equation

Answer: b

Explanation: Simpson's one-third rule assumes that the short length of the boundary between the ordinates is parabolic arc and this method is more useful when the boundary line departs considerably from the straight line.

8. Simpson's rule is capable of producing more accurate results.

- a) True
- b) False

Answer: a

Explanation: The results obtained by the use of Simpson's rule are more accurate in all cases. The result obtained is smaller than those obtained by using the trapezoidal rule.

9. Find the value of the multiplier constant if the length of the arm is given as 45.78 m and diameter as 2.54 m.

- a) 643.86 sq. m
- b) 436.86 sq. m
- c) 346.68 sq. m
- d) 364.86 sq. m

Answer: d

Explanation: The value of multiplier constant can be given as $M = L \times \text{circumference}$

$\text{Circumference} = \pi \times D = \pi \times 2.54 = 7.97 \text{ m}$. On substitution, we get

$M = 45.78 \times 7.97 = 364.86 \text{ sq. m}$.

10. If length of the arm = 23.31 m, distance between wheel and pivot = 2 m, $D = 3\text{m}$. Find the value of constant C.

- a) 4.63 sq. m
- b) 6.64 sq. m
- c) 6.46 sq. m
- d) 4.95 sq. m

Answer: c

Explanation: The value of the constant C can be given as, $C = \frac{\pi (L^2 - 2aL + R^2)}{M}$. The value of M can be given as $M = L \times \pi \times D = 219.691 \text{ sq. m}$. On substitution, we get

$C = \pi (23.31^2 - 2 \times 2 \times 23.31 + 1.5^2) / 219.691 = 6.46 \text{ sq. m}$.

11. If the area of the traverse is 645.32 sq. m and the change in the wheel readings can be given as 10, find the value of multiplier constant.

- a) 64.532 sq. m
- b) 6453.2 sq. m
- c) 6.4532 sq. m
- d) 0.65432 sq. m

Answer: a

Explanation: If the values of area and the change in wheel readings are given then the multiplier constant can be given as $M = A / \Delta R$, where A is the area and ΔR is the change in wheel readings. On substitution, we get

$M = 645.32 / 10 = 64.532 \text{ sq. m}$.

12. If the area of traverse is drawn to a scale $1 \text{ inch} = 23 \text{ ft}$, find the change in area if the original area is 497.76 sq. in.

- a) 6.04 sq. m
- b) 6.04 m
- c) 6.04 sq. in
- d) 6.04 acres

Answer: d

Explanation: Here, the scale is given as $1 \text{ inch} = 23 \text{ ft}$. So, $1 \text{ sq. in} = 23 \times 23 \text{ sq. ft}$

And the area of the field can be given as $(23 \times 23 \times 497.76) / 43560 = 6.044 \text{ acres}$.

13. Find the value of I if the area of the field is given as 234.315 sq. m, $M = 22.15 \text{ sq. m}$, $F = 3.256$, $N = 1$, $C = 26.43$.

- a) 21.907 sq. m
- b) 29.107 sq. m
- c) 29.701 sq. m
- d) 23.071 sq. m

Answer: b

Explanation: The area of the field can be given as $A = M (F - I \pm 10N + C)$. On substitution of the given values we get,

$234.315 = 22.15 (3.256 - I + 10 + 26.43)$

$I = 29.107 \text{ sq. m}$.

This set of Surveying Multiple Choice Questions & Answers (MCQs) focuses on “Volume Measurement – Trapezoidal Formula”.

1. The trapezoidal formula can be applied only if _____

- a) It composes prism and wedges
- b) It composes triangles and parallelograms
- c) It composes prism and parallelograms
- d) It composes triangles and wedges

Answer: a

Explanation: The trapezoidal method is based on the assumption that the mid-area is the mean of the end areas. It is true only if the prismoid is composed of prisms and wedges only but not of pyramids.

2. Trapezoidal formula is also known as _____

- a) Simpson's rule
- b) Co-ordinate method
- c) Prismoidal method

d) Average end area method

Answer: d

Explanation: This method is based on the assumption that the mid-area is the mean of the end areas, which make it the Average end area method.

3. Which of the following indicates the assumption assumed in the trapezoidal formula?

- a) mid-area is the mean of the starting area
- b) mid-area is the mean of the end area
- c) mid-area is the mean
- d) mid-area is not the mean of the end area

Answer: b

Explanation: Trapezoidal formula is based on the assumption that the mid-area is the mean of the end area. Based on this, the trapezoidal formula will be worked out and further calculations are done.

4. Prismoidal correction can be applied to the trapezoidal formula.

- a) True
- b) False

Answer: a

Explanation: Every volumetric formula needs certain corrections in order to set the errors occurred. In the case of trapezoidal formula, prismoidal corrections will be applied so as to reduce the error impact.

5. Calculate the volume of third section, if the areas are 76.32 sq. m and 24.56 sq. m with are at a distance of 4 m.

- a) 210.11 cu. m
- b) 201.67 cu. m
- c) 201.76 cu. m
- d) 210.76 cu. m

Answer: c

Explanation: Volume of the third section of a prismoid can be calculated as,

$V = d/2 (A_3 + A_4)$. On substitution, we get

$V = 4/2 (76.32 + 24.56)$

$V = 201.76$ cu. m.

6. If the areas of the two sides of a prismoid represent 211.76 sq. m and 134.67 sq. m, which are 2 m distant apart, find the total volume using trapezoidal formula. Consider $n=3$.

- a) 651.99 cu. m
- b) 615.99 cu. m
- c) 651.77 cu. m
- d) 615.77 cu. m

Answer: d

Explanation: The total volume using trapezoidal formula can be given as,

$V = d ((A_1 + A_2)/2 + A_2)$. On substitution, we get

$V = 2 ((211.76 + 134.67)/2 + 134.67)$

$V = 615.77$ cu. m.

7. In trapezoidal formula, volume can be over estimated.

- a) False
- b) True

Answer: b

Explanation: Due to the consideration of mid-area of the pyramid, volume of the pyramid can be over estimated. But due to the consideration of method of end area, the over estimation can be set right.

8. Determine the volume of prismoid using trapezoidal formula, if the areas are given as 117.89 sq. m and 55.76 sq. m which are 1.5m distant apart.

- a) 130.23 cu. m
- b) 103.23 cu. m
- c) 13.44 cu. m
- d) 103.65 cu. m

Answer: a

Explanation: The volume of prismoid in case of trapezoidal formula can be given as,

$V = d/2 (A_1 + A_2)$. On substitution, we get

$$V = 1.5/2 (117.89 + 55.76)$$

$$V = 130.23 \text{ cu. m.}$$

9. Which of the following methods is capable of providing sufficient accuracy?

- a) Area by planimeter
- b) Area by co-ordinates
- c) Prismoidal method
- d) Trapezoidal method

Answer: d

Explanation: Trapezoidal method involves the calculation of the volume of the prismoid and the shape acquired by the traverse. During volume calculations, many methods can be employed off which the trapezoidal method is capable of delivering the utmost accuracy.

10. The correction applied in trapezoidal formula is equal to _____

- a) Product of calculated volume and obtained volume
- b) Summation between calculated volume and obtained volume
- c) Difference between calculated volume and obtained volume
- d) Division of calculated volume and obtained volume

Answer: c

Explanation: Correction applied in case of the trapezoidal formula is equal to the difference between the volume calculated and that obtained from the prismoidal formula. In general, this correction is known as prismoidal correction and can be applied to the trapezoidal formula.

This set of Surveying Multiple Choice Questions & Answers (MCQs) focuses on “Volume Measurement”
Prismoidal Correction

1. Correction applied in prismoidal correction is always _____

- a) Subtractive
- b) Additive
- c) Multiplicative
- d) Divisible

Answer: a

Explanation: The formula used while calculating volume needs to apply certain correction so as to reduce the error occurred. In the case of prismoidal correction, the correction applied will be always subtractive, which means it should be subtracted from the volume obtained.

2. The calculation of mid-area is necessary in case of a prismoidal correction.

- a) False
- b) True

Answer: b

Explanation: Mid-area calculations were generally carried out in case of calculation of volume by trapezoidal formula. In case of prismoidal corrections, the mid-area is used for deriving its formula.

3. Which of the following value is necessary in case of determining the correction in prismoid?

- a) Volume
- b) Area
- c) Constants
- d) Distance between the sides

Answer: d

Explanation: The prismoidal correction requires certain values which can be applied for determining the corrections in both prismoid and trapezoid. The value of the equidistant position of the prisms must be known for further continuation problem.

4. Prismoidal correction can be given as _____

- a) Addition between the volume calculated and that obtained from the prismoid formula
- b) Summation between the volume calculated and that obtained from the prismoid formula
- c) Difference between the volume calculated and that obtained from the prismoid formula
- d) Product between the volume calculated and that obtained from the prismoid formula

Answer: c

Explanation: Prismoidal correction can be given as the difference between the volume calculated and that obtained from the prismoid formula. The obtained correction is always subtractive.

5. Prismoidal correction is obtained from which of the following formulae?

- a) Prismoid formula
- b) Trapezoidal formula
- c) Square formula
- d) Rectangular formula

Answer: a

Explanation: It is evident that the formula for prismoidal correction can be obtained from the prismoidal formula. But the usage can be done in both prismoidal and trapezoidal formulae because it involves only correction.

6. Find the prismoidal correction, if the area of cross sections were given as 114.65 sq. m and 56.76 sq. m, which are 2 m distant apart having 3 sides.

- a) 2214.24
- b) 3315.26
- c) 3531.25
- d) 3351.25

Answer: d

Explanation: The value of correction for prismoid can be given as

$C_p = d n(h-h_1)^2 / 6$. On substitution, we get

$$C_p = 2 \times 3(114.65 - 56.76)^2 / 6$$

$$C_p = 3351.25.$$

7. If the areas of cross sections of one side area given as 117.86 sq. m, 105.76 sq. m and the other side as 98.76 sq. m, 86.54 sq. m. the values of b, n, m, $\frac{h}{2}$ and d are given as 2, 3, 4, 4 and 1 respectively. Find the correction of prismoid in case of side hill section.

- a) 36.9
- b) 30.6
- c) 29.1
- d) 26.6

Answer: b

Explanation: The formula for the correction of prismoid in case of side hill section can be given as

$C_p = d(w-w_1) \left(\frac{b}{2} - \frac{b_1}{2} + m \cdot h - m \cdot \frac{h}{2} \right) / 12 \cdot n$. On substitution, we get

$$C_p = 1(117.86 - 98.76) \cdot (4 \cdot 105.76 - 4 \cdot 86.54) / 12 \cdot 3$$

$$C_p = 30.6.$$

8. Prismoidal correction can be applied to which of the following formulae?

- a) Rectangular formula
- b) Square formula
- c) Trapezoidal formula
- d) Quadrilateral formula

Answer: c

Explanation: Trapezoidal formula uses the prismoidal correction to reduce the error caused. The impact of the error must be reduced for having a better output. The formula derived for prismoidal correction is having similar conditions as of trapezoidal formula.

9. Find the correction applied for two-level section if area of cross sections at different sides were given as 115.31, 165.72 and 65.87, 54.23, which unit distant apart having number of sides 2.

- a) 459.33
- b) 495.33
- c) 594.33
- d) 543.22

Answer: a

Explanation: The formula for correction of two-level section can be given as

$C_p = d \cdot (w - w_1) \cdot (w_1 - w_2) / 6 \cdot n$. on substitution,

$$\text{We get } C_p = 1(115.31 - 65.87) \cdot (165.72 - 54.23) / 6 \cdot 2 = 459.33.$$

10. What will be the correction for three level sections, if the areas of 3 different sides, which are having unit distance are 121.31 sq. m, 145.76 sq. m, 176.65 sq. m and 45.87 sq. m, 45.67 sq. m, 72.43 sq. m?

- a) -89.76
- b) 25.92

- c) -52.98
- d) -25.96

Answer: d

Explanation: The formula of correction for three level section can be given as

$C_p = d \cdot (h - h_2) \cdot (w - w_2 + w_1 - w_1) / 12$. On substitution, we get

$C_p = 1 \cdot (121.31 - 45.87) \cdot (145.76 - 45.67 + 176.65 - 72.43) / 12$

$C_p = -25.96$.

This set of Surveying Multiple Choice Questions & Answers (MCQs) focuses on “Volume Measurement – Curvature Correction”.

1. Which of the following indicates the assumption assumed in case of curvature correction?

- a) End sections are parallel
- b) End sections are vertical
- c) End sections are not present
- d) End sections are perpendicular

Answer: a

Explanation: The curvature correction is applied in case of prismoidal and trapezoidal formulae. This correction is based on the assumption that the end sections are parallel.

2. Which of the following is not a case assumed in curvature correction?

- a) Two level section
- b) Three level section
- c) Four level section
- d) Side hill section

Answer: c

Explanation: The curvature correction is applied in case of the prismoidal and the trapezoidal formulae. This correction assumes certain cases like applying it in level-section, two level section, three level section, side hill section.

3. Level section requires application of correction.

- a) True
- b) False

Answer: b

Explanation: The level section one of the cases in the curvature correction. It requires no correction because it involves a symmetrical area about the central line, which makes it free from applying any type of correction.

4. For larger and smaller areas, same formula can be applied in case of side-hill section.

- a) False
- b) True

Answer: a

Explanation: The application of curvature correction requires involves a certain type of cases of which the side hill section has two sub cases. It involves smaller and larger areas. The formula for both differs in case of signs.

5. Correction for curvature is applied for getting _____

- a) Station points
- b) Ordinates
- c) Heights
- d) Equivalent areas

Answer: d

Explanation: The correction for curvature can be applied for obtaining the equivalent areas for the type of shape employed for the traverse. It is then followed by the usage of prismoidal formula.

6. What is the correction applied for two-level section if the area of the traverse is 121.45 sq. m and value of e = 9.34?

- a) 9.34 sq. m
- b) 9.06 sq. m
- c) 9.46 sq. m
- d) 9.43 sq. m

Answer: a

Explanation: The correction applied for two level section can be given as

$C = A \cdot e / A$, where e is the eccentricity and A is the area. On substitution, we get

$$C = 121.54 \cdot 9.34 / 121.54 = 9.34 \text{ sq. m.}$$

7. What will be the correction for curvature of three level sections, if the areas are given as 43.56 sq. m, 22.54 sq. m and $h = 56.43$ sq. m, $b = 2$, $n = 2$ which are having faces at a unity distance having 59.87 m radius?

- a) 220.91 sq. m
- b) 220.19 sq. m
- c) 202.65 sq. m
- d) 205.65 sq. m

Answer: b

Explanation: The formula of correction for curvature can be given as

$$C = d \cdot (w^2 - w_1^2) \cdot (h + b/2n) / 6R. \text{ On substitution, we get}$$

$$C = 1 \cdot (43.56^2 - 22.54^2) \cdot (56.43 + 2/2 \cdot 2) / 6 \cdot 59.87$$

$$C = 220.19 \text{ sq. m.}$$

8. Find the value of eccentricity if the values of area of the sides can be given as 134.76 sq. m, 56.76 sq. m and $A = 76.65$ sq. m with number of sides as 2.

- a) 3185.23 sq. m
- b) 3158.32 sq. m
- c) 3185.32 sq. m
- d) 3185.99 sq. m

Answer: c

Explanation: The eccentricity value can be given as,

$$e = w_1 \cdot w_2 \cdot (w_1 + w_2) / 3 \cdot A \cdot n. \text{ on substitution, we get}$$

$$e = 134.76 \cdot 56.76 \cdot (134.76 + 56.76) / 3 \cdot 76.65 \cdot 2$$

$$e = 3185.32 \text{ sq. m.}$$

9. Find the correction for side hill of two level section if the area is given as 654.76 sq. m, and the value of eccentricity is 89.76.

- a) 89.76 sq. m
- b) 98.76 sq. m
- c) 89.67 sq. m
- d) 98.54 sq. m

Answer: a

Explanation: The correction for the side hill of two level section can be given as

$$C = A \cdot e / A. \text{ On substitution, we get}$$

$$C = 654.76 \cdot 89.76 / 654.76$$

$$C = 89.76 \text{ sq. m.}$$

10. Find the value of e for side hill of small area by using the values provided. $W = 54.32$ sq. m, $b = 1$, $n = 2$, $h = 76.24$ sq. m.

- a) 43.87
- b) 87.98
- c) 96.1
- d) 69.1

Answer: d

Explanation: The value of eccentricity for small area can be given as,

$$e = (w_1 + b/2 + n \cdot h) / 3. \text{ On substitution, we get}$$

$$e = 69.1.$$

This set of Surveying Multiple Choice Questions & Answers (MCQs) focuses on "Adjustments of Dumpy Level".

1. Which principle is used in the process of permanent adjustment of dumpy level?

- a) Repetition
- b) Reiteration
- c) Recurring
- d) Reversion

Answer: d

Explanation: The principle of reversion is very much used in all adjustments. By reversing the instrument, the error becomes apparent.

2. Which of the following does not indicate a principle line?

- a) Line of sight
- b) Vertical axis
- c) Horizontal axis
- d) Axis of level tube

Answer: c

Explanation: The principle lines in a dumpy level include line of sight at intersection of cross-hairs, axis of level tube, vertical axis. These are to be adjusted in order to avoid the error.

3. Which of the following does not represent the condition of adjustment?

- a) Adjustment of vertical axis
- b) Adjustment of level tube
- c) Adjustment of cross hair ring
- d) Adjustment of line of sight

Answer: a

Explanation: The conditions of adjustment include Adjustments of level tube, cross-hair ring, line of sight which must be done so that there won't be any problem while using the instrument.

4. The principle of single reversion is involved in which of the following processes?

- a) Adjustment of vertical axis
- b) Adjustment of level tube
- c) Adjustment of cross hair ring
- d) Adjustment of line of sight

Answer: b

Explanation: Adjustment of level tube is the case of single reversion in which the apparent error is double the true error.

5. Which of the following processes is adopted when speed of the work is concerned?

- a) Adjustment of vertical axis
- b) Adjustment of cross hair ring
- c) Adjustment of level tube
- d) Adjustment of line of sight

Answer: c

Explanation: For ordinary work, adjustment of level tube is not essential but it is made for the sake of convenience in using the level. This adjustment is desirable for speedy work and convenience.

6. Which adjustment doesn't need any levelling?

- a) Vertical axis
- b) Horizontal axis
- c) Line of sight
- d) Cross-hair

Answer: d

Explanation: The objective of cross-hair adjustment is to ensure that the horizontal cross-hair lie in a plane perpendicular to the vertical axis. It is not necessary to level the instrument when the test is carried out.

7. The adjustment of line of collimation is having most priority in permanent adjustments.

- a) True
- b) False

Answer: a

Explanation: Once the desired relation is accomplished, the line of sight will be horizontal when the bubble is in the centre. This adjustment is very necessary, and is having prime importance since the whole function of the level is to provide horizontal line of sight.

8. Dumpy level is used for _____

- a) Finding point to point distance
- b) Finding the elevation difference
- c) Finding the traverse area
- d) Finding the perimeter of area

Answer: b

Explanation: Dumpy level is one of the levelling instruments, which is used for finding the elevation difference between the points so that slope and area of the particular traverse can be determined.

9. Permanent adjustments are done at every time the instrument is setup.

- a) True
- b) False

Answer: b

Explanation: Permanent adjustments are done at the time of manufacturing the instruments whereas temporary adjustments are done at every instrumental setup.

10. Determine the inclination of line of sight if $H = 2.654$ m and $H_2 = 1.876$ m and the distance between the points can be given as 150 m.

- a) $0^\circ 19'$
- b) $0^\circ 20'$
- c) $0^\circ 17'$
- d) $0^\circ 7'$

Answer: c

Explanation: The declination of line of sight can be given as

$\tan \hat{i} = (H - H_2) / AB$. On substitution, we get

$$\hat{i} = \tan^{-1} (2.654 - 1.876 / 150)$$

$$\hat{i} = 0^\circ 17'$$

11. Find the amount of inclination provided in case of two stations A and B having staff readings 0.984m, 0.765m which are placed at a distance of 100m.

- a) 1.23 m
- b) 0.98 m
- c) 0.44 m
- d) 0.22 m

Answer: d

Explanation: The amount of inclination provided can be determined by the difference between the points i.e., $0.984 - 0.765 = 0.22$ m in 100m.

12. Which among the following indicates the objective of adjusting level tube?

- a) Making horizontal axis truly horizontal
- b) Levelling the tube
- c) Making vertical axis truly vertical
- d) Making line of collimation perpendicular to vertical axis

Answer: c

Explanation: The objective of the adjusting the level tube is to make the vertical axis truly vertical so as to ensure that once the instrument is levelled up, the bubble will remain central in all directions of sighting.

13. The readings of staff at points A and B are given as 1.672 m, 2.484 m and 1.928 m, 3.124 m. Find the true elevation difference between the station points.

- a) 0.384 m
- b) 0.834 m
- c) 0.438 m
- d) 0.843 m

Answer: a

Explanation: The difference in elevation between the readings at A can be given as $2.484 - 1.672 = 0.812$ m and at B as $3.124 - 1.928 = 1.196$ m.

The true difference in elevation can be given as $1.196 - 0.812 = 0.384$ m.

This set of Surveying Multiple Choice Questions & Answers (MCQs) focuses on "Area Computation by Ordinate Rule".

1. Which of the following represents the correct set of ordinate rules used?

- a) Average ordinate rule, Trapezoidal rule
- b) Mid-ordinate rule, Mean ordinate rule
- c) Mid-ordinate rule, Average ordinate rule
- d) Trapezoidal rule, Mean ordinate rule

Answer: c

Explanation: The area from offsets can be calculated by using certain rules which include Mid-ordinate rule, Average ordinate rule, Trapezoidal rule, Simpson's one-third rule, of which the mid-ordinate and average ordinate rules come under ordinate rules set.

2. Find the length of the base line if the number of divisions are 4 and $d = 1.5\text{m}$.

- a) 2 m
- b) 6 m
- c) 2.5 m
- d) 8 m

Answer: b

Explanation: The value of length of the base can be found out by using the formula,

$L = n \cdot d$ and on substitution, we get

$L = 4 \cdot 1.5 = 6\text{ m}$.

3. Ordinate rule is based on which of the following assumptions?

- a) Boundaries of the offsets are straight lines
- b) Boundaries of the offsets are perpendicular
- c) Boundaries of the offsets are curves
- d) Boundaries of the offsets are parabolic

Answer: a

Explanation: The ordinate rule is used with the assumption that the boundaries between the extremities of the ordinates are straight lines. The base line is divided into number of divisions and the ordinates are measured at the midpoints of each division.

4. The area of the figure from ordinate rule can be determined as _____

- a) $A = \text{average ordinate} \cdot \text{perimeter}$
- b) $A = \text{average ordinate} \cdot \text{breadth}$
- c) $A = \text{average ordinate} \cdot \text{area}$
- d) $A = \text{average ordinate} \cdot \text{length of base}$

Answer: d

Explanation: The formula for area of figure from ordinate rule can be given as,

$A = \text{average ordinate} \cdot \text{length of base}$

Where, L can be determined by no. of divisions \cdot distance of each division.

5. Calculate the area by mid-ordinate rule if the value of $d = 2\text{m}$ and the ordinates are given as 24.69m, 42.96 m, 26.74m.

- a) 188.87 sq. m
- b) 881.78 sq. m
- c) 188.78 sq. m
- d) 198.78 sq. m

Answer: c

Explanation: The formula for the area of the mid-ordinate can be given as

$A = d \cdot \sum O$. On substitution, we get

$A = 2 \cdot (24.69 + 42.96 + 26.74)$

$A = 188.78\text{ sq. m}$.

6. Among the area calculation methods, which is more accurate?

- a) Area by co-ordinates
- b) Area by Simpson's one-third rule
- c) Area by double mean distances
- d) Area by offsets

Answer: b

Explanation: Though the area calculated by dividing into triangles helps in determining the area of the figure, the area calculated by using Simpson's rule helps in providing accurate results than the previously mentioned process.

7. Calculate the area by average co-ordinate rule, by using the offsets provided taken at 10m interval.

4.16, 6.34, 7.89, 6.54, 5.67, 7.76, 8.52, 5.87, 6.21

- a) 245.08m
- b) 542.08 m
- c) 524.08 m
- d) 528.04 m

Answer: b

Explanation: We have, $\hat{I}'' = (L * \hat{a}^{\circ}O) / (n+1)$

Here n = number of divisions = 8; n + 1 = number of ordinates = 8 + 1 = 9

L = Length of base = 10 x 8 = 80 m

$\hat{a}^{\circ}O = 4.16 + 6.34 + 7.89 + 6.54 + 5.67 + 7.76 + 8.52 + 5.87 + 6.21 = 58.96\text{m}$

$\hat{I}'' = (80 * 58.96) / 9 = 524.089\text{m}$.

8. Find the value of number of divisions if the area is 543.89 sq. m and the summation of the co-ordinates is given as 223.98 m.

- a) 2.42 m
- b) 2.24 m
- c) 4.22 m
- d) 2.56 m

Answer: a

Explanation: We know that, the area by mid-ordinate can be given as, $A = d * \hat{a}^{\circ}O$. from this, the value of d can be calculated as,

$d = A / \hat{a}^{\circ}O$

$d = 543.89 / 223.98$

$d = 2.42\text{m}$.

9. The calculation of area by ordinate rule and Simpson's rule will come under which category?

- a) Area by double mean distances
- b) Area by co-ordinates
- c) Area by triangles
- d) Area by offsets

Answer: d

Explanation: The area by offset method is suitable for long narrow strips of land. The offsets are measured from the boundary of the base line or a survey line at regular intervals. This method can also be applied to a plotted plan from which the offsets to a line can be scaled off.

10. Which of the following indicates the formula for area by average co-ordinate method?

- a) $\hat{I}'' = (L * \hat{a}^{\circ}O) / (n+1)$
- b) $\hat{I}'' = (L * \hat{a}^{\circ}O) / (n-1)$
- c) $\hat{I}'' = (L + \hat{a}^{\circ}O) / (n+1)$
- d) $\hat{I}'' = (L * \hat{a}^{\circ}O) / (n+1)$

Answer: a

Explanation: The area by average co-ordinate method is given as,

$\hat{I}'' = \text{Average ordinate} * \text{length of base}$

$\hat{I}'' = (L * \hat{a}^{\circ}O) / (n+1)$ where, $\hat{a}^{\circ}O = O_1 + O_2 + \dots + O_n$

This set of Surveying Multiple Choice Questions & Answers (MCQs) focuses on "Tacheometric Surveying" "Stadia Method Principle".

1. Horizontal distances are measured by direct methods, i.e. laying of chains or tapes on the ground.

- a) True
- b) False

Answer: a

Explanation: Generally, horizontal distances are measured by direct methods, i.e. laying of chains or tapes on the ground. These methods are not always convenient if the ground is undulating, rough, difficult and inaccessible.

2. If the ground is undulating, rough, difficult and inaccessible. Under these circumstances _____ methods are used to obtain distances.

- a) Direct methods
- b) Indirect methods
- c) Chain surveying
- d) Tacheometry

Answer: b

Explanation: Generally, horizontal distances are measured by direct methods, i.e. laying of chains or tapes on the ground. These methods are not always convenient if the ground is undulating, rough, difficult and inaccessible. Under these circumstances, indirect methods are used to obtain distances.

3. Which of the following is an indirect method of surveying?

- a) Chain surveying

- b) Tacheometry
- c) Countouring
- d) All of the mentioned

Answer: b

Explanation: Generally, horizontal distances are measured by direct methods, i.e. laying of chains or tapes on the ground. These methods are not always convenient if the ground is undulating, rough, difficult and inaccessible. Under these circumstances, indirect methods are used to obtain distances. One such method is "Tacheometry".

4. Using tacheometric methods, elevations can also be determined.

- a) True
- b) False

Answer: a

Explanation: Using tacheometric methods, elevations can also be determined. It is in fact a branch of angular surveying in which both the horizontal and vertical positions of points are determined from the instrumental observations, the chain surveys being entirely eliminated.

5. Which of the following is the branch of angular surveying in which both the horizontal and vertical positions of points are determined from the instrumental observations, the chain surveys being entirely eliminated?

- a) Tacheometry
- b) Contouring
- c) Ranging
- d) Random line method

Answer: a

Explanation: Using tacheometric methods, elevations can also be determined. It is in fact a branch of angular surveying in which both the horizontal and vertical positions of points are determined from the instrumental observations, the chain surveys being entirely eliminated.

6. Tacheometer has _____ number of horizontal hairs.

- a) 2
- b) 3
- c) 4
- d) 5

Answer: b

Explanation: A tacheometer is similar to an ordinary transit theodolite, generally a vernier theodolite itself, fitted with two stadia wires in addition to the central cross-hair. The stadia diaphragm has three horizontal hairs viz., a central horizontal hair and upper and lower stadia hairs.

7. Which of horizontal hairs are equivalent in stadia diaphragm of tacheometer?

- a) Upper and central
- b) Central and lower
- c) Upper and lower
- d) Lower, central and upper

Answer: c

Explanation: The stadia diaphragm has three horizontal hairs viz., a central horizontal hair and upper and lower stadia hairs. The upper and lower stadia hairs are equidistant from the central horizontal hair. Stadia hairs are sometimes called stadia lines.

8. The magnification of the telescope in tacheometer should be at least _____ to _____ diameters.

- a) 10 to 20
- b) 10 to 30
- c) 20 to 30
- d) 20 to 40

Answer: c

Explanation: For the purpose of tacheometry, even though an ordinary transit can be employed, accuracy and speed are increased if the instrument is specially designed for the work. The magnification of the telescope in tacheometer should be at least 20 to 30 diameters.

9. What should be the aperture required for tacheometer?

- a) 30mm
- b) 40mm
- c) 25mm
- d) 15mm

Answer: b

Explanation: The magnification of the telescope in tacheometer should be at least 20 to 30 diameters, with an aperture of at least 40 mm for a sufficiently bright image.

10. The magnifying power of the eyepiece is also smaller than for an ordinary transit to produce a clearer image of a staff held far away.

- a) True
- b) False

Answer: a

Explanation: The magnifying power of the eyepiece is also greater than for an ordinary transit to produce a clearer image of staff held far away.

11. For short sights of about _____ m or less, an ordinary levelling staff may be used. For long sights, special staff called stadia rod is generally used.

- a) 50
- b) 100
- c) 150
- d) 200

Answer: b

Explanation: For short sights of about 100 m or less, an ordinary levelling staff may be used. For long sights, special staff called stadia rod is generally used. The graduations are in bold type (face about 50 mm to 150 mm wide and 15 mm to 60 mm thick) and the stadia rod is 3 m to 5 m long. To keep the staff or stadia rod vertical, a small circular spirit level is fitted on its backside. It is hinged to fold up.

12. In fixed hair method, the distance between _____ hair and _____ hair are fixed.

- a) Upper and central
- b) Central and lower
- c) Upper and lower
- d) Lower, central and upper

Answer: c

Explanation: In this method, the distance between the upper hair and lower hair, i.e. stadia interval i , on the diaphragm of the lens system is fixed. The staff intercepts, therefore, changes according to the distance D and vertical angle \hat{I} .

13. Distance and elevation formulae for fixed hair method assuming line of sight as horizontal and considering an external focusing type telescope is $D = Ks + C$. where K is _____

- a) f/i
- b) i/f
- c) $f + c$
- d) $f \sin^2 c$

Answer: a

Explanation: The constant K is equal to (f/i) . It is called multiplying constant of the tacheometer and is generally kept as 100. The constant C is equal to $(f + c)$. It is called additive constant whose value ranges from 30 cm to 50 cm for external focusing telescopes and 10 cm to 20 cm for internal focusing telescopes.

14. For anallactic lens in $D = Ks + C$, which of the following is zero?

- a) D
- b) K
- c) C
- d) S

Answer: c

Explanation: The constant C is equal to $(f + c)$. It is called additive constant whose value ranges from 30 cm to 50 cm for external focusing telescopes and 10 cm to 20 cm for internal focusing telescopes. For telescopes fitted with anallactic lens, C equals zero.

15. Distance and elevation formulae for fixed hair method assuming the line of sight as horizontal and considering an external focusing type telescope is $D = Ks + C$. where C is _____

- a) f/i
- b) i/f
- c) $f + c$
- d) $f \sin^2 c$

Answer: c

Explanation: The constant K is equal to (f/i) . It is called multiplying constant of the tacheometer and is generally kept as 100. The constant C is equal to $(f + c)$. It is called additive constant whose value ranges from 30 cm to 50 cm for external focusing telescopes and 10 cm to 20 cm for internal focusing telescopes.

This set of Surveying Multiple Choice Questions & Answers (MCQs) focuses on “Area Computation using Simpson’s Rule”.

1. Find the area of the traverse using Simpson’s rule if $d = 12$ m and the values of ordinates are 2.25m, 1.46m, 3.23m, 4.46m.
- a) 116.88 sq. m
 - b) 161.88 sq. m
 - c) 611.88 sq. m
 - d) 169.54 sq. m

Answer: b

Explanation: The formula for Simpson’s rule can be given as $\hat{I}'' = (d/3) * ((O_0 + O_4) + 4 * (O_1 + O_3) + 2 * (O_2 + O_4))$. On substitution, we get
 $\hat{I}'' = (12/3) * ((2.25 + 4.46) + 4 * (2.25 + 3.23) + 2 * (1.46 + 4.46))$
 $\hat{I}'' = 161.88$ sq. m.

2. Simpson’s rule assumes that boundary between the ordinates are parabolic arcs.
- a) True
 - b) False

Answer: a

Explanation: In Simpson’s rule, it is assumed that the short lengths of the boundaries can form parabolic arcs. Simpson’s rule can be useful when boundary line departs from a straight line rather than a curve.

3. The results obtained are greater than which among the following?
- a) Prismoidal rule
 - b) Trapezoidal rule
 - c) Rectangular rule
 - d) Square rule

Answer: b

Explanation: Due to the presence of curvature at the boundary whether it may be concave or convex towards the base line, the results are depended. It makes them greater than that obtained from the trapezoidal rule.

4. The value obtained from Simpson’s rule depends on the nature of the curve.
- a) True
 - b) False

Answer: a

Explanation: The results obtained by Simpson’s rule are more accurate when compared to all cases. The results obtained by using Simpson’s rule are greater or smaller than those obtained by using the trapezoidal rule according as the curve of the boundary is concave or convex towards the base line.

5. Find the area of segment if the values of co-ordinates are given as 119.65m, 45.76m and 32.87m. They are placed at a distance of 2 m each.
- a) 20.43 sq. m
 - b) 2.34 sq. m
 - c) 20.34 sq. m
 - d) 87.34 sq. m

Answer: c

Explanation: The area of the segment can be found out by using,
 $A = (2/3) * (O_1 - (O_0 + O_2/2))$. On substitution, we get
 $A = (2/3) * (45.76 - (119.65 + 32.87/2))$
 $A = -20.34$ Sq. m (negative sign has no significance)
 $A = 20.34$ sq. m.

6. In which of the following cases, Simpson’s rule is adopted?
- a) When straights are perpendicular
 - b) When straights are parallel
 - c) When straights form curves
 - d) When straights form parabolic arcs

Answer: b

Explanation: Even though Simpson's rule assumes that short lengths of boundary between the ordinates are parabolic arcs, this method is more accurate for the case when straights act as a parallel to each other.

7. The total number of ordinates present must be _____

- a) Real numbers
- b) Complex
- c) Even
- d) Odd

Answer: d

Explanation: The presence of ordinates help in determining the area by substituting them in the formula provided. Odd number presence makes them calculate in an easy manner without involving tedious procedure.

8. Which of the following shapes is generally preferred in case of application of Simpson's rule?

- a) Square
- b) Triangle
- c) Trapezoid
- d) Rectangle

Answer: c

Explanation: The application of Simpson's rule generally involves usage of trapezoids which can involve as many sides as possible. To have any accuracy in the output it is recommended to consider a trapezoid.

9. Which of the following can the Simpson's rule possess?

- a) Negatives
- b) Accuracy
- c) Positives
- d) Zero error

Answer: b

Explanation: Accuracy is the main plus point in case of Simpson's rule. Due to the involvement of odd number of sides and also the procedure, the accuracy levels in this process are good enough for producing good result.

10. Which of the following indicates the formula for Simpson's rule?

- a) $\hat{I}'' = (d/3) * ((O_0 + O_n) + 4 * (O_1 + O_3 + \dots) + 2 * (O_2 + O_4 + \dots))$
- b) $\hat{I}'' = (d/3) * ((O_0 + O_n) + 2 * (O_1 + O_3 + \dots) + 2 * (O_2 + O_4 + \dots))$
- c) $\hat{I}'' = (d/3) * ((O_0 + O_n) + 4 * (O_1 + O_3 + \dots) + 2 * (O_2 + O_4 + \dots))$
- d) $\hat{I}'' = (d/3) * ((O_0 + O_n) + 2 * (O_1 + O_3 + \dots) + 4 * (O_2 + O_4 + \dots))$

Answer: a

Explanation: The formula for Simpson's rule can be given as the sum of the two end ordinates plus four times the sum of even intermediate ordinates plus twice the sum of odd intermediate ordinates, the whole multiplied by one-third the common interval between them. This can be mathematically expressed as,

$$\hat{I}'' = (d/3) * ((O_0 + O_n) + 4 * (O_1 + O_3 + \dots) + 2 * (O_2 + O_4 + \dots))$$

This set of Surveying online quiz focuses on “Tacheometric Surveying – Subtense Method Principle”.

1. In the subtense bar method, the horizontal angle subtended by two targets fixed on a horizontal bar at a known distance apart is measured at instrument station by theodolite.

- a) True
- b) False

Answer: a

Explanation: In the subtense bar method, the horizontal angle subtended by two targets fixed on a horizontal bar at a known distance apart is measured at instrument station by theodolite. The two targets are at a distance s apart, and each at s/2 from the centre, i.e. vertical axis.

2. The two targets are at a distance s apart, and each at s/2 from the centre, i.e. vertical axis. The horizontal angle \hat{I} is measured carefully by means of a theodolite. Then what is the value of D in the subtense bar method?

- a) $s/2\hat{I}$
- b) s/\hat{I}
- c) $s/4\hat{I}$
- d) $2s/\hat{I}$

Answer: b

Explanation: From the geometry, $D = \frac{1}{2} s \cot \frac{\hat{I}}{2}$, where, s = the distance between the targets of subtense bar, and \hat{I} = apex angle subtended by targets at O. As \hat{I} is small $\tan \frac{\hat{I}}{2} = \frac{\hat{I}}{2}$, $D = \frac{s}{\hat{I}}$.

3. The following readings were taken with a tachometer on to a vertical staff. Horizontal Distance Stadia Readings 46.20 m 0.780; 1.010; 1.240 51.20 m 1.860; 2.165; 2.470. Calculate the tacheometric constants.

- a) 100, 0.20 m
- b) 200, 0.10 m
- c) 100, 0.10 m
- d) 200, 0.20 m

Answer: a

Explanation: $D = Ks + C$, where the constant K is equal to (f/i) . It is called multiplying constant of the tachometer and is generally kept as 100. The constant C is equal to $(f + c)$. It is called an additive constant.

4. Stadia readings were taken with a theodolite on a vertical staff with the telescope inclined at an angle of depression of $3^\circ 30'$. The staff readings were 2.990, 2.055 and 1.120. The reduced level of the staff station is 100.000m, and the height of the instrument is 1.40 m. What is the reduced level of the ground at the instrument? Take constants as 100 and zero.

- a) 102.050 m
- b) 122.050 m
- c) 112.050 m
- d) 132.050 m

Answer: c

Explanation: Use $D = Ks + C$, where the constant K is equal to (f/i) . It is called multiplying constant of the tachometer and is generally kept as 100. The constant C is equal to $(f + c)$. It is called an additive constant.

5. A tachometer is setup at an intermediate point on a traverse course PQ and the following observations are made on a staff held vertical. Staff Station Vertical Angle Staff Intercept Axial Hair Readings P + $9^\circ 30'$ 2.250 2.105 Q + $6^\circ 00'$ 2.055 1.975 The constants are 100 and 0. Compute the length PQ and the reduced level of Q. RL of P = 350.50 m.

- a) 428.13 m; 335.47 m
- b) 402.13 m; 335.47 m
- c) 422.13 m; 305.47 m
- d) 422.13 m; 335.47 m

Answer: d

Explanation: Use $D = Ks + C$, where the constant K is equal to (f/i) . It is called multiplying constant of the tachometer and is generally kept as 100. The constant C is equal to $(f + c)$. It is called an additive constant.

6. Following observations were taken with a tachometer fitted with an anallactic lens having value of constant as 100.

Inst. Station	Staff station	Reduced bearing	Vertical angle	Staff reading
O	P	N37W	412	0.910, 1.510, 2.110
O	Q	N23E	542	1.855, 2.705, 3.555

Calculate the horizontal distance between P and Q.

- a) 149.96 m
- b) 140.26 m
- c) 141.92 m
- d) 143.56 m

Answer: a

Explanation: Use $D = Ks + C$, where the constant K is equal to (f/i) . It is called multiplying constant of the tachometer and is generally kept as 100. The constant C is equal to $(f + c)$. It is called an additive constant. Use formula $a^2 = b^2 + c^2 - 2bc \cos A$. From the geometry, $D = \frac{1}{2} s \cot \frac{\hat{I}}{2}$, where, s = the distance between the targets of subtense bar, and \hat{I} = apex angle subtended by targets at O. As \hat{I} is small $\tan \frac{\hat{I}}{2} = \frac{\hat{I}}{2}$, $D = \frac{s}{\hat{I}}$.

7. The horizontal angle subtended at the theodolite station by a subtense bar with vanes 3 m apart is $0^\circ 10' 40''$. Calculate the horizontal distance between the theodolite and the subtense bar?

- a) 960.00 m
- b) 966.87 m
- c) 966.78 m
- d) 906.87 m

Answer: b

Explanation: Use from the geometry, $D = \frac{1}{2} \times s \times \cot \frac{\hat{I}}{2}$, where, s = the distance between the targets of subtense bar, and \hat{I} = apex angle subtended by targets at O. As \hat{I} is small $\tan \frac{\hat{I}}{2} = \frac{\hat{I}}{2}$, $D = \frac{s}{\hat{I}}$.

8. The vertical angles to vanes fixed at 1 m and 3 m above the foot of the staff held vertically at a station P were 45° and 30° , respectively. Find the horizontal distance and the reduced RL of P if the RL of the instrument axis is 110.00 m?

- a) 26.95 m, 100.177
- b) 20.95 m, 108.177
- c) 26.95 m, 108.177
- d) 26.95 m, 108.000

Answer: c

Explanation: Use from the geometry, $D = \frac{1}{2} \times s \times \cot \frac{\hat{I}}{2}$, where, s = the distance between the targets of subtense bar, and \hat{I} = apex angle subtended by targets at O. As \hat{I} is small $\tan \frac{\hat{I}}{2} = \frac{\hat{I}}{2}$, $D = \frac{s}{\hat{I}}$.

9. The following notes refer to a traverse run by a tacheometer fitted with an anallactic lens, with constant 100 and staff held vertical. Line, Bearing, Vertical Angle, Staff Intercept -PQ, $30^\circ 24'$, $+5^\circ 06'$, 1.875; QR, $300^\circ 48'$, $+3^\circ 48'$, 1.445; RS, $226^\circ 12'$, $2^\circ 36'$, 1.725 respectively. Find the length and bearing of SP.

- a) 191.930 m, $126^\circ 47' 47''$
- b) 190.930 m, $125^\circ 47' 47''$
- c) 193.930 m, $124^\circ 47' 47''$
- d) 192.930 m, $120^\circ 47' 47''$

Answer: a

Explanation: Use $D = Ks + C$, where the constant K is equal to (f/i) . It is called multiplying constant of the tacheometer and is generally kept as 100. The constant C is equal to $(f + c)$. It is called an additive constant. From the geometry, $D = \frac{1}{2} \times s \times \cot \frac{\hat{I}}{2}$, where s = the distance between the targets of subtense bar, and \hat{I} = apex angle subtended by targets at O. As \hat{I} is small $\tan \frac{\hat{I}}{2} = \frac{\hat{I}}{2}$, $D = \frac{s}{\hat{I}}$.

10. Distance and elevation formulae for fixed hair method assuming the line of sight as horizontal and considering an external focusing type telescope is $D = Ks + C$, where C is _____

- a) f/i
- b) i/f
- c) $f + c$
- d) $f - c$

Answer: c

Explanation: The constant K is equal to (f/i) . It is called multiplying constant of the tacheometer and is generally kept as 100. The constant C is equal to $(f + c)$. It is called additive constant whose value ranges from 30 cm to 50 cm for external focusing telescopes and 10 cm to 20 cm for internal focusing telescopes.

This set of Surveying Multiple Choice Questions & Answers (MCQs) focuses on "Electromagnetic Waves".

1. Modern EDM uses which among the following waves?

- a) Visible rays
- b) Thermal infra-red
- c) Modulated infra-red
- d) Radio waves

Answer: c

Explanation: Modern EDM uses the modulated infra-red waves, which are capable of receiving the reflected waves from a distance of 100km.

2. Which property of an electromagnetic wave, depends on the medium in which it is travelling?

- a) Velocity
- b) Frequency
- c) Time period
- d) Wave length

Answer: a

Explanation: The frequency, wavelength and time period can all vary according to the wave producing source. But, the velocity of an electromagnetic wave depends upon the medium through which it is travelling. The velocity of wave in a vacuum is termed as speed of light, which is assumed to be 3×10^8 m/s.

3. The distance in EDM is measured by _____
- a) Frequency of the wave
 - b) Wave length
 - c) Phase difference
 - d) Amplitude

Answer: c

Explanation: In general, the various EDM systems available do not measure the transit time directly. The distance is determined by measuring the phase difference between the transmitted and reflected signals, which possible only when the process is done without errors.

4. Tellurometer, a type of EDM uses which of the following waves?
- a) Visible rays
 - b) Infra-red waves
 - c) Micro waves
 - d) Radio waves

Answer: d

Explanation: Tellurometer is generally having a range of 100km i.e., it is capable of measuring distance up to 100km. In order to function properly it requires a high range propagating wave, which can reflect back to the instrument.

5. Find the value of D if the wave length of the wave is 40m, $n=2$ and the angles are given as $\hat{I}_1 = 0^\circ$, $\hat{I}_2 = 180^\circ$.
- a) 50m
 - b) 40m
 - c) 20m
 - d) 10m

Answer: a

Explanation: The value of D can be found by,

$2D = n \cdot \hat{I}_1 + \hat{I}_2$. On substitution, we get

$$2D = 40 \cdot (2 + (180 - 0/360))$$

$$D = 50 \text{ m.}$$

6. Electromagnetic waves are represented in which of the following format?
- a) Longitudinal waves
 - b) Transverse waves
 - c) Sinusoidal waves
 - d) Surface waves

Answer: c

Explanation: A sinusoidal wave describes the oscillation periodically. Since the electromagnetic wave is represented in the form of sine curve it is named after it as sinusoidal wave.

7. For increasing accuracy, high frequency of propagation is used.
- a) True
 - b) False

Answer: a

Explanation: In order to increase accuracy, it is recommended to use an extremely high frequency of propagation. However, the available phase comparison techniques cannot be used at frequencies greater than 5×10^6 Hz, which corresponds to a wavelength of 0.6 m.

8. What would be the value of length if the distance is given as 30m, $m=3$ and the change in length is 8m.
- a) 7.43m
 - b) 7.34m
 - c) 6.34m
 - d) 5.43m

Answer: b

Explanation: The value of length can be found out by using the formula,

$$D = m \cdot l + \hat{I}$$

On substitution, we get

$$30 = 3 \cdot l + 8$$

$$L = 7.34 \text{ m.}$$

9. Phase difference can be expressed in which of the following format?
- a) Meters per second

- b) Meters
- c) Cycles
- d) Seconds

Answer: c

Explanation: In the total station, the distance between two point scan be determined by measuring the phase difference between transmitted and reflected signals. Phase difference can be expressed in terms of the fraction of cycles, which provides the best output for quick calculation and for easy understanding.

10. Which of the following represents the correct sequence for the basis of EDM propagation?

- a) Propagation, generation, reflection and reception
- b) Generation, reception, reflection and propagation
- c) Generation, propagation, reception and reflection
- d) Generation, propagation, reflection and reception

Answer: d

Explanation: Electronic Distance Measurement method is based on generation, propagation, reflection and subsequent reception of electromagnetic waves. The type of electromagnetic waves generated depends on many factors but mainly, on the nature of the electrical signal used to generate the waves. It follows the above-mentioned sequence without any disturbance in it.

This set of Surveying Multiple Choice Questions & Answers (MCQs) focuses on “EDM – Modulation”.

1. In amplitude modulation, which among the following is constant?

- a) Amplitude
- b) Frequency
- c) Wave length
- d) Time period

Answer: b

Explanation: In amplitude modulation, the carrier wave has constant frequency and the modulating wave information is conveyed by the amplitude of the carrier waves.

2. Modern phase techniques are capable of _____

- a) Resolving modulation
- b) Resolving amplitude
- c) Resolving frequency
- d) Resolving wave length

Answer: d

Explanation: Modern phase comparison techniques are able to possess a better resolving capacity than the remaining techniques. They can resolve better than 1/1000 part of a wavelength.

3. Lower frequency is not suitable in _____

- a) Direct transmission
- b) Distance calculation
- c) Determination of wavelength
- d) Determination of frequency

Answer: a

Explanation: The range of lower frequency is not suitable in case of direct transmission through the atmosphere because it may involve in atmospheric conditions like interference, reflection, fading and scattering. This may decrease the impact of frequency which may reduce the information being transmitted.

4. Which of the following represents the correct set of modulation classification?

- a) Frequency, time period
- b) Frequency, amplitude
- c) Amplitude, wavelength
- d) Wavelength, frequency

Answer: b

Explanation: The interference technique can be eradicated by modulation, which involves two classifications. They are amplitude and frequency modulations, which can be super imposed during phase comparison.

5. Which of the following indicates the correct set of frequency employed in measuring process?

- a) 7×10^6 to 5×10^8 Hz
- b) 7.5×10^6 to 4.5×10^8 Hz

- c) 7.5×10^6 to 5.9×10^8 Hz
- d) 7.5×10^6 to 5×10^8 Hz

Answer: d

Explanation: In general, the present situation needs a frequency range of approximately 7.5×10^6 to 5×10^8 Hz. This can be used in order to determine the distance between the points and also employed in EDM instruments.

6. Which of the following is constant in the case of frequency modulation?

- a) Modulation
- b) Wavelength
- c) Amplitude
- d) Frequency

Answer: c

Explanation: In frequency modulation, the carrier wave has constant amplitude and the modulating wave information is conveyed by the amplitude of the carrier waves.

7. Which cannot be done in high frequency zones?

- a) Phase comparison
- b) Super imposition of waves
- c) Distance measurement
- d) Wavelength measurement

Answer: a

Explanation: In high frequency zones, the phase comparison techniques cannot be applied. The high frequency may be determined as 5×10^8 Hz which may correspond to a wave length of 0.6 m.

8. Modulating wave can also be known as _____

- a) Total wave
- b) Measuring wave
- c) Super wave
- d) Incubation wave

Answer: b

Explanation: Modulation involves the overcoming of the problems raised due to the interference, scattering, etc. In this, the measuring wave is super imposed on a carrier wave of high frequency, so it is also known as measuring wave.

9. If 10mm is the accuracy considered, what will be the maximum value of \hat{I}_w for 1/1000 part?

- a) 10000 m
- b) 10 cm
- c) 10 m
- d) 10000 cm

Answer: c

Explanation: The maximum value of the wave length can be determined by multiplying assumed wave length with the accuracy considered, which means, $\hat{I}_w = 10 \times 1000 = 10$ m.

10. Frequency modulation is equipped in all EDM instruments.

- a) True
- b) False

Answer: a

Explanation: In frequency modulation, the carrier wave has constant amplitude and frequency varies in proportion to the amplitude of the modulating wave. Frequency modulation is used in all EDM instruments, while amplitude modulation is done in visible light instruments and infrared instruments.

This set of Surveying Multiple Choice Questions & Answers (MCQs) focuses on "Types of EDM Instruments".

1. Different types of EDMs are obtained on the basis of _____

- a) Wave length
- b) Carrier wave
- c) Frequency
- d) Time period

Answer: b

Explanation: EDM instruments can be classified based on the type of carrier wave employed. The classification

includes microwave, Infra-red, visible light instruments. It can be observed that all three categories of EDM instruments use short wavelengths and hence higher frequencies.

2. Which among the following EDM instruments is having more range?

- a) Infra-red instruments
- b) Visible light instruments
- c) Microwave instruments
- d) Gamma ray instruments

Answer: c

Explanation: The frequency range of the microwave instrument is about 3-30 kHz which provides it the ability to cover a range up to 100km. The usage of gamma rays is not possible in the case of Total station.

3. Which type of modulation is used in the case of microwave instrument?

- a) Frequency modulation
- b) Amplitude modulation
- c) Carrier wave modulation
- d) Time period modulation

Answer: a

Explanation: Frequency modulation is used in all kinds of EDM instruments which make it feasible, but, amplitude modulation is also used in remaining classifications which makes it quite different from the microwave instruments.

4. The frequency range used in visible light instruments is _____

- a) 5×10^{11} Hz
- b) 5×10^8 Hz
- c) 5×10^{10} Hz
- d) 5×10^{14} Hz

Answer: d

Explanation: The frequency range in the visible light instruments is capable of determining the range of its calculation which may affect it.

5. Geodimeter uses which of the following waves as a carrier wave?

- a) Microwaves
- b) Visible light
- c) Infra-red
- d) Cosmic rays

Answer: b

Explanation: Geodimeter is a classification of EDM based on carrier wave. This instrument uses visible light as its source and possesses a range of 25 km, having accuracy up to 2-3km.

6. Microwave EDM instrument requires two instrument stations.

- a) True
- b) False

Answer: a

Explanation: Visible light EDM instrument requires only one instrument station whereas the microwave EDM instrument requires two instrument stations which make it quite expensive and accurate as it can cover long distances.

7. What among the following indicates the range of Geodimeter?

- a) 20 km
- b) 30 km
- c) 25km
- d) 35 km

Answer: c

Explanation: Geodimeter uses visible light as a carrier wave in which it is capable of obtaining information, like the distance between the points, within 25km of range.

8. The wavelength of I.R in infra-red instruments is about _____

- a) 0.6×10^{-6} m
- b) 1.0×10^{-6} m
- c) 0.7×10^{-6} m

d) 0.9×10^{-6} m

Answer: d

Explanation: Infra-red instruments use infra-red waves as carrier waves. These are widely used in the present day as these are able to provide information with less economy.

9. Frequency modulation is used in the case of visible light EDM.

- a) True
- b) False

Answer: b

Explanation: Though frequency modulation is used in all the EDM instruments, the usage of amplitude modulation is more in case of visible light EDM instrument, which is capable of keeping frequency constant and measure the wavelength for calculation phase difference.

10. Which among the following EDM instruments are capable of producing output with less expenditure?

- a) Microwave instruments
- b) Cosmic ray instruments
- c) Visible light instruments
- d) Infra-red instruments

Answer: d

Explanation: Infra-red instruments use Gallium-Arsenide diode as a source for obtaining infra-red waves. These diodes can be easily directed to amplitude modulation at high frequencies. So, infra-red carrier wave is obtained by an inexpensive method, which makes the entire process inexpensive.

This set of Surveying Multiple Choice Questions & Answers (MCQs) focuses on “EDM – Total Station”.

1. In total station, data is stored in _____

- a) Pen drive
- b) Data card
- c) Micro processor
- d) External hardware

Answer: c

Explanation: Micro processor provided in the instrument helps in saving the data and helps in transferring it to the system, by which it can be viewed in different software.

2. Compensator can make complete adjustments in total station.

- a) True
- b) False

Answer: b

Explanation: The use of compensator can be found in case of finding vertical angles, where the instrument has to be perfectly levelled. But the compensator isn't sufficient to provide perfect levelling. Manual operation is also involved in obtaining perfect level.

3. Vertical angle is measured in the total station as Zenith angle.

- a) False
- b) True

Answer: b

Explanation: The vertical angle is usually measured as a zenith angle which indicates 0° vertically up, 90° at horizontal, and 180° vertically down. The zenith angle is generally easier to work.

4. Which of the following indicates the formula for converting slope distance to horizontal distance?

- a) $S = H (\sin z)$
- b) $H = S \cdot S (\sin z)$
- c) $H \cdot H = S (\sin z)$
- d) $H = S (\sin z)$

Answer: d

Explanation: The slope distance obtained can be used for calculating horizontal distance from the formula, $H = S (\sin z)$ where, H= horizontal distance, S = slope distance.

5. When total station is sighted to the target, which of the operation acts first?

- a) Rotation of optical axis
- b) Rotation of vertical axis

- c) Rotation of horizontal axis
- d) Rotation of line of collimation

Answer: a

Explanation: At the time of sighting the instrument towards the target, first step involves the rotation of the instrument's optical axis from the instrument north in horizontal plane.

6. Which of the following indicates the correct set of the combination of total station?

- a) Theodolite, compass
- b) Theodolite, EDM
- c) Electronic theodolite, EDM
- d) EDM, GPS

Answer: c

Explanation: A total station is a combination of an electronic theodolite and an Electronic Distance Measurement. This combination makes it possible to determine the coordinates of a reflector by aligning the instruments cross-hairs on the reflector and simultaneously measuring the vertical, horizontal angles and slope distances.

7. Which among the following doesn't indicate the basic calculation of the total station?

- a) Horizontal distance
- b) Slope distance
- c) Vertical distance
- d) Co-ordinate calculations

Answer: b

Explanation: The basic calculations of total stations include horizontal distance, vertical distance, co-ordinate distance in which, slope distance is used in horizontal distance calculations. It is obtained directly from the total station equipment.

8. The formula for difference in elevation can be given as _____

- a) $D = V + (I - R)$
- b) $D = V + (I + R)$
- c) $D = V - (I - R)$
- d) $D = V * (I - R)$

Answer: a

Explanation: The difference in elevation can be given as $D = V + (I - R)$ where, V= vertical difference between two points, I=instrument height, R = height of centre of reflector.

9. In which direction it is best to place the total station for obtaining the best output?

- a) East
- b) West
- c) South
- d) North

Answer: d

Explanation: The best procedure while using a Total Station is to set a convenient "north" and carry this through the survey by using back sight process when the instrument is moved.

10. The data obtained from total station can be used in which among the following software directly?

- a) Primavera
- b) STAAD PRO
- c) Autodesk Revit
- d) Surfer

Answer: d

Explanation: The data obtained from the total station can be indirectly used in STAAD Pro, Autodesk Revit, Primavera but it can be directly used in software's like Arc GIS, Surfer, Auto CAD etc., as they are linked with it.

11. Calculation the elevation difference if the vertical distance is 14.89m, instrument height is 9.2m, ground is at 2.8m.

- a) 21.29 m
- b) 12.29 m
- c) 21.92 m
- d) 41.29 m

Answer: a

Explanation: The elevation difference in total station can be calculated as

$dz = V_d + (I_h - R_h)$. On substitution, we get

$$dz = 14.89 + (9.2 - 2.8)$$

$$dz = 21.29 \text{ m.}$$

12. Find the vertical distance if the value of slope distance can be given as 12.98 and the angle is $1^\circ 23'$.

- a) 21.97m
- b) 12.97m
- c) 12.79m
- d) 21.79m

Answer: b

Explanation: The vertical distance can be calculated by using the formula,

$$V_d = S_d \cdot \cos Z_a = 12.98 \cdot \cos (1^\circ 23') \quad V_d = 12.97 \text{ m.}$$

13. Find the elevation of ground beneath the reflector, if the known elevation of instrument is 12.76m, slope distance = 3.76m, angle is about $3^\circ 43'$, instrument height = 2.93m, ground is at 0.987 m.

- a) 18.54m
- b) 81.54m
- c) 18.45m
- d) 18.97m

Answer: c

Explanation: The elevation of ground beneath the reflector can be given as

$$R_z = I_z + S_d \cdot \cos Z_a + I_h - R_h \quad \text{On substitution, we get}$$

$$R_z = 12.76 + (3.76 \cdot \cos (3^\circ 43')) + 2.93 - 0.987$$

$$R_z = 18.45 \text{ m.}$$

This set of Surveying Multiple Choice Questions & Answers (MCQs) focuses on "Designation of Curve".

1. Which of the following does not represent the classification of the curve?

- a) Simple
- b) Compound
- c) Complex
- d) Reverse

Answer: c

Explanation: A curve can be expressed as a turning which is provided for a change in direction. It is classified as Simple curve, Compound curve, Reverse curve, Transition curve.

2. The formula for length of the curve can be given as _____

- a) $L = R \cdot \hat{I}$
- b) $L = R + \hat{I}$
- c) $L = R \cdot \left(\tan \left(\frac{\hat{I}}{2} \right) \right)$
- d) $L = R / \hat{I}$

Answer: a

Explanation: Length of the curve can be given as the total distance from point of curvature to point of tangent, which is given as $L = R \cdot \hat{I}$ where, \hat{I} is the deflection angle.

3. Sharpness of the curve can be determined by _____

- a) Chord length
- b) Radius
- c) Mid-ordinate
- d) Tangent

Answer: b

Explanation: The sharpness of the curve can be determined by the radius or by its degree of curvature. In India, degree of curvature method is adopted due to the circumstances.

4. Relation between radius and degree of curvature can be approximately given as _____

- a) $R = 5370 / D$
- b) $R = 7530 / D$
- c) $R = 5770 / D$
- d) $R = 5730 / D$

Answer: d

Explanation: The relation between radius and degree of curvature can be given as, $R = 5730 / D$. It is an approximation which can be verified by applying check if necessary.

5. The relation of radius and degree of curvature cannot be applied for small radius.

- a) True
- b) False

Answer: a

Explanation: We know that the relation between radius and degree of curvature is an approximate value, it cannot be applied for smaller curves and also for obtaining more accuracy in work, it is recommended to take exact value rather than approximate value.

6. The maximum curvature provided for a highway is about _____

- a) 10^0
- b) 20^0
- c) 30^0
- d) 50^0

Answer: b

Explanation: Over turning of vehicle depends upon the amount of curvature provided, which should be at a minimum rate. In general, highways are provided curvature and railway track is having curvature about 1^0 .

7. While designing a curve, which among the following must be taken into consideration?

- a) Minerals present
- b) Geomorphology
- c) Topography
- d) Rocks present

Answer: c

Explanation: For designing a curve, topography must be given at most importance which plays a crucial role in determining its durability. Topography involves obtaining information about the folds, faults, undulations present. So that care can be taken while designing.

8. Length of the curve depends on the criteria used for defining the degree of the curve.

- a) True
- b) False

Answer: a

Explanation: In India, all the curves are designated based on the degree of curvature which is different from the curve designated based on radius. The criteria used will be depending upon the degree obtained by the curve, which are pre-defined.

9. Mid-ordinate is also known as _____

- a) Cosine of curve
- b) Sine of curve
- c) Versed cosine of curve
- d) Versed sine of curve

Answer: a

Explanation: The value of mid-ordinate can be given as, $M = R (1 - \cos(\hat{I}''/2))$ in which the value $(1 - \cos(\hat{I}''/2))$ is expressed as versed sine. Mid-ordinate is the ordinate from midpoint of long chord to midpoint of curve.

10. The formula for tangent length can be given as _____

- a) $T = R + \tan(\hat{I}''/2)$
- b) $T = R * \tan(\hat{I}''/2)$
- c) $T = R / \tan(\hat{I}''/2)$
- d) $T = R \cdot \tan(\hat{I}''/2)$

Answer: b

Explanation: The tangent distance can be defined as the distance between point of curvature to point of intersection, which is given as $T = R \tan(\hat{I}''/2)$. Here, \hat{I}'' = deflection angle which is determined by setting instrument at required points.

11. Find the value of mid-ordinate if the value of R can be given as 22.19m and the angle is given as $19^{\circ}21'21''$.

- a) 0.89 m
- b) 0.98 m

- c) 0.13 m
d) 0.31 m

Answer: d

Explanation: The mid-ordinate can be determined by $R - R \cdot \cos(\hat{I}/2)$, which on substitution may obtain,
 $= 22.19 - 22.19 \cdot \cos(19^\circ 21' 42''/2)$
 $= 0.31 \text{ m}.$

12. What would be the length of the curve, if the radius of the curve is 24.69m and the angle is given as $12^\circ 42'$?

- a) 9.87 m
b) 5.74 m
c) 5.47 m
d) 9.78 m

Answer: c

Explanation: The formula for finding the length of the curve can be given as $l = R \cdot (\pi/180) \cdot \hat{I}$. On substitution, we get

$$l = 24.69 \cdot (\pi/180) \cdot 12^\circ 42'$$

$$l = 5.47 \text{ m}.$$

13. Find the tangent length if the radius of the curve and its angle were given as 42.64m and $42^\circ 12'$.

- a) 16.45 m
b) 16.54 m
c) 61.45 m
d) 61.54 m

Answer: a

Explanation: The value of tangent length can be found out by using the formula,

$$T = r \cdot \tan(\hat{I}/2).$$

$$T = 42.64 \cdot \tan(42^\circ 12'/2)$$

$$T = 16.45 \text{ m}.$$

14. What would be the value of apex distance if the angle is given as $13^\circ 42'$ and the radius of the curve is given as 19.24m?

- a) 0.1134 m
b) 0.831 m
c) 0.318 m
d) 0.138 m

Answer: d

Explanation: The apex distance for a simple curve can be given as

$$E = R \cdot (\sec(\hat{I}/2) - 1).$$

$$E = 19.24 \cdot (\sec(13^\circ 42'/2) - 1)$$

$$E = 0.138 \text{ m}.$$

15. If the radius of the curve is given as 14.96m and the angle is about $32^\circ 24'$, find the length of the chord.

- a) 8.43 m
b) 8.34 m
c) 4.83 m
d) 3.43 m

Answer: b

Explanation: Length of the chord can be given as $L = 2 \cdot r \cdot \sin(\hat{I}/2)$

$$L = 2 \cdot 14.96 \cdot \sin(32^\circ 24'/2)$$

$$L = 8.34 \text{ m}.$$

This set of Surveying Multiple Choice Questions & Answers (MCQs) focuses on "Setting out Simple Curves".

1. Which among the following indicates the correct set of methods for setting out a simple curve?

- a) Angular method, curvature method
b) Linear method, angular method
c) Curvature method, linear method
d) Tangent method, curvature method

Answer: b

Explanation: The methods involved in setting out a curve can be given as linear method, angular method and instrument method is also involved which is capable of providing accurate information.

2. In linear method of setting out curve, which of the following is not used?

- a) Tape
- b) Chain
- c) Theodolite
- d) Compass

Answer: c

Explanation: Theodolite is an instrument that is used for computing angles or bearings between the lines which are used for further calculation in computing the distance between the points. Whereas tape, chain can be directly used for determining the distance.

3. Which of the following methods is used when curve to be designed is short?

- a) Linear method
- b) Angular method
- c) Tangent method
- d) Curvature method

Answer: a

Explanation: Linear method adopts the usage of chain or tape in which only distance can be found but not angles. Moreover, this process is used when accuracy is not required and speed of work is concerned.

4. In angular method of setting a curve, which of the following is used?

- a) Compass
- b) Tape
- c) Chain
- d) Theodolite

Answer: d

Explanation: The angular method of setting out a curve involves finding out the angles between the lines, which is required for further assessment. Before measuring angles it is essential to set the required asserts.

5. For setting the tangent, which process is most commonly used?

- a) Rankine's method
- b) Trial and error method
- c) Tacheometric method
- d) Two theodolite method

Answer: b

Explanation: Though trial and error method is a tedious process, it is mostly used in all methods of setting a tangent because it involves accuracy and might be able to deliver the best output through calculation.

6. P.T, P.I, P.C are the basic requirements for setting a curve.

- a) True
- b) False

Answer: a

Explanation: The point of curvature, point of tangency, point of intersection are basic requirements which are used for setting out curve, tangents by placing instrument at that point based on our requirement.

7. Which of the following doesn't indicate the linear method of setting out the curve?

- a) By offsets from chords produced
- b) By offsets from the tangents
- c) By curves
- d) By offsets of long chords

Answer: c

Explanation: The linear methods of setting out the curve involve setting by offsets, offsets by tangents, offsets by long chords, offsets by deflection distances which are applied based on the area they are dealing with and output necessary.

8. Find the value of radius if the value of D is given as 23.76m.

- a) 214.98m
- b) 241.61m
- c) 214.16m
- d) 241.16m

Answer: d

Explanation: The value of radius with respect to only radius can be given as,

$R = 5730/D$. On substitution, we get
 $R = 5730 / 23.76$
 $R = 241.16 \text{ m}$.

9. Find the value of length of the curve if the degree of curve is taken at 20m arc with an angle $42^\circ 12'$.
- 24.9m
 - 24.2m
 - 42.2 m
 - 49.2m

Answer: c

Explanation: The value of the length of the curve at an arc which is designated at 20 m can be given as, $l = 20 \times \frac{\Delta}{D}$, /
 D . On substitution, we get
 $l = 20 \times \frac{42.2}{20}$
 $l = 42.2 \text{ m}$.

10. The length of the chord must not be greater than one tenth of radius.
- True
 - False

Answer: a

Explanation: In order to have a better accuracy in the output, the length of the chord must not be greater than one-tenth of the radius. Reduce in error will be at a great extent for example 8mm in 20m length.

11. Using the degree of curvature, find the value of radius of curve if the distance is given as 24.65 m.
- 64.49m
 - 46.49m
 - 46.94m
 - 64.94m

Answer: b

Explanation: In degree of curvature, the value of radius can be designated by using 20m arc length. The formula is given as $R = 1146 / D$. On substitution, we get
 $R = 1146 / 24.65 = 46.49 \text{ m}$.

This set of Surveying Multiple Choice Questions & Answers (MCQs) focuses on "Curve Surveying" By Ordinates of the Long Chord.

1. Find the value of mid-ordinate if the radius of the curve is given as 40.62 m and length as 10.2m.
- 0.43
 - 0.22
 - 0.12
 - 0.33

Answer: d

Explanation: Mid-ordinate calculation involves the following procedure,

$O_0 = R \left[1 - \left(\frac{l}{2R} \right)^2 \right]^{1/2}$. On substitution, we get

$O_0 = 40.62 \left[1 - \left(\frac{10.2/2}{40.62} \right)^2 \right]^{1/2}$

$O_0 = 0.33$.

2. For setting the curve, chord must be divided into even number of equal parts.
- True
 - False

Answer: a

Explanation: While setting a curve, the chord must be divided into even number of equal parts in order to decrease the time of the entire process. After dividing, the offsets are calculated.

3. Which of the following indicates the formula for setting a long chord by using ordinate?

- $O_x = (R^2 + (x)^2)^{1/2} - (R - O_0)$
- $O_x = (R^2 - (x)^2)^{1/2} - (R - O_0)$
- $O_x = (R^2 - (x)^2)^{1/2} + (R - O_0)$
- $O_x = (R^2 - (x)^2)^{1/2} - (R + O_0)$

Answer: b

Explanation: The formula for setting a long chord by using ordinate can be given as $O_x = (R^2 - (x)^2)^{1/2} - (R - O_0)$. In this O_0 is given as mid ordinate, R indicates the radius of the curve, x indicates the distance of the point from mid region.

4. General method can be adopted when radius of the curve is large.

- a) False
- b) True

Answer: a

Explanation: When the radius of the curve is large, general method might take more time while solving than expected. In order to reduce the time of procedure we generally adopt an approximate method which is only considered in case of large radius than the length of the chord.

5. In approximate method, the value of x is measured from _____

- a) Chord point
- b) Mid point
- c) Tangent point
- d) Secant point

Answer: c

Explanation: In general, the value of x is taken from the midpoint but in case of approximate method the x value is taken from the tangent point. It is so because of the larger radius.

6. Which of the following indicates the formula for determining ordinate in an approximate method?

- a) $O_x = x*(1-x) / 2+R$
- b) $O_x = x*(1-x) / 2*R$
- c) $O_x = x*(1+x) / 2*R$
- d) $O_x = x+(1-x) / 2*R$

Answer: b

Explanation: When the radius of the curve is large, for decreasing the time period of the entire process this process is adopted. It involves calculation of ordinate by assuming perpendicular distance and the formula is given as $O_x = x*(1-x) / 2*R$.

7. Find the value of ordinate at a distance of 10m having radius of 22.92m with mid-ordinate 12.12.

- a) 3.289
- b) 2.892
- c) 8.293
- d) 9.823

Answer: d

Explanation: The value of ordinate placed at certain distance x can be found out by using the formula,

$O_x = (R^2 - (x)^2)^{1/2} - (R - O_0)$. On substitution, we get

$$O_x = (22.92^2 - (10)^2)^{1/2} - (22.92 - 12.12)$$

$$O_x = 9.823.$$

8. If the value of $O_0 = 24.62$ and $R = 4m$, find the value of l using the general method of long chords.

- a) 1636.73m
- b) 1363.73m
- c) 1366.73m
- d) 1363.37m

Answer: a

Explanation: The general method of the ordinate calculation involves,

$O_0 = R - (R^2 - (l/2)^2)^{1/2}$. On substitution, we get

$$24.62 = 4 - (4^2 - (l/2)^2)^{1/2}$$

$$l = 1636.73 \text{ m.}$$

9. Which of the following indicates the formula for a general method by ordinate of long chords?

- a) $\sqrt{R + (R^2 - (\frac{l}{2})^2)^{1/2}}$
- b) $\sqrt{R * (R^2 - (\frac{l}{2})^2)^{1/2}}$

- c) $\sqrt{R^2 + \left(\frac{l}{2}\right)^2}^{1/2}$
 d) $\sqrt{R^2 - \left(\frac{l}{2}\right)^2}^{1/2}$

Answer: d

Explanation: The perpendicular which is erected while setting curve by ordinates of long chords, is equal to versed sine of the curve which makes it equal to $\sqrt{R^2 - \left(\frac{l}{2}\right)^2}^{1/2}$.

10. What will be value of ordinate placed at a distance of 20m having radius and length as 72.46m and 42.92m respectively?(use approximate method)

- a) 6.13
 b) 1.36
 c) 3.16
 d) 4.86

Answer: c

Explanation: Since the radius of the curve is large, we may consider the approximate method i.e.,

$$O_x = x(l-x) / 2R. \text{ On substitution, we get}$$

$$O_x = 20(42.92-20) / 2 \times 72.46$$

$$O_x = 3.16.$$

This set of Surveying written test Questions & Answers focuses on “Curve Surveying By Successive Bisection of Arcs or Chords”.

1. Which of the following indicates the formula for linear method of bisection of arcs?

- a) $\sqrt{R + (R^2 - \left(\frac{l}{2}\right)^2)^{1/2}}$
 b) $\sqrt{R * (R^2 - \left(\frac{l}{2}\right)^2)^{1/2}}$
 c) $\sqrt{R^2 + \left(\frac{l}{2}\right)^2}^{1/2}$
 d) $\sqrt{R^2 - \left(\frac{l}{2}\right)^2}^{1/2}$

Answer: d

Explanation: The perpendicular which is erected while setting curve by bisection of arcs, is equal to versed sine of the curve which makes it equal to $\sqrt{R^2 - \left(\frac{l}{2}\right)^2}^{1/2}$.

2. Find the perpendicular distance if the radius of the curve is given as 10.26m and the angle as $\hat{I}_1 = 10^\circ 24'$.

- a) 0.042m
 b) 0.402m
 c) 0.204m
 d) 0.024m

Answer: a

Explanation: The formula for finding the perpendicular can be given as, $R*(1-\cos(\hat{I}_1/2))$. On substitution, we get $10.26*(1-\cos(10^\circ 24'/2)) = 0.042 \text{ m}$.

3. The bisection of chords method involves more accuracy.

- a) False
 b) True

Answer: b

Explanation: Since the bisection of each chord is involved in this method, this may have an advantage over the remaining methods. The bisection can provide accuracy by involving each step closely.

4. Set a perpendicular offset for A and B using the radius and the angle given. $R = 34.76\text{m}$ and $\hat{I}_1 = 14^\circ 57'$.

- a) 2.08m
 b) 0.82m
 c) 0.28m
 d) 8.02m

Answer: c

Explanation: The perpendicular offset can be set by using the formula, $R*(1-\cos(\hat{I}_1/4))$. On substitution, we get $34.76*(1-\cos(14^\circ 57'/4)) = 0.28 \text{ m}$.

5. Which of the following represents the replication of versine?

- a) $1-\cos \hat{I}_1$,
 b) $1-\operatorname{cosec} \hat{I}_1$,
 c) $1-\cot \hat{I}_1$,
 d) $1-\sin \hat{I}_1$,

Answer: a

Explanation: Versine is the indication of the inversion of sine i.e., \sin^{-1} . Among the following, $1 - \cos \hat{I}$, represents the versine value. This is done for improving technical knowledge.

6. Perpendicular offsets can be set out after _____

- a) Resection
- b) Intersection
- c) Trisection
- d) Bisection

Answer: d

Explanation: Bisection is the main process involved in the successive bisection of the chords method. For the erection of perpendicular offsets it is must for developing the bisection process, as it provides the points necessary for perpendicular offsets.

7. Which of the following describes the advantage of bisection of chords method?

- a) Setting out more chords
- b) Setting out more parallels
- c) Setting out more points
- d) Setting out more perpendiculars

Answer: c

Explanation: The successive bisection of chords involve in determining the offsets points and also in erecting the perpendicular offsets. The main advantage of this method involves generation of more amount of points by which this process can be continued.

8. Find the perpendicular offset using successive bisection of chords, with radius 34.98m and length 12.65 m.

- a) 0.75m
- b) 0.57m
- c) 5.07m
- d) 7.05m

Answer: b

Explanation: The formula in successive bisection of chords for erecting a perpendicular can be given as $\sqrt{R^2 - \left(\frac{l}{2}\right)^2}$. On substitution, we get $\sqrt{34.98^2 - \left(\frac{12.65}{2}\right)^2} = 0.57\text{m}$.

9. The successive bisection of chords comes under which of the following category?

- a) Transition curve
- b) Reverse curve
- c) Compound curve
- d) Simple curve

Answer: d

Explanation: The simple curve setting methods involve certain category off which, the successive bisection of chords is one of them. It is a tedious procedure because it involves the bisection of each chord.

10. Perpendicular chords can be obtained by using the successive bisection method.

- a) True
- b) False

Answer: a

Explanation: The successive bisection method involves certain procedures among which the erection of perpendicular offsets is also present. This can be achieved by using the formula obtained by solving the procedure.

This set of Surveying Multiple Choice Questions & Answers (MCQs) focuses on “Curve Surveying” By Offsets from the Tangent.

1. Which process can be used for setting a small curve?

- a) Offsets from radial offsets
- b) Offsets from perpendicular tangents
- c) Bisection of arcs
- d) Offsets from chords

Answer: b

Explanation: Even though the offset by radial and perpendicular tangents are under the same head, they are having difference in the process which makes the perpendicular tangent method suitable for small curves and radial tangent method for long curve.

2. Which of the following describes the right usage of tangent method for offsets?

- a) Smaller radius
- b) Larger radius
- c) Large deflection angle
- d) More tangent length

Answer: a

Explanation: The tangential method can find its usage only in case of the smaller deflection angle and radius of curvature. Smaller radius of curvature enables this method to have a clear idea about setting offsets.

3. The points that are set by using the method of tangents will lie on _____

- a) Tangent
- b) Chord
- c) Arc of circle
- d) Parabola

Answer: d

Explanation: The curve which is set by using the offsets produced by the tangent method involves formation of points on the parabola, but not on the arc of circle. If versine is considered then the curve will come close to the arc.

4. If the tangent distance increases, the offsets distance also increases.

- a) False
- b) True

Answer: b

Explanation: When the tangent distance increases, the offsets will become too large. It might create problem for accuracy. So, maintenance of appropriate lengths is very much needed as they are directly proportional.

5. Central position of curve can be set by _____

- a) Tangent
- b) Chord
- c) Apex
- d) Secant

Answer: c

Explanation: Apex of the curve acts as the central position for the curve, which can be obtained by the intersection of the tangents which touch the curve and a perpendicular can be drawn from it, which is able to determine apex distance.

6. Which of the following represents the correct set of classification in the method of setting offset by tangent method?

- a) Radial, perpendicular
- b) Radial, parallel
- c) Parallel, perpendicular
- d) Parallel, horizontal

Answer: a

Explanation: The method of determining offsets by the tangents method involves two classifications, radial offsets and perpendicular offsets. Each of them can be applied based on the type of work being done and their accuracy involved.

7. Find the radial offset if radius of the curve is given as 23.65m and the offset placement is at 15m.

- a) 5.63m
- b) 5.36m
- c) -5.63m
- d) -5.36m

Answer: d

Explanation: The formula for the radial offset can be given as

$O_x = (R^2 - (x)^2)^{1/2} - R$. On substitution, we get

$$O_x = \sqrt{23.65^2 - (15)^2} - 23.65$$

$$O_x = -5.36\text{m.}$$

8. Set a radial offset by using the approximate method with radius of the curve given as 25.76m and the offset distance as 5m.

- a) 0.584m

- b) 0.845m
- c) 0.485m
- d) 0.854m

Answer: c

Explanation: The approximate method for finding the offsets can be determined by using the formula, $O_x = x^2 / 2R$.

On substitution, we get

$$O_x = 5^2 / 2 \times 25.76$$

$$O_x = 0.485m.$$

9. Find the perpendicular offset by using the general method, with radius of the curvature being 70.98m and the offset distance about 9m.

- a) 0.57m
- b) -0.57m
- c) 7.05m
- d) -7.05m

Answer: b

Explanation: The perpendicular offsets can be found out by using the formula, $O_x = R - (R^2 - (x)^2)^{1/2}$. On substitution, we get

$$O_x = (70.98^2 - (9)^2)^{1/2} - 70.98$$

$$O_x = -0.57m.$$

10. Set a perpendicular offset using the approximate method, having radius of curvature as 47.43m and the offset distance being 8m.

- a) 0.67m
- b) 0.76m
- c) 7.06m
- d) 6.07m

Answer: a

Explanation: The formula for finding the perpendicular offset using the approximate method can be given as $O_x = x^2 / 2R$.

On substitution, we get

$$O_x = 8^2 / 2 \times 47.43 = 0.67m.$$

This set of Surveying Multiple Choice Questions & Answers (MCQs) focuses on "Compound Curve Elements".

1. Length of tangent formula is same for all types of curves.

- a) True
- b) False

Answer: a

Explanation: Though there might be a change in the curve but length of the tangent value remains the same i.e., $t = R \tan (\hat{I}/2)$. Where R is the radius and \hat{I} is the deflection angle measured.

2. In a compound curve, both curves are of equal radius.

- a) True
- b) False

Answer: b

Explanation: A compound curve consists of two curves which will meet at P.C.C, known as Point of Compound Curve, in which it consists of one shorter radius curve another one of longer radius.

3. Compound curve can be designated by _____

- a) Angle subtended by a chord of any curvature
- b) Angle subtended by a chord of known radius
- c) Angle subtended by a chord of known length
- d) Angle subtended by a chord of any length

Answer: c

Explanation: For designing a Compound curve, we must know the required property like length from where it has to

be started and where it has to end. It should also be known that the angle by which the chord subtends that is taken by the length determined.

4. The angle at point of intersection of tangents indicate _____

- a) Radius of the arc
- b) Angle of the arc
- c) Curvature angle
- d) Deflection angle

Answer: d

Explanation: The point where the two tangents will meet is described as the point of intersection, where the deflection angle between the two tangents can be known and later on used for further calculation like setting out curve.

5. Which of the following curves helps in avoiding overturning of vehicles?

- a) Simple curve
- b) Transition curve
- c) Compound curve
- d) Reverse curve

Answer: b

Explanation: Though compound curve serves as a best source in highways, it doesn't provide the elevation needed to avoid overturning. Simple curve, reverse curve are not used in case of highways so those can be avoided. Transition curve provides the required amount of super elevation by using the formula provided and helps in decreasing overturning problem.

6. The tangent distance of a long curve is given as _____

- a) $T = t_l + (t_s + t_l) \frac{\sin(\frac{\hat{I}}{2})}{\sin(\hat{I})}$
- b) $T = t_l + (t_s + t_l) \frac{\sin(\hat{I})}{\sin(\frac{\hat{I}}{2})}$
- c) $T = t_l + (t_s + t_l) \frac{\sin(\hat{I})}{\sin(\frac{\hat{I}}{2})}$
- d) $T = t_l + (t_s + t_l) \frac{\sin(\hat{I})}{\sin(\hat{I})}$

Answer: c

Explanation: The tangent distance for a long curve can be given as $T = t_l + (t_s + t_l) \frac{\sin(\frac{\hat{I}}{2})}{\sin(\hat{I})}$ in which t_l = long tangent length, t_s = short tangent length. These can be determined by their respective formulae and will be substituted in T for getting tangent distance.

7. What would be the short curve length of tangent if the radius of curvature is given as 43.21m and deflection of about 76°54'?

- a) 34.13m
- b) 43.13m
- c) 43.31m
- d) 34.31m

Answer: d

Explanation: The tangent length can be found out by using the formula,

$t = R \cdot \tan(\frac{\hat{I}}{2})$. On substitution, we get

$t = 43.21 \cdot \tan(76^\circ 54' / 2)$

$t = 34.31 \text{ m}$.

8. Find the value of the long curve tangent distance, if the tangent length of short and long curves were given as 23.21m and 65.87m. The total deflection is 67°54' and the deflection angle at short curve is given as 28°43'.

- a) 112.06m
- b) 121.06m
- c) 211.06m
- d) 121.68m

Answer: a

Explanation: The long curve tangent distance can be determined by,

$T = t_l + (t_s + t_l) \frac{\sin \hat{I}_1}{\sin \hat{I}}$. On substitution, we get

$T = 65.87 + (23.21 + 65.87) \frac{\sin 28^\circ 43'}{\sin 67^\circ 54'}$

$T = 112.06 \text{ m}$.

9. Determine the value of chainage of point of the compound curve, if the chainage at T1 is given as 226.43m and the curve length as 23.64m.

- a) 205.07

- b) 250.07
- c) 207.7
- d) 202.79

Answer: b

Explanation: Chainage at point of compound curve can be given as

Chainage at P.C.C = chainage of T1 + curve length. On substitution, we get

Chainage at P.C.C = 226.43 + 23.64

Chainage at P.C.C = 250.07 m.

10. If the radius of curvature is given as 76.98m and the deflection angle as $45^{\circ}21'$, find the short curve length of a compound curve.

- a) 60.93m
- b) 6.93m
- c) 9.63m
- d) 3.69m

Answer: a

Explanation: The compound curve length can be determined by using the formula,

$t = R \cdot \frac{\Delta}{180}$. On substitution, we get

$t = 76.98 \cdot \frac{45^{\circ}21'}{180}$

$t = 60.93$ m.

11. Find the value of long curve tangent length, if the radius is given as 76.43m and the deflection angle as $54^{\circ}32'$.

- a) 39.24m
- b) 93.42m
- c) 39.42m
- d) 93.24m

Answer: c

Explanation: The formula for the determination of the long curve tangent length is given as,

$t = R \cdot \tan(\frac{\Delta}{2})$. On substitution, we get

$t = 76.43 \cdot \tan(54^{\circ}32'/2)$

$t = 39.42$ m.

This set of Tough Surveying Interview Questions & Answers focuses on “Curve Surveying” Rankine’s Method of Tangential Angles.

1. Rankine’s method will come under which of the following classification?

- a) Linear method
- b) Instrumental method
- c) Angular method
- d) Offset method

Answer: b

Explanation: The instrumental methods which are commonly used are rankine’s method, two theodolite method and tacheometric method which are used for setting a circular curve.

2. In Rankine’s method it is assumed that length of arc is equal to its chord.

- a) True
- b) False

Answer: a

Explanation: Rankine’s method is based on the principle that deflection angle to any point on a circular curve is measured one-half the angle subtended by arc. For that purpose length of arc is assumed to be equal to its chord.

3. According to Rankine’s method, the formula for finding deflection angle can be given as _____

- a) $\hat{I}' = 1718.9 \cdot C + R$
- b) $\hat{I}' = 1719.8 \cdot C \cdot R$
- c) $\hat{I}' = 1781.9 \cdot C / R$
- d) $\hat{I}' = 1718.9 \cdot C / R$

Answer: d

Explanation: Rankine’s method defines the formula for deflection angle as $\hat{I}' = 1718.9 \cdot C / R$, where c is the chord length, r is the radius of the curve. This deflection angle is useful for determining the curve setting requirements and also determines that deflection angle for any chord is equal to the deflection angle for previous chord.

4. Rankine's method can be applied for setting curves of large radius.

- a) False
- b) True

Answer: b

Explanation: The Rankine's method, when compared to linear and angular methods, is having more accuracy and it is easy to solve which gives systematic solution for the problem raised.

5. Determine the value of radius of the curve if the length of the chord is given as 2m and the tangential angle as $100^\circ 23'$.

- a) 34.42m
- b) 43.24m
- c) 34.24m
- d) 43.42m

Answer: c

Explanation: The formula for finding the radius using tangential angle can be given by Rankine's formula, $\hat{I}' = 1718.9 \times C / R$

On substitution, we get

$$100^\circ 23' = 1718.9 \times 2 / R$$

$$R = 34.24 \text{ m.}$$

6. Which of the following method is capable of delivering more accurate output?

- a) Linear methods
- b) Angular methods
- c) Rankine's method
- d) Two-theodolite method

Answer: d

Explanation: Since two theodolites are used and manual involvement is more in case of two theodolite method, it is capable of producing more accurate output when compared to remaining methods.

7. Which among the following is more expensive process for setting a curve?

- a) Linear method
- b) Rankine's method
- c) Two theodolite method
- d) Angular method

Answer: c

Explanation: The usage of two theodolites makes it more expensive when compared to the remaining methods of setting curves. It also involves three men, one for handling instrument and remaining two for handling chain.

8. Which among the following is a frequently used process?

- a) Rankine's method
- b) Tacheometric method
- c) Two-theodolite method
- d) Bisection of arcs

Answer: a

Explanation: Though two theodolite method is an accurate procedure for obtaining the values, it is a bit expensive when compared to Rankine's method. Rankine's method is also capable of producing accurate values. So that it is adopted.

9. If the value of length of the chord is given as 4m and the radius of the curve as 3.65m, find the tangential angle using Rankine's method.

- a) $179^\circ 24'$
- b) $173^\circ 4'$
- c) $73^\circ 24'$
- d) $173^\circ 24'$

Answer: d

Explanation: The Rankine's angle can be found out by using the formula,

$$\hat{I}' = 1718.9 \times C / R. \text{ On substitution, we get}$$

$$\hat{I}' = 1718.9 \times 4 / 39.65$$

$$\hat{I}' = 173^\circ 24'.$$

10. Rankine's method is also known as _____

- a) Deflection distances method

- b) Deflection angles method
- c) Tacheometric method
- d) Arc bisection method

Answer: b

Explanation: Rankine's method is also known as deflection angle method because this method involves finding the deflection angle on the curve using point of curvature from tangent to point of curvature of chord.

11. If the degree of the curve is equal to D at 20m chord, find the tangential angle with length of the chord being 5.6m.

- a) 28°
- b) 12°
- c) 2°
- d) 22°

Answer: a

Explanation: The value of tangential angle can be found out by using the formula,

$\hat{I}' = c * D / 40$. On substitution, we get

$$\hat{I}' = 5.6 * 20 / 40$$

$$\hat{I}' = 28^{\circ}$$

12. Which of the following describes the advantage of Rankine's method?

- a) Curve can be set only at P.T
- b) Curve can be set only at P.C
- c) Curve can be set in multiple operations
- d) Curve can be set in one operation

Answer: d

Explanation: The major advantage of this method is that the curve can be set out in one operation when the theodolite is placed at P.I, which finds its purpose of finding angle of intersection.

13. Find the deflection angle for various points if the value of \hat{I}_1 is given as 24° and $\hat{I}'' = 48^{\circ}$.

- a) 54°
- b) 45°
- c) 45°
- d) 50°

Answer: c

Explanation: The value of deflection of various points can be determined by using the formula,

$\tan \hat{I}_{\pm} = (1 - \cos \hat{I}_1) / (\tan \hat{I}'' / 2 - \sin \hat{I}_1)$. On substitution, we get

$$\tan \hat{I}_{\pm} = (1 - \cos 24^{\circ}) / (\tan (48^{\circ} / 2) - \sin 4^{\circ})$$

$$\hat{I}_{\pm} = 45^{\circ}$$

14. Find the tangential angle of the curve, if the length of the chord is given as 65m and the degree of the curve is equal to D at 100ft length.

- a) 32°
- b) 32°
- c) 23°
- d) 2°

Answer: b

Explanation: The value of tangential angle if the degree of the curve is equal to D at 100ft length can be determined by,

$\hat{I}' = c * D / 200$. On substitution, we get

$$\hat{I}' = 65 * 100 / 200$$

$$\hat{I}' = 32^{\circ}$$

15. Find the chord length using Rankine's method with radius of the curve being 43.76m and the tangential angle is 87° .

- a) 2.23m
- b) 3.22m
- c) 3.98m
- d) 5.43m

Answer: a

Explanation: From Rankine's method, the chord length can be given as

$$\hat{I}' = 1718.9 * C / R$$

On substitution, we get

$$87\ddot{E}š45\hat{e}ž\ddot{E} = 1718.9 * C / 43.76$$

$$C = 2.23 \text{ m.}$$

This set of Surveying Multiple Choice Questions & Answers (MCQs) focuses on “Curve Surveying” By Deflection Distances.

1. The method of deflection distances is used in which of the following cases?

- a) Road surveys
- b) Railway survey
- c) Land survey
- d) Town planning survey

Answer: a

Explanation: The deflection distances method is having at most priority in case of road surveys as the curvature for joining parallel straights is to be done without any error.

2. The method of producing offsets from the chords can also be named as _____

- a) Rankine’s method
- b) Bisection of chords
- c) Deflection distances
- d) Two-theodolite method

Answer: c

Explanation: Deflection distances method is adopted in case of long curves, which generally implies in highways. Highway possess long curves which can’t be designed other than this method.

3. Which of the following indicates the formula used in deflection distances?

- a) $O_n = C_n + (C_{n-1} + C_n)/2 * R$
- b) $O_n = C_n (C_{n-1} + C_n)/2 + R$
- c) $O_n = C_n (C_{n-1} + C_n)/2 * R$
- d) $O_n = C_n (C_{n-1} + C_n)/2 * R$

Answer: d

Explanation: The formula for the offsets by chords produced include, $O_n = C_n (C_{n-1} + C_n)/2 * R$. the value of n depends upon the number of chords introduced and C represents chord length, where R is the radius of the curve.

4. Which of the following process can be adopted as an alternative of theodolite?

- a) Bisection of chords
- b) Deflection distances
- c) Ordinates by long chords
- d) Rankine’s method

Answer: b

Explanation: Theodolite usage is more in case of designing long curves. Long curve designation involves in lengthy calculation and developing number of chords, which can be done in deflection distances method. So, it can serve as an alternative.

5. Errors in deflection distances method are distributed to all the points.

- a) True
- b) False

Answer: a

Explanation: The occurrence of errors in all cases is common, but in case of deflection distances method the error can be distributed all over the points. If the error is more, then the curve should be re-set.

6. Closing error can also be known as _____

- a) Absolute error
- b) Zero error
- c) Subjecting error
- d) Discrepancy

Answer: d

Explanation: Closing error occurs due to the mismatching of the beginning and the last points. It can be eradicated or reduced up to some extent based on the amount of error produced. It is also known as discrepancy.

7. While producing offsets by deflection distances method, the last offset must coincide with the beginning.

- a) False
- b) True

Answer: b

Explanation: The occurrence of closing error depends on the closing the curve due to offsets. If the beginning point doesn't coincide with the end point, then closing error may occur which may lead to re-setting of the entire curve.

8. Determine the first offset if the chord length is given as 23.98m and the radius is given as 5.87m.

- a) 84.98 m
- b) 48.98 m
- c) 48.89 m
- d) 84.89 m

Answer: b

Explanation: The value of offset can be given as $O = C^2 / 2 \cdot R$. On substitution, we get

$$O = 23.98^2 / 2 \cdot 5.87$$

$$O = 48.98 \text{m.}$$

9. Find the value of last offset, if the lengths of first and second chords are given as 45.87m and 62.87m with radius of curve 69.76m and length of chain being 30m.

- a) 38.987 m
- b) 83.987 m
- c) 38.697 m
- d) 83.697 m

Answer: d

Explanation: The value of offsets can be calculated by using,

$O_n = C_n \cdot (C_{n-1} + C_n) / 2 \cdot R$, it can be simplified as

$O_n = C_n \cdot (C + C_n) / 2 \cdot R$. On substitution, we get

$$O_n = 62.87 \cdot (30 + 62.87) / 69.76$$

$$O_n = 83.697 \text{m.}$$

10. Find the value of chord length if the offset is given as 36.54m and the radius include 3.43m.

- a) 15.38 m
- b) 51.83 m
- c) 15.83 m
- d) 87.54 m

Answer: c

Explanation: From the deflection distances method, the value of chord length can be determined by

$O = C^2 / 2 \cdot R$. On substitution, we get

$$36.54 = C^2 / 2 \cdot 3.43$$

$$C = 15.83 \text{m.}$$

This set of Surveying Multiple Choice Questions & Answers (MCQs) focuses on "Setting out Compound Curve".

1. The observations made for setting a compound curve must be equal to _____

- a) $180 - (\hat{I}''/2)$
- b) $180 - (\hat{I}''/1/2)$
- c) $180 - (\hat{I}''/2/2)$
- d) $180 + (\hat{I}''/2)$

Answer: a

Explanation: The points which are plotted for setting a compound curve involve a check at the last for determining the errors. The check can be given as $180 - (\hat{I}''/2)$. Here, \hat{I}'' is the deflection angle at P.I.

2. A compound curve can be set by which of the following methods?

- a) Two-theodolite method
- b) Deflection angles
- c) Bisection of arcs
- d) Tacheometric method

Answer: b

Explanation: Since a compound curve involves a combination of both long and short curves, it is best to adopt the deflection angles method so that work can be completed with accurate values.

3. In a compound curve, the point at which both the long curve and short curve will meet is called _____

- a) Point of radius
- b) Point of curvature curve
- c) Point of compound curve
- d) Point of deflection curve

Answer: c

Explanation: The point at which both the long curve and short curve will meet is determined as point of compound curve or P.C.C. It is the point where point of intersection lies perpendicular to P.C.C.

4. For setting a compound curve, the theodolite is first placed at _____

- a) P.I
- b) P.C.C
- c) P.T
- d) P.C

Answer: d

Explanation: Generally, a compound curve can be set by the method of deflection angles. In this method, the theodolite is placed at point of curve (P.C) and later at P.C.C for obtaining long curve.

5. Find the value of radius of curvature, if the degree of the curve is given as 7°.

- a) 136.71 m
- b) 163.17 m
- c) 163.71 m
- d) 613.71 m

Answer: c

Explanation: The radius of curvature can be determined by

$R = 1146 / D$. On substitution, we get

$R = 1146 / 7^\circ$

$R = 163.71 \text{ m}$.

6. Determine the value of long curve length of a compound curve, if the radius of curvature is given as 56.87m and the deflection angle is given as 65°.

- a) 56.22m
- b) 65.22m
- c) 65.44m
- d) 69.22m

Answer: b

Explanation: The long curve length can be determined by using the formula,

$t = R \cdot \Delta / 180$. On substitution, we get

$t = 56.87 \cdot 65^\circ / 180$

$t = 65.22 \text{ m}$.

7. Find the value of the chainage of T1 by using the chainage of P.I and the tangent distance is given as 1024.31m and 707.57m.

- a) 616.74m
- b) 313.74m
- c) 613.74m
- d) 316.74m

Answer: d

Explanation: The chainage of T1 can be calculated as,

Chainage of T1 = chainage of P.I + T_s . On substitution, we get

Chainage of T1 = 1024.31 + 707.57

Chainage of T1 = 316.74m.

8. Determine the short curve tangent distance by using the short curve and long curve tangent lengths given as 54.98m and 89.32m. The deflection angles at P.I and at long curve are given as 86° and 43°.

- a) 154.5 m
- b) 145.5 m
- c) 514.5 m
- d) 451.5 m

Answer: a

Explanation: The short curve tangent distance can be determined by using the formula,

$$T = t_s + (t_s + t_l) * \frac{\sin \hat{I}_2}{\sin \hat{I}_1}$$

On substitution, we get

$$T = 54.98 + (54.98 + 89.32) * \frac{\sin 43^\circ 16' E}{\sin 86^\circ 45' E}$$

$T = 154.5 \text{ m.}$

9. Find the chainage of second tangent point, if the chainage at the point of compound curve is given as 2345.87m and the curve length can be given as 568.54m.

- a) 2941.41 m
- b) 9214.41 m
- c) 2914.14 m
- d) 2914.41 m

Answer: d

Explanation: The chainage at T_2 can be given as,

Chainage at T_2 = chainage at P.C.C + curve length. On substitution, we get

$$\text{Chainage at } T_2 = 2345.87 + 568.54$$

$$\text{Chainage at } T_2 = 2914.41 \text{ m.}$$

10. All the necessary calculations will be done before setting the curve.

- a) True
- b) False

Answer: b

Explanation: The determination of tangent length, curve length, tangent distance will be done after setting of the curve, but not before. The curve setting process actually involves in the determination of these. By using the required data further process can be done.

This set of Surveying Multiple Choice Questions & Answers (MCQs) focuses on "Reverse Curve Elements".

1. Reverse curve is a combination of two simple curves.

- a) True
- b) False

Answer: a

Explanation: A reverse curve is a combination of two simple curves in the opposite direction, which are not recommended to be provided in highways as it can lead to overturning of vehicles.

2. Which of the following provides the best case for setting the reverse curve?

- a) When straights are perpendicular
- b) When straights form arc
- c) When straights are parallel
- d) When straights form curves

Answer: c

Explanation: A reverse curve can be placed in case the straights are parallel. It is so because the remaining classification of curves is meant to serve in case of highways rather than mountainous regions.

3. Which of the following curves is not used in case highways?

- a) Simple curve
- b) Compound curve
- c) Transition curve
- d) Reverse curve

Answer: d

Explanation: Simple, compound, transition curves can be used in case of highway as they are having good amount of curvature provided by the radius. But in the case of reverse curve, it provides immediate turning, which should not be present in highway as it may lead to accidents. So it is avoided.

4. Which of the following cases is generally adopted in the reverse curve?

- a) $T_1 = T_2$
- b) $R_1 = R_2$
- c) $t_1 = t_2$
- d) Chainages are equal

Answer: b

Explanation: In reverse curve, there two cases to be considered parallel straights, non-parallel straights. In these cases, sometimes, the radius of both curves is assumed to be the same and also deflections are assumed as equal.

5. Which of the following case is assumed in a reverse curve?

- a) $\hat{I}'' = \hat{I}''_1 * \hat{I}''_2$
- b) $\hat{I}'' = \hat{I}''_2 \hat{\epsilon} \hat{I}''_1$
- c) $\hat{I}'' = \hat{I}''_1 \hat{\epsilon} \hat{I}''_2$
- d) $\hat{I}'' = \hat{I}''_1 + \hat{I}''_2$

Answer: c

Explanation: In case of determining the deflection angle, \hat{I}'' , a relation must be assumed which is given as $\hat{I}'' = \hat{I}''_1 \hat{\epsilon} \hat{I}''_2$ in which \hat{I}''_1 and \hat{I}''_2 are the deflection angles for the two curves which will meet at point of reverse curve (P.R.C).

6. Chainage at the point of reverse curve can be given as _____

- a) Chainage at P.R.C = Chainage at P.C + length of first arc
- b) Chainage at P.R.C = Chainage at P.I + length of first arc
- c) Chainage at P.R.C = Chainage at P.C + length of second arc
- d) Chainage at P.R.C = Chainage at P.C $\hat{\epsilon}$ length of first arc

Answer: a

Explanation: The chainage at the point of curvature can be given as the summation of chainage at point of curvature and the length of the first arc. The value of chainage of P.C is known and length of the arc is determined by formula provided.

7. A Reverse curve can be set by which of the following methods?

- a) Method of bisection of arcs
- b) Method of deflection angles
- c) Method of deflection distances
- d) Method of tangential angles

Answer: d

Explanation: The method of tangential angles involves two processes i.e., radial offset, perpendicular offset in which, perpendicular offset method is having the accuracy in the results obtained.

8. Which of the following indicates the correct set of the cases employed in reverse curves?

- a) Perpendicular, non-parallel
- b) Parallel, perpendicular
- c) Non-parallel, parallel
- d) Perpendicular, curved

Answer: c

Explanation: For designing a reverse curve in case of mountainous regions and also in case of railways which are having more degree of curvature, parallel and non-parallel straights are adopted with certain assumptions like $R_1 = R_2$, $\hat{I}''_1 = \hat{I}''_2$.

9. In case of parallel straights, the length of the curve is given as _____

- a) $L = (2(R_1 + R_2)V)^{1/2}$
- b) $L = 2L(R_1 + R_2) / V$
- c) $L = 2V(R_1 - R_2) / R$
- d) $L = 2V(R_1 * R_2) / R$

Answer: a

Explanation: The case of parallel straights is applied in railway track purpose, where the curvature to join two parallel straights can be more. Here V represents perpendicular distance between the points and L represents parallel distance.

10. The formula of length of tangent is given as _____

- a) $t = L \tan(\hat{I}'/2)$
- b) $t = r \hat{\epsilon} \tan(\hat{I}'/2)$
- c) $t = r + \tan(\hat{I}'/2)$
- d) $t = r * \tan(\hat{I}'/2)$

Answer: d

Explanation: Though there might be a change in curve setting but the length of tangent remains the same in all the curve cases i.e., $t = r \tan (\hat{I}/2)$ where, \hat{I}' = deflection angle measured.

11. Calculate the short tangent length, if the radius of curvature is given as 56.21m and the deflection angle as $32^{\circ}54'$.

- a) 61.6m
- b) 116.6m
- c) 16.6m
- d) 6.6m

Answer: c

Explanation: The value of short tangent length can be calculated by,

$t = R \cdot \tan \hat{I}/2$. On substitution, we get

$t = 56.21 \cdot \tan (32^{\circ}54'/2)$

$t = 16.6\text{m}$.

12. Determine the common tangent of a reverse curve if the radius of curvature and deflection angles is given as, 43.57m, $32^{\circ}43'$ and $65^{\circ}76'$.

- a) 217.087m
- b) 127.087m
- c) 127.807m
- d) 127.708m

Answer: b

Explanation: The common tangent can be determined by, $d = R \cdot \tan \hat{I}_1 + R \cdot \tan \hat{I}_2$. On substitution, we get

$d = 43.57(\tan 32^{\circ}43' + \tan 65^{\circ}76')$

$d = 127.087\text{m}$.

13. Find the value of tangent distance, possessing radius of curvature as 24.89m, common tangent 65m length and having deflection angles as $24^{\circ}56'$ and $76^{\circ}32'$.

- a) 64.5m
- b) 46.5m
- c) 64.98m
- d) 62.5m

Answer: a

Explanation: The tangent distance can be determined by using the formula,

$T = R \cdot \tan (\hat{I}_1/2) + d \cdot \frac{\sin \hat{I}_1}{\sin \hat{I}_2}$. On substitution, we get

$T = 24.89 \cdot \tan (24^{\circ}56'/2) + 65 \cdot \frac{\sin 76^{\circ}32'}{\sin (24^{\circ}56' + 76^{\circ}32')}$ $T = 64.5\text{m}$.

14. Calculate the chainage of P.R.C, if the chainage of Tangent is 567.54m and the curve length is about 65m.

- a) 623.54m
- b) 632.45m
- c) 362.54m
- d) 632.54m

Answer: d

Explanation: The value of chainage of P.R.C can be obtained by using the formula,

Chainage of P.R.C = chainage of tangent + length of arc

Chainage of P.R.C = $567.54 + 65$

Chainage of P.R.C = 632.54m .

15. If the radii of the curves in a reverse curve are equal, calculate the distance between the tangent points T1 and T2. Assume $R = 98.54\text{m}$ with deflection angle $54^{\circ}31'$.

- a) 108.52m
- b) 180.52m
- c) 180.25m
- d) 108.25m

Answer: b

Explanation: From the question, it is clear that $R_1 = R_2 = R$. So, the distance between the tangent points T1 and T2 can be given as

$L = 4 \cdot R \cdot \sin (\hat{I}/2)$. On substitution, we get

$L = 4 \cdot 98.54 \cdot \sin (54^{\circ}31'/2)$

$L = 180.52\text{m}$.

This set of Surveying Multiple Choice Questions & Answers (MCQs) focuses on “Triangulation Reconnaissance”.

1. In the process of reconnaissance, map reference is taken.

- a) True
- b) False

Answer: a

Explanation: The Reconnaissance process can be done with the help of existing maps. If they aren't available, a preliminary Reconnaissance is done for allocating the general location of triangulation for that terrain.

2. Which of the following is not necessary for Reconnaissance process?

- a) Sextant
- b) Theodolite
- c) Chain
- d) Aneroid Barometer

Answer: c

Explanation: The usage chain might make the entire process a little bit tedious, so a steel tape is in that place. Theodolite, sextant are used for taking angles, Aneroid barometer for measuring elevations.

3. Height of the instrument depends upon _____

- a) Elevation differences
- b) Type of terrain present
- c) Type of instrument used
- d) Distance between stations

Answer: d

Explanation: The height of the instrument and the signal in the process of Reconnaissance depends upon the profile of the ground, distance between the stations, and relative elevations of stations.

4. Height of the station above datum is given as _____

- a) $h = \frac{D^2 (1-2m)}{2R}$
- b) $h = \frac{D^2 (1-2m)}{2}$
- c) $h = \frac{D^2 (1+2m)}{2R}$
- d) $h = \frac{D(1-2m)}{2R}$

Answer: a

Explanation: Due to the absence of any obstruction on the ground, the value of the height of station is given as $h = \frac{D^2 (1-2m)}{2R}$ where D is the distance to the horizon, m is the mean coefficient of refraction and R is the mean radius of the earth.

5. In the process of Reconnaissance, which of the following is determined?

- a) Slope
- b) Elevation
- c) Gradient
- d) Distance between stations

Answer: b

Explanation: In Reconnaissance, the elevation and the peak points in terrain are determined. These are compared with the proposed elevations to ascertain whether the line of sight is clear or not.

6. Reconnaissance process will give best output only on elevated grounds.

- a) False
- b) True

Answer: b

Explanation: Reconnaissance is a process which helps on determining the elevations in terrain and also the peak points in the terrain which help in determining slope which is a secondary thing.

7. While calculating h_2 with reference to h_1 , line of sight must be _____ m above the point of tangency.

- a) 5-6 m
- b) 4-5 m
- c) 3-4 m
- d) 2-3 m

Answer: d

Explanation: The elevation of a station can be determined by $h = \frac{D^2 (1-2m)}{2R}$ and from taking its

reference h_2 will be calculated. It requires certain parameters like keeping the line of sight at a height of 2-3 m above the point of tangency.

8. For proper identification, station marks are marked with _____

- a) Wood
- b) Plastic
- c) Copper
- d) Concrete

Answer: c

Explanation: The marks of triangulation must be permanently marked with copper so as to make them visible all over the years. A minimum of two or three marks must be noted for easy identification.

9. Besides theodolite which among the following is used for taking angles.

- a) Compass
- b) Only theodolite
- c) Total station
- d) Sextant

Answer: d

Explanation: Compass is used only for determining bearings not for angles. Though theodolite is used, it sometimes might not be possible for setting the instrument. In that case, a sextant is used.

10. Determine the height of the station if the distance between the visible horizon is 44km.

- a) 121.54m
- b) 211.54m
- c) 121.45m
- d) 211.45m

Answer: a

Explanation: The height of the station can be determined by,

$h = D^2 * (1-2m) / 2 * R$. here, $m = 0.07$, radius of earth = 6370km. On substitution, we get

$$h = 44^2 * (1-2*0.07) / 2 * 6370$$

$$h = 121.54m.$$

11. Find the distance between the visible horizon, if the height of the station is given as 2.98m.

- a) 8.66m
- b) 6.88m
- c) 8.68m
- d) 2.86m

Answer: b

Explanation: The distance between the visible horizon can be given by,

$(D = \sqrt{\frac{h}{0.06278}})$. On substitution, we get

$$(D = \sqrt{\frac{2.98}{0.06278}}) D = 6.88m.$$

This set of Surveying Multiple Choice Questions & Answers (MCQs) focuses on "Triangulation System Classification".

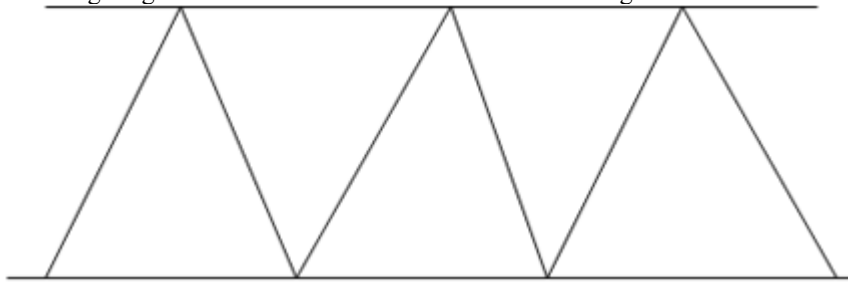
1. Which among the following indicates the correct necessity of classification of the triangulation system?

- a) For measuring in any way
- b) For accuracy in measurement
- c) For covering the entire field
- d) For reducing the work process

Answer: b

Explanation: The classification of the survey field into a triangulation system helps in covering the entire area, but the main intention is to have accuracy in the measurement values obtained.

2. The figure given below describes which of the following methods?



- a) Quadruple chain triangulation
- b) Triple chain triangulation
- c) Single chain triangulation
- d) Double chain triangulation

Answer: c

Explanation: This process is adopted in case of obtaining output in less time. Due to obtaining output in less time, the accuracy is not up to the mark and is not suitable in case of primary works.

3. Among the classification of triangulation system, which possesses the highest order?

- a) Primary
- b) Secondary
- c) Tertiary
- d) Quaternary

Answer: a

Explanation: The primary or first order classification of triangulation system provides the necessary output with high accuracy because of its high order when compared to secondary and tertiary.

4. In which of the following areas, the usage of primary triangulation is done?

- a) Measuring fields
- b) Measuring built up lands
- c) Measuring earth's figure
- d) Measuring unused lands

Answer: c

Explanation: Due to its high accuracy and high order presence, the primary triangulation is adopted for important works like measuring the earth's figure and also for other government related works.

5. Length of base line in primary triangulation is given as _____

- a) 1.5 to 5 km
- b) 0.5 to 10 km
- c) 0.5 to 3 km
- d) 5 to 15 km

Answer: d

Explanation: For applying the triangulation system, certain parameters will be assumed and length of base line is one among them. It is assumed as 5-15 km in primary, 1.5-5 km in secondary, 0.5-3 km in tertiary triangulation system.

6. When compared to primary triangulation, secondary triangulation is having smaller triangles.

- a) True

b) False

Answer: a

Explanation: When compared to primary triangulation, secondary triangulation and tertiary triangulation are having less order which decreases its accuracy. So in order to obtain stable values the formation of number of triangles in a framework increases.

7. Among the classification of triangulation, which will give the precise value?

- a) Quaternary
- b) Tertiary
- c) Secondary
- d) Primary

Answer: d

Explanation: Because of the presence of high order when compared to the remaining classifications, primary triangulation can provide precise and accurate values than the remaining.

8. Which classification involves the formation of more number of triangles?

- a) Primary
- b) Secondary
- c) Tertiary
- d) Quaternary

Answer: c

Explanation: Due to the presence of less order than the remaining classifications, tertiary triangulation involves the formation of more number of triangles which makes it a tedious process.

9. Which triangulation system has the least probability of occurring errors?

- a) Primary
- b) Secondary
- c) Quaternary
- d) Tertiary

Answer: a

Explanation: Primary triangulation involves the formation of triangles in a frame work which covers a vast area. The triangles formed will be having high accuracy in obtained values which might serve as the best method with least errors.

10. Which triangulation system is will not give more accurate results?

- a) Quadrilateral
- b) Single chain
- c) Double chain
- d) Central point

Answer: b

Explanation: In a single chain of triangles, narrow strips are used for covering the terrain. This process can be useful in case of obtaining results in a rapid way within the expenditure. But it is not suitable for primary works.

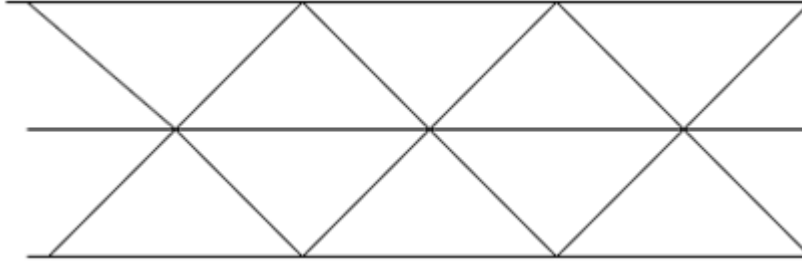
11. Covering whole survey area with primary triangulation but filling the gaps with secondary and tertiary triangulation involves in which among the following processes?

- a) Central system
- b) Quaternary triangulation
- c) Grid iron system
- d) Well conditioned system

Answer: c

Explanation: The grid system involves formation of framework with primary triangulation but filling the parallel and perpendicular with secondary and tertiary triangulation systems. It is the widely used process in India and central system is adopted in U.K.

12. The figure given below describes about the double chain method of triangulation.



- a) True
- b) False

Answer: a

Explanation: Double chains of triangulation can be applied in case of covering a large area within a short span of time. It is also somewhat related to the single chain triangles. This method is also not capable of producing accurate values.

This set of Surveying Multiple Choice Questions & Answers (MCQs) focuses on “Triangulation” Signals and Towers.

1. A structure erected over a station can be determined as _____

- a) Signal
- b) Tower
- c) Instrument station
- d) Satellite station

Answer: b

Explanation: A tower can be designated as a structure which is erected over a station, for supporting the instrument. Most probably it can be seen when the station has to be elevated.

2. The amount of elevation depends on which of the following characteristics?

- a) Instrument used
- b) Gradient
- c) Slope level
- d) Characteristics of terrain

Answer: d

Explanation: The elevation which is provided to the station will depend upon the characteristic of the terrain the base line has to be setup. Both the stations are to be elevation enough so that they are inter visible to each other.

3. Which type of structure (tower) can be used for small heights?

- a) Masonry structure
- b) Wooden structure
- c) Steel structure
- d) Timber structure

Answer: a

Explanation: A tower is generally made of masonry, timber and steel. For small heights, masonry structure is adoptable, which makes them economical for the range of work they do.

4. What is the height of a Bilby tower?

- a) 10 m

- b) 20 m
- c) 30 m
- d) 50 m

Answer: c

Explanation: Bilby tower is one of the types of tower, which is named after the inventor, which can uplift the observer as well as the lamp to a height of 30 m minimum and to a maximum of 40 m. Manual power is needed for the upliftment.

5. Which of the following determines the exact position of the observed station?

- a) Signal
- b) Tower
- c) Theodolite
- d) Chain

Answer: a

Explanation: A signal can determine the exact position of the station with its functionality. The classifications are done so that it can be used within the specified ranges.

6. Which of the following is not a classification of signal?

- a) Sun signal
- b) Night signal
- c) Daylight signal
- d) Polarised signal

Answer: d

Explanation: A signal is divided into certain categories so that it can serve within the specified range. The classifications include day light signal, night signal, sun signal, which are free from the phase.

7. A signal must contain phase.

- a) True
- b) False

Answer: b

Explanation: A signal is a device which is capable of determining the exact location of the station. In order to exhibit this property, it must be free from phase. But it can be allowed to have some phase in it.

8. Opaque signal is having a range of _____

- a) 50 km
- b) 40 km
- c) 30 km
- d) 80 km

Answer: c

Explanation: Day light or opaque signals consists of various forms in it. They are eligible to sight up to a distance of 30 km after which the grip on sight will be lost. For more than 30 km sighting, other methods can be employed.

9. In which of the following cases, a pole signal is used?

- a) Non-Luminous signal
- b) Luminous signal
- c) Night signal
- d) Polarised signal

Answer: a

Explanation: In day light signal, if the measurement has to be done within 6 km range then pole signal are used. Pole signal is consists of pole painted in alternate colours for easy identification. It is rested on the tripod.

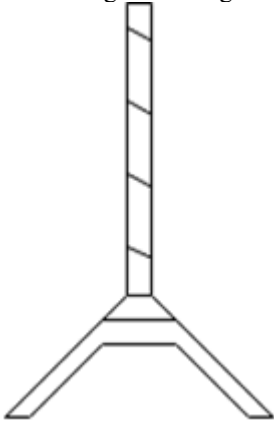
10. Which among the following indicates the instrument used in Sun signals?

- a) Polarised signal
- b) Night signal
- c) Non Luminous signal
- d) Luminous signal

Answer: d

Explanation: A heliotrope is an instrument, which is used as a sun signal. It consists of a plane mirror to reflect sun's rays. The line of sight can be telescopic with an aperture consisting cross hairs.

11. The figure belongs to which of the following classifications?



- a) Night signal
- b) Luminous signals
- c) Non-luminous signals
- d) Sun signal

Answer: c

Explanation: The figure given here will come under the classification of signal which is used in case of opaque signals which can site up to 30km. In order to have the visibility of the signal rod is placed on the stand, having alternate colors for easy identification.

12. What will be the face correction made on bright line, if the radius of the signal is given as 24m, angle with which the station points make with the sun is given as $24^{\circ}12'$ and the distance between the station points is given as 85m?

- a) $953^{\circ}11'$
- b) $59^{\circ}11'$
- c) $359^{\circ}11'$
- d) $593^{\circ}11'$

Answer: d

Explanation: The determination of the phase correction on a bright line can be done by using the formula,

$\hat{P} = 206265 * r * \cos(\hat{I} \pm 2) / D$. On substitution, we get

$\hat{P} = 206265 * 2 * \cos(24^{\circ}12' / 2) / 85$

$\hat{P} = 593^{\circ}11'$.

This set of Surveying Multiple Choice Questions & Answers (MCQs) focuses on “Triangulation – Base Line Measurement”.

1. Which of the following is the most important process in the triangulation system?

- a) Towers
- b) Signals
- c) Base line measurement
- d) Reconnaissance

Answer: c

Explanation: The base line measurement serves as an important source in the process of triangulation. It helps in determination of station points and the elevated, peak points in a terrain which help in the remaining fields like signals, towers etc.,

2. The length of the tenth base is _____

- a) 1.7 miles
- b) 2.7 miles
- c) 4.7 miles
- d) 6.7 miles

Answer: a

Explanation: The length of the base chosen will depend upon the grade of the triangulation adopted. Generally, in India, ten bases were adopted off which the tenth base is having a length of 1.7 miles.

3. Ground which is having undulations is taken into consideration while setting base line.

- a) True
- b) False

Answer: b

Explanation: In the triangulation system, base line will have the at most importance. It will be the key factor of the classification, as it describes the accuracy of the work. So in order to improve that, a ground with fewer undulations must be chosen.

4. Which of the following is not a form of base measuring apparatus?

- a) Flexible apparatus
- b) Rigid bars
- c) Spiral apparatus
- d) Colby apparatus

Answer: c

Explanation: The base line measurement involves certain processes of which rigid bars, flexible apparatus are the basic divisions made. The remaining will come under the sub-categories of these.

5. Corrections can be applied without measuring the temperature in field.

- a) True
- b) False

Answer: a

Explanation: The measured base line can contain some errors which will decrease the accuracy of the output. While using steel and brass wires this possibility increases. So in order decrease the prone of having less accuracy, corrections are applied without considering certain parameters.

6. Colby apparatus will come under which of the following forms?

- a) Optical apparatus
- b) Flexible apparatus
- c) Rigid bars
- d) Jaderinâ€™s apparatus

Answer: c

Explanation: While determining the base line, some of the methods are adopted in which usage of rigid bars is one of them. The usage of rigid bars involves in the formation of certain classes of which Colby is present.

7. Which of the following indicates a flexible apparatus?

- a) Copper tape
- b) Steel tape
- c) Chain
- d) Iron tape

Answer: b

Explanation: A steel tape is used in case of flexible apparatus because it involves speed in the work which is an economical one. But due to speed concern, it lacks accuracy.

8. Which of the following methods is having more amount of flexibility?

- a) Flexible apparatus
- b) Rigid bars
- c) Colby apparatus
- d) Jaderinâ€™s method

Answer: d

Explanation: Jaderinâ€™s method is said to be having more flexibility when compared to the remaining methods of setting a base line. This method involves usage of tripods, tapes which are able to provide accurate value when ever used so that they wonâ€™t loose flexibility.

9. The formula for correction for temperature is _____

- a) $C = \pm (T_m - T_0) L$
- b) $C = \pm (T_m - T_0) + L$
- c) $C = \pm (T_m + T_0) L$
- d) $C = \pm (T_m - T_0) / L$

Answer: a

Explanation: The formula for correction of temperature can be given as $C = \pm (T_m - T_0) L$, where \pm determines the value of coefficient of thermal expansion, T_m = mean temperature, T_0 = temperature during standardisation, L = length measured.

10. What will be the correction for absolute length of the length of the line is 20m, correction is 2m and length of the tape is 30m?

- a) 1.43
- b) 1.34
- c) 31.42
- d) 2.65

Answer: b

Explanation: The correction for absolute length can be given as

$C_a = L \cdot c / l$. On substitution, we get

$$C_a = 20 \cdot 2 / 30$$

$$C_a = 1.34.$$

11. Determine the correction for the temperature, if the mean temperature is 30°C and the temperature during standardization of tape is about 28°C with length of the line 9m.

- a) 8×10^{-6}
- b) 81×10^{-6}
- c) 18×10^{-6}
- d) 18×10^6

Answer: c

Explanation: The correction for temperature can be assumed as,

$C_t = \alpha (T_m - T_0) \times L$. here, $\alpha = 1 \times 10^{-6}$ /°C. On substitution, we get

$$C_t = 1 \times 10^{-6} \times (30 - 28) \times 9$$

$$C_t = 18 \times 10^{-6}.$$

12. Apply correction for tension, if the pull applied during measurement is 15N and standard pull is about 8N.

Measured length is about 10m, cross-section of the tape is 5 sq. cm with $E = 2 \times 10^7$ N/sq. cm.

- a) 7×10^7
- b) 6×10^7
- c) 7×10^{10}
- d) 7×10^2

Answer: a

Explanation: The correction for pull or tension can be given as,

$C_p = (P - P_0) \times L / A \times E$. On substitution, we get

$$C_p = (15 - 8) \times 10 / (5 \times 2 \times 10^7)$$

$$C_p = 7 \times 10^7.$$

13. If the weight of the tape is 1kg having length 100m with 6 equal bays. The pull applied will be 9N, calculate the correction for sag.

- a) 0.01042
- b) 0.0142
- c) 0.142
- d) 0.00142

Answer: d

Explanation: Correction of sag can be given as,

$C_s = \frac{1}{8} \times \frac{W^2}{n^2 \times P^2}$. On substitution, we get

$$C_s = \frac{1}{8} \times \frac{100^2}{6^2 \times 9^2}$$

$$C_s = 0.00142.$$

14. Calculate the correction for misalignment, if the length of the line is 18m with perpendicular of 3m.

- a) 0.52
- b) 0.25
- c) 2.05
- d) 5.02

Answer: b

Explanation: The correction for misalignment can be calculated by,

$C_h = \frac{d^2}{2 \times L}$. On substitution, we get

$$C_h = \frac{3^2}{2 \times 18}$$

$$C_h = 0.25.$$

15. What will be the correction for slope, if the length of the line is given as 20m with slope of 5°?

- a) 1.101
- b) 0.011
- c) 0.101
- d) 1.001

Answer: c

Explanation: The correction to slope can be given as,

$C_v = 2 * L * \sin^2 (\hat{I}/2)$. On substitution, we get

$C_v = 2 * 20 * (5^\circ 46' 24'' / 2)$

$C_v = 0.101$.

This set of Surveying Multiple Choice Questions & Answers (MCQs) focuses on "Ideal Transition Curve".

1. A curve which is having a varying radius is called _____

- a) Simple curve
- b) Compound curve
- c) Transition curve
- d) Reverse curve

Answer: c

Explanation: A transition curve is having a varying radius which is introduced in between the branches of different curves. It is used in areas where a straight line and a curve have to be connected.

2. In order to prevent the case of overturning, which of the following is provided?

- a) Super elevation
- b) Reverse curve
- c) Simple curve
- d) Compound curve

Answer: a

Explanation: Super elevation is provided in such a way that there is a rise at a side of the curve which helps in avoiding overturning, which is given as B/gR which helps in determining the amount of elevation needed to be provided.

3. The provision of equilibrium cant can be seen in case of _____

- a) Curves
- b) Mountains
- c) Highways
- d) Railways

Answer: d

Explanation: The provision of equilibrium cant can be seen in case of railways, which is capable of providing the same amount of load on either side of the track, which makes the passenger not to lean in any direction.

4. Side friction factor is used in which of the following cases?

- a) Reverse curve
- b) Transition curve
- c) Simple curve
- d) Compound curve

Answer: b

Explanation: Side friction factor is the force transferred by friction to the pavement, which can be used in case of highways while providing super elevation to avoid overturning of vehicles.

5. With increase in super elevation there must be subsequent increase in centrifugal force for balancing it.

- a) True
- b) False

Answer: a

Explanation: While considering super elevation, the weight of the vehicle and centrifugal force must be taken into consideration. So if there is an increase in super elevation, centrifugal force must be increased so that it balances the motion with less frictional force.

6. Length of transition curve can be given as _____

- a) $L = r \tan(\hat{I}/2)$
- b) $L = ne$
- c) $L = n \cdot e$
- d) $L = n + e$

Answer: b

Explanation: Length of transition curve is given as $L = ne$ in which, e describes about the amount of super elevation provided which should be at a required rate and n varies in between 300 to 1200.

7. Which of the following methods doesn't describe the method of finding length of transition curve?

- a) Arbitrary gradient
- b) Time rate
- c) Bisection of arcs
- d) Rate of Change of radial acceleration

Answer: c

Explanation: The length of transition curve depends upon amount of super elevation provided which must be at a required rate. It can be determined by an arbitrary gradient, time rate and change of radial acceleration.

8. Among the methods available for determining the length of the curve, which is commonly used?

- a) Bisection of arcs
- b) Time rate
- c) Arbitrary method
- d) Rate of change of radial acceleration

Answer: d

Explanation: In the rate of change of radial acceleration, time rate methods length is directly proportional to which makes both of them useful. But, in accuracy perspective, rate of change of radial acceleration method is used most commonly.

9. Clothoid is also known as _____

- a) Glover's spiral
- b) Froude's equation
- c) Cartesian curve
- d) Cubic spiral

Answer: a

Explanation: A clothoid is an ideal transition curve in which, length is inversely proportional to the radius of the curve. It is also known as Glover's spiral.

10. Froude's transition is also known as _____

- a) Clothoid
- b) Cubic parabola
- c) Cubic spiral
- d) Glover's spiral

Answer: b

Explanation: Cubic parabola is also known as Froude's transition curve. It uses Cartesian co-ordinates which are required for setting the curve. It is the most commonly used transition curve, which can use rectangular co-ordinates too.

11. Determine the super elevation, if the width of the road can be given as 2.96m, radius of curve as 62.96m, vehicle speed = 56m/s.

- a) 51.303m
- b) 51.03m
- c) 15.03m
- d) 15.3m

Answer: c

Explanation: Super elevation or cant can be derived by,

$$e = \frac{Bv^2}{g \cdot R}. \text{ on substitution, we get}$$

$$e = \frac{2.96 \cdot 56^2}{9.81 \cdot 62.96}$$

$$e = 15.03\text{m}.$$

12. If the super elevation for a road is given as 24m, find the length of transition curve.

- a) 15.6 km
- b) 15.6 m
- c) 15.6 cm
- d) 15.6 mm

Answer: a

Explanation: The length of transition curve can be determined by,

$L = n \cdot e$, the value of n varies in between 300-1200. Assume the value of $n = 650$. On substitution, we get

$$L = 650 \cdot 24$$

$$L = 15600 \text{ m} = 15.6 \text{ km}.$$

13. Using intrinsic equation, find the value of the length of curve between two points of a 45m transition curve having radius 24.76m with an inclination of $8^{\circ}43'$.

- a) 319.37m
- b) 913.37m
- c) 139.73m
- d) 139.37m

Answer: d

Explanation: From the intrinsic equation,

$(l = \sqrt{2RL})$ On substitution, we get

$(l = \sqrt{2 \times 24.76 \times 45 \times 8.7167})$

$l = 139.37\text{m}$.

14. If the radius of curvature of a curve being 45.42m with an inclination of $7^{\circ}52'$. The value of s and L corresponds to 2 and 56m respectively, find the total tangent length of a transition curve.

- a) 03.02m
- b) 30.02m
- c) 2.3m
- d) 3.2m

Answer: b

Explanation: The total length of a transition curve can be determined by,

$(R+s) \tan(\frac{\hat{I}}{2}) + L(1 + \frac{s}{R}) / 2$. On substitution, we get

$= (45.42+2) \tan(7.8667^{\circ}/2) + 56(1 + \frac{2}{45.42}) / 2$

$= 30.02\text{m}$.

15. In a cubic parabola, if the value of x co-ordinate is 7, radius of the curve is given as 42.69m and the length of the curve as 24m. Find the y co-ordinate.

- a) 2.76
- b) 1.05
- c) 0.05
- d) 5

Answer: c

Explanation: The value of y co-ordinate can be determined by using the formula,

$y = x^3 / 6RL$. on substitution, we get

$y = 7^3 / 6 \times 42.69 \times 24$

$y = 0.05$.

This set of Advanced Surveying Questions and Answers focuses on "Triangulation - Satellite Station: Reduction to Centre".

1. Which of the following can describe the main purpose of the satellite station?

- a) Act as false station
- b) Act as true station
- c) Measuring length
- d) Measuring diameter

Answer: a

Explanation: The main purpose of the satellite station is to act as an eccentric station or a false station. For securing well conditioned triangle some of the objects like flag poles, towers, were chosen as satellite station.

2. The recordings taken from eccentric station are more precise.

- a) False
- b) True

Answer: b

Explanation: Satellite station involves in adopting the place where instrument can't be placed. So, this might have an opportunity to create error in the recordings taken which can be further removed by applying corrections. The recordings taken are near to precise value.

3. Which of the following indicates the formula of phase correction?

- a) $\hat{I}^2 = 206265 + d \sin(\hat{I}^3) / a$
- b) $\hat{I}^2 = 206265 \times d \sin(\hat{I}^3) / a$
- c) $\hat{I}^2 = 20265 \times d \sin(\hat{I}^3) / a$
- d) $\hat{I}^2 = 206265 \times d \sin(\hat{I}^3) / a$

Answer: d

Explanation: The phase correction is actually used for determining the eccentricity of the signal. The observations of this signal can be made by placing the station out of the center, which is essential to correct the angles, which is similar to the corrections of satellite station.

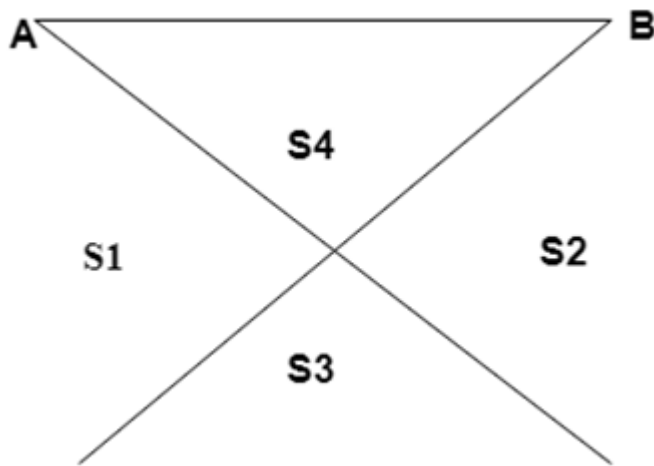
4. Which of the following method can be adopted if there is any object in the point of instrument station?

- a) Centric station
- b) True station
- c) Satellite station
- d) Controlled station

Answer: c

Explanation: The main objective of using satellite station is to place the instrument in the surrounding places of the point where object has been pre constructed. This involves in enhancing technical knowledge and also in improving false stations.

5. Find the true angle from the given figure.



a) $\hat{I}_{\pm} = \hat{I}_1 + \hat{I}_2$

b) $\hat{I}_{\pm} = \hat{I}_1 + \hat{I}_2$

- c) $\hat{I}_{\pm} = \hat{I}_1 \hat{\alpha} \hat{I}_2$
d) $\hat{I}_{\pm} = \hat{I}_1 + \hat{I}_2 \hat{\alpha} \hat{I}_2$

Answer: a

Explanation: The true angle can be calculated by determining the positions of the station points and the remaining points. From the figure, at position S1, the true angle is given as

$$\hat{I}_{\pm} = \hat{I}_1 + \hat{I}_2 \hat{\alpha} \hat{I}_2$$

6. Determine the true angle, if the station is placed at the second point having angles \hat{I}_1 , \hat{I}_{\pm} and \hat{I}_2 as $20^{\circ}45'$, $2^{\circ}31'$ and $7^{\circ}12'$.

- a) $52^{\circ}26'$
b) $25^{\circ}62'$
c) $25^{\circ}26'$
d) $26^{\circ}25'$

Answer: c

Explanation: The value of the true angle at the second station point can be determined by

Angle = $\hat{I}_1 \hat{\alpha} \hat{I}_{\pm} + \hat{I}_2$. On substitution, we get

$$\text{Angle} = 20^{\circ}45' \hat{\alpha} 2^{\circ}31' + 7^{\circ}12'$$

$$\text{True angle} = 25^{\circ}26'$$

7. Determine the eccentric station point if the station is 1.65m to the west and the distance between remaining two station points is given as 300m, with an angle of $10^{\circ}12'$.

- a) $200^{\circ}35'$
b) $2^{\circ}53'$
c) $202^{\circ}53'$
d) $200^{\circ}53'$

Answer: d

Explanation: The value of eccentric station can be found out by using,

$$\hat{I}_2 = 206265 \cdot d \cdot \sin(\hat{I}_1) / a$$

$$\hat{I}_2 = 206265 \cdot 1.65 \cdot \sin(10^{\circ}12') / 300$$

$$\hat{I}_2 = 200^{\circ}53'$$

8. Determine the corrected direction of the eccentric station if the value of D is given as 200m with a reflection of $9^{\circ}15'$ having a distance of 1.2m from the main station.

- a) $198^{\circ}45'$
b) $198^{\circ}56'$
c) $189^{\circ}56'$
d) $918^{\circ}56'$

Answer: b

Explanation: The corrected direction of the eccentric station can be determined by

$$\hat{I}_2 = d \cdot \sin \hat{I}_1 \cdot 206265 / D$$

$$\hat{I}_2 = 1.2 \cdot \sin 9^{\circ}15' \cdot 206265 / 200$$

$$\hat{I}_2 = 198^{\circ}56'$$

9. Calculate the corrected angle if the values of \hat{I}_1 , \hat{I}_1 and \hat{I}_2 are given as $50^{\circ}46'$, $12^{\circ}24'$ and $13^{\circ}36'$.

- a) $94^{\circ}34'$
b) $49^{\circ}43'$
c) $4^{\circ}34'$
d) $49^{\circ}34'$

Answer: d

Explanation: The corrected angle can be determined by using the formula,

$$\text{Corrected angle} = \hat{I}_1 + \hat{I}_1 \hat{\alpha} \hat{I}_2$$

$$\text{Corrected angle} = 50^{\circ}46' + 12^{\circ}24' \hat{\alpha} 13^{\circ}36'$$

$$\text{Corrected angle} = 49^{\circ}34'$$

10. Satellite station is also known as _____

- a) Centric station
b) True station
c) Eccentric station
d) Instrument station

Answer: c

Explanation: A satellite station can also be known as an eccentric station. It involves the following process when a structure is taken as an instrument station, it is not possible to set the instrument over that structure and a false station point is assumed that can be referred as satellite station.

This set of Surveying Multiple Choice Questions & Answers (MCQs) focuses on “Survey Adjustments and Errors Theory – Accidental Errors Laws”.

1. The laws of accidental errors follow which of the following principle?

- a) Normal equation
- b) Probability law
- c) Laws of weight
- d) Most probable value

Answer: b

Explanation: Laws of accidental errors follow the probability law, which is having a definite law for accidental error occurrence. It defines the errors and helps in expressing them in the form of equations.

2. Which of the following does not indicate the feature in laws of accidental errors?

- a) Negligible errors
- b) Small errors
- c) Large errors
- d) Positive errors

Answer: a

Explanation: The features in laws of accidental errors include the tendency of small errors to be more frequent, positive and negative errors with equal frequency and making large errors occurrence impossible.

3. Most probable value is equal to which of the following?

- a) Differentiation
- b) Summation
- c) Arithmetic mean
- d) Normal equation

Answer: c

Explanation: Most probable value is equal to the arithmetic mean, in case all the taken weights are equal and in case of unequal weights, it is equal to the weighted arithmetic mean.

4. The value of mean square error can be given as _____

- a) $(\hat{\sigma}_v^2 + n)^{1/2}$
- b) $(\hat{\sigma}_v^2 * n)^{1/2}$
- c) $(\hat{\sigma}_v^2 / n)^{1/2}$
- d) $(\hat{\sigma}_v^2 / n)^{1/2}$

Answer: d

Explanation: The mean square error is the ratio which is obtained by the taking mean of all the possible errors. It is taken as. It is useful in determining the possible error occurred and helps in reducing it by distributing it equally.

5. Probability curve describes about _____

- a) Normal equation
- b) Frequency of errors
- c) Probability curve
- d) Probability equation

Answer: b

Explanation: The probability curve, which is established from the theory of probability, describes about the features like relative frequency of the errors in the form of curve. It is the basis for many mathematical derivations.

6. Determine the probable error in a single measurement if the summation of the difference between mean and single observation is given as 8.76 in a series of 7 observations.

- a) 0.98
- b) 0.93
- c) 9.08
- d) 0.89

Answer: a

Explanation: The value of the probable error of single observation can be determined by using the formula,

$E_s = 0.6745 \cdot \sqrt{\hat{v}^2 / (n-1)}$. On substitution, we get

$E_s = 0.6745 \cdot \sqrt{8.76^2 / (7-1)}$. $E_s = 0.98$.

7. Determine the probable error of measurements by using the different probable errors, which are given as 5.64, 2.98, 0.98 and 2.54.

- a) 3.96
- b) 9.63
- c) 6.93
- d) 9.36

Answer: c

Explanation: The probable error of measurements can be given as,

Probable error of measurement = $\sqrt{E_1^2 + E_2^2 + E_3^2 + E_4^2}$. On substitution, we get
= $\sqrt{5.64^2 + 2.98^2 + 0.98^2 + 2.54^2}$
= 6.93.

8. What will be the mean square error, if the readings were given as 2.654, 2.987, 2.432 and 2.543.

- a) 3.305
- b) 0.335
- c) 0.305
- d) 30.35

Answer: b

Explanation: The mean square error can be given as,

$M.S.E = \sqrt{\hat{v}^2 / n}$. The mean of the readings can be given as,
(2.645 + 2.987 + 2.432 + 2.543) / 4 = 2.651.

The values of \hat{v} are obtained by difference of each reading with the mean. So, the \hat{v} can be given as
 $\hat{v} = (2.651 - 2.645) + (2.987 - 2.651) + (2.651 - 2.432) + (2.651 - 2.543) = 0.67$

On substitution, we get

$M.S.E = \sqrt{\hat{v}^2 / n}$

$M.S.E = \sqrt{0.67^2 / 4}$

$M.S.E = 0.335$.

9. If the value of error due to the single measurement is 6.54 for 10 observations, then calculate the value of average probable error.

- a) 2.086
- b) 2.608
- c) 0.268
- d) 2.068

Answer: d

Explanation: The average probable error can be calculated by using the formula,

$E_m = E_s / \sqrt{n}$. On substitution, we get

$E_m = 6.54 / \sqrt{10}$

$E_m = 2.068$.

10. Find the number of observations if the mean square error and the summation of the difference between the individual and the mean series are given as 0.987 and 3.654.

- a) 14
- b) 12
- c) 10
- d) 9

Answer: a

Explanation: The mean square error can be calculated by using the formula,

$M.S.E = \sqrt{\hat{v}^2 / n}$. On substitution, we get

$0.987 = \sqrt{3.654^2 / n}$

$n = 14$ (approximately).

This set of Surveying Multiple Choice Questions & Answers (MCQs) focuses on "Survey Adjustments and Errors Theory" Laws of Weights.

1. The laws of weight are established on the basis of _____

- a) Observed equation
- b) Normal equation
- c) Least squares

d) Probability equation

Answer: c

Explanation: The laws of weight are established based on the method of least squares in which it describes the true value among the list of possible errors. It consists of the sum of squares with a minimum residual error.

2. In the laws of weight, weight is inversely proportional to length.

- a) True
- b) False

Answer: a

Explanation: In the laws of weight, it is described that weight is inversely proportional to the length which makes length of various routes level.

3. Weight of the equation remains unchanged even when the signs in the equation are changed.

- a) True
- b) False

Answer: a

Explanation: The laws of weight include certain cases off which the weight of the equation doesn't change even though the sign of the equation changes. It indicates that the sig of the equation is independent of the weight applied.

4. Find the arithmetic mean if the angles and their weights were given as $20^{\circ}42'3''$, $20^{\circ}42'6''$ and $2, 2, 2$ respectively.

- a) $20^{\circ}42'6.3''$
- b) $20^{\circ}42'5.3''$
- c) $20^{\circ}42'1.3''$
- d) $20^{\circ}42'4.3''$

Answer: d

Explanation: The arithmetic mean can be calculated as,

$$\text{Mean} = 20^{\circ}42' + (1/3) * (3'' + 4'' + 6'')$$

$$\text{Mean} = 20^{\circ}42'4.3''$$

5. Determine the weight of the weighted arithmetic mean if the angles and their weights are given as $40^{\circ}56'2''$, $40^{\circ}56'7''$ and $40^{\circ}56'12''$ and 5, 4, 9 respectively.

- a) 13
- b) 18
- c) 81
- d) 10

Answer: b

Explanation: The weight of the weighted arithmetic mean can be calculated by summation of the individual weights. So,

$$\text{Weight of the arithmetic mean} = 5 + 4 + 9 = 18.$$

6. Find the weight of the algebraic sum of the two quantities given as $21^{\circ}43'10''$, $54^{\circ}32'20''$, having weights 5, 7 respectively.

- a) $13 * 35$
- b) $13/35$
- c) $35/13$
- d) 48

Answer: c

Explanation: From the given, it is clear that we can use sum of reciprocals of individual weights i.e.

$$\text{Summation} = 1/5 + 1/7 = 13 / 35.$$

$$\text{Weight of } \hat{I} = (76^{\circ}15'30'') = 1 / (13/35) = 35 / 13.$$

7. If the angle $\hat{I} = 54^{\circ}32'12''$, having weight 7, is multiplied by a factor 5 then find the resulting weight of that angle.

- a) $7/25$
- b) $25/7$
- c) 175
- d) 571

Answer: a

Explanation: The weight of the angle can be found out by dividing the square of that factor with the given weight.

$$5\hat{1} = (272 \div 41) = 7 / 5^2 = 7 / 25.$$

8. Find the weight of the equation $\hat{1} + \hat{2} = 23$ if it is multiplied by its own weight. Weight of the equation is given as 2.

- a) 2
- b) 1/2
- c) 4
- d) 5

Answer: b

Explanation: If the equation is multiplied by its own weight then the resulting weight will be equal to reciprocal of the original weight.

$$2 * (\hat{1} + \hat{2}) = 47 \div 30, \text{ weight} = \frac{1}{2}.$$

9. Determine the weight of the quantity $\hat{2} = 21$ if it is divided by a factor 3. Its original weight is 8.

- a) 9/8
- b) 8/9
- c) 27
- d) 72

Answer: d

Explanation: If a quantity is divided a factor then the weight can be obtained by multiplying with square of that factor to the original weight.

$$\hat{2} / 3 = 7 \div 18 \div 4.3 = 8 * (3^2) = 72.$$

10. What will be the value of weight if the equation $\hat{1} + \hat{2} = 32$ having weight 5 is subtracted by 180?

- a) 3
- b) 5/3
- c) 5
- d) 2

Answer: c

Explanation: If the equation is subtracted from a constant, the weight of the equation remains unchanged. So, $180 - 32 = 148$, weight of the equation = 5.

This set of Surveying Multiple Choice Questions & Answers (MCQs) focuses on "Survey Adjustments and Errors Theory" General Principles of Least Squares.

1. The principle of least squares can be formed from _____

- a) Probability equation
- b) Normal equation
- c) Celestial equation
- d) Observed equation

Answer: a

Explanation: Though the principle of least squares is useful in the determination of certain parameters it is actually derived from the probability equation. A probability equation shows an accidental error with definite law.

2. In the principle of least squares, residual error will be _____

- a) Maximum
- b) Minimum
- c) Negligible
- d) Nor error occurs

Answer: b

Explanation: The general method of least squares is used in case of determination of normal equations and the laws of weight. It consists of a set of observations, which are having a minimum residual error. Residual error is the difference in the adopted value and observed value.

3. Which of the following indicates the formula of arithmetic mean?

- a) $\sum V * n$
- b) $\sum V \div n$
- c) $\sum V + n$

d) $\hat{e} \cdot V / n$

Answer: d

Explanation: The formula of arithmetic mean can be given as $\hat{e} \cdot V / n$, where n indicates the number of observed values and V indicates difference of the individual with the mean of the readings.

4. If the value of number of observations is large and e is small then $\hat{e} \cdot V / n$ will be equal to _____

- a) Frequency
- b) True value
- c) Arithmetic mean
- d) Probable value

Answer: c

Explanation: The value of number of observations and the e values are to be maintained in a stable manner. If the n is increased and e is decreased, the value $\hat{e} \cdot V / n$ will be infinitesimally small and will be equal to arithmetic mean.

5. Which of the following indicates the fundamental of least squares?

- a) arithmetic mean should be maximized
- b) arithmetic mean should be zero
- c) arithmetic mean should be neutralized
- d) arithmetic mean should be minimized

Answer: d

Explanation: The fundamental of law of least squares include the sum of squares of the residuals found by the use of arithmetic mean should be minimized. This must be applied while using the principle of least squares.

6. Which of the following value must always be positive in the principle of least squares?

- a) $(N - (\hat{e} \cdot V / n))^2$
- b) $(N * (\hat{e} \cdot V / n))^2$
- c) $(N + (\hat{e} \cdot V / n))^2$
- d) $(N - (\hat{e} \cdot V / n))^0$

Answer: a

Explanation: The term must always be positive because it eliminates the possible error which will occur during the process of recording values. It can also be believed that the presence of square can make it positive.

7. In the process of least squares, sum of residuals must be equal to zero.

- a) False
- b) True

Answer: b

Explanation: While determining the relation between the different set of values considered, we assume certain preferences which results in sum of residuals being zero.

8. When number of observations is large, the arithmetic mean will be equal to true value.

- a) True
- b) False

Answer: a

Explanation: It is known that the increase in number of observations leads to increase in the value of e. this can lead to equality of mean and the true value. This is the key point used in the principle of least squares.

9. Determine the arithmetic mean if the summation of the difference between individual and mean of the observations is given as 1.54 for 10 observations.

- a) 0.154
- b) 0.514
- c) 0.145
- d) 1.405

Answer: a

Explanation: The arithmetic mean can be calculated by using the formula,

$$M = \hat{e} \cdot V / n. \text{ On substitution, we get}$$

$$M = 1.54 / 10$$

$$M = 0.154.$$

10. Find the value of N if the sums of squares of two individual residuals are given as 24.98 and 13.76 respectively. The summation of the difference between individual and the mean of the readings is 3.32 for 8 observations.

- a) 1
- b) 1.6
- c) 1.7
- d) 2

Answer: b

Explanation: By applying the principle of least squares the value of N can be determined by,

$\hat{r}^2 = \hat{r}^2 + n \cdot (N - (\hat{r} \cdot V/n))^2$. On substitution, we get

$$24.98 = 13.76 + 8 \cdot (N - (3.32/8))^2$$

$$N = 1.6.$$

This set of Surveying Multiple Choice Questions & Answers (MCQs) focuses on "Survey Adjustments and Errors Theory" Normal Equations.

1. Which of the following can be used for finding a normal equation?

- a) Unknown values
- b) Algebraic coefficients
- c) Probability law
- d) Probability curve

Answer: b

Explanation: A normal equation is formed by the multiplication of unknown coefficients by which, the obtained equation is added and leads to the formation of normal equation. If the number of equations formed is equal to the number of unknowns the n the most probable value values can be found by the equations.

2. Normal equation is used in case of _____

- a) Probability equation
- b) Arithmetic method
- c) Indirect method
- d) Direct method

Answer: d

Explanation: Since the usage of normal equation involves finding unknowns of an equation, it is more used in the direct method. The found unknowns are used for the determination of most probable values and in the method of correlates.

3. Which of the following processes is a tedious one?

- a) Probability law
- b) Normal equation
- c) Probability equation
- d) Most probable value

Answer: b

Explanation: The process involved in finding and using the unknowns in a normal equation is tedious because it involves deriving the unknowns and using them for finding the most probable value, solving their cases and in the method of correlates.

4. Determine the normal equation for x for the equations, $5x+2y+3z-6=0$ and $2x+4y+6z-10=0$, having equal weight.

- a) $29x+18y+27z-50=0$
- b) $18x+29y+27z-50=0$
- c) $27x+18y+29z-50=0$
- d) $29x+81y+27z-50=0$

Answer: a

Explanation: The normal equation for x can be found out by multiplying the equations with the constant of x i.e., $5 \cdot (5x+2y+3z-6=0) = 25x+10y+15z-30=0$ and similarly,

$2 \cdot (2x+4y+6z-10=0) = 4x+8y+12z-20=0$. On adding we get the normal equation for x i.e., $29x+18y+27z-50=0$.

5. If different weights of the equations are involved then they are to be subtracted with the coefficients.

- a) False
- b) True

Answer: b

Explanation: The presence of unequal weights may be a problem for having a normal equation. In that case, the weights are to be multiplied with the constants present with the variables for obtaining the required equation.

6. Formation of normal equation with unknown quantities must be multiplied with the algebraic coefficient.
a) True
b) False

Answer: a

Explanation: In order to form a normal equation with unknown quantities it is necessary to multiply every observation with an algebraic coefficient of an unknown quantity. By this, a relation can be established.

7. Find the normal equation for y of the equations $2x+3y+4z-7=0$, $x-4y+6z-9=0$, having weights 3 and 2 respectively.
a) $48x-32y+8z-72=0$
b) $32x-8y+48z-72=0$
c) $8x-32y+48z-72=0$
d) $8x-48y+32z-72=0$

Answer: c

Explanation: In order to find normal equations for different weights we have to multiply with the weight along with the constant of the variable i.e.,

$$(3*3)*(2x+3y+4z-7=0) = 18x+27y+36z-54=0 \text{ and similarly,}$$

$$(4*2)*(x-4y+6z-9=0) = 8x-32y+48z-72=0.$$

8. What will be the normal equation for z if the equations are given as $3x+9y+4z-43=0$, $2x+6y+z-5=0$. Assume these are having equal weights.
a) $17x+42y+47z-178=0$
b) $14x+17y+42z-178=0$
c) $14x+42y+17z-178=0$
d) $42x+14y+17z-178=0$

Answer: c

Explanation: The normal equation for the variable z can be found out by multiplying those equations with their respective variable constants i.e.,

$$4*(3x+9y+4z-43=0) = 12x+36y+16z-172=0 \text{ and}$$

$$1*(2x+6y+z-5=0) = 2x+6y+z-5=0. \text{ On addition, we get the required normal equation,}$$

$$14x+42y+17z-178=0.$$

9. A normal equation is formed by _____
a) Subtracting algebraic coefficients
b) Adding algebraic coefficients
c) Dividing algebraic coefficients
d) Multiplying algebraic coefficients

Answer: d

Explanation: In general, normal equation can be found out by multiplying every given equation with the coefficient of unknown whose normal equation has to be found out. By adding all those equations, the complete normal equation can be found out.

10. Which of the following represents the correct set of constants and variables present in a normal equation?
a) 4 constants, 3 variables
b) 3 constants, 4 variables
c) 2 constants, 2 variables
d) 1 constant, 1 variable

Answer: a

Explanation: In general, any normal equation contains four constants and three variables. It can be found out by multiplying with the weight value provides with the constant of the variable required.

This set of Surveying Question Paper focuses on “Survey Adjustments and Errors Theory” Most Probable Values Determination.

1. Most probable value can be found by using a _____
a) Normal equation
b) Probability law
c) Probability curve
d) Algebraic coefficients

Answer: a

Explanation: From the unknowns, normal equations are found out. These are further used in identifying the most probable values if the number of unknowns is equal to the most probable value.

2. Most probable value is not used in the determination of which of the following?

- a) Observations by conditions
- b) Indirect readings from unequal weights
- c) Observations from equal weights
- d) Probability curve

Answer: d

Explanation: The most probable value obtained from the unknowns of the normal equation helps in the determination of direct observations from equal and unequal weights, indirect readings from equal and unequal weights, observations accompanied by condition equation.

3. If $A = 57 \pm 28$, $4A = 88 \pm 15$, $5A = 143 \pm 57$. Find the most probable value of A.

- a) $A = 26 \pm 45$
- b) $A = 26 \pm 54$
- c) $A = 26 \pm 54$
- d) $A = 62 \pm 54$

Answer: c

Explanation: The coefficients of A are given as 1, 4, 5. By multiplying these we get, $A = 57 \pm 28$, $16A = 353 \pm 56$, $25A = 719 \pm 35$ on adding we get, $42A = 1130 \pm 20$ and $A = 26 \pm 54$.

4. The Most probable value found by normal equation involves the usage of known values.

- a) True
- b) False

Answer: b

Explanation: From the normal equations found, the most probable value can be determined. The normal equations involve the usage of unknowns which help in the determination of most probable value but the number of unknowns must be known to us.

5. It is necessary for the observed equations to be accompanied with condition equation.

- a) True
- b) False

Answer: b

Explanation: It is not necessary for an observed equation to be accompanied with condition equation. It indicates a certain case in the most probable values. If so, the condition equation is reduced to observed equation which will give an unknown. It is preferable than the method of correlates.

6. Most probable value determines certain observations. Which among them will give accurate value?

- a) Direct observation with unequal weights
- b) Indirect observation with weights
- c) Direct observation with weights
- d) Observation with condition equation

Answer: d

Explanation: Since the usage of condition equation is done and it is been reduced to an observed equation, this involves more accuracy in the process. The observed equation obtained can be determined by method of correlates too.

7. Find the most probable value with the observations 2.76, 4.32, 9.87, 8.83 having equal weights.

- a) 6.45
- b) 6.54
- c) 4.65
- d) 5.46

Answer: a

Explanation: The value of most probable value can be obtained by using the formula, $M = (V_1 + V_2 + V_3 + V_4) / n$. On substitution, we get $M = (2.76 + 4.32 + 9.87 + 8.83) / 4$
 $M = 6.45$.

8. From which of the following cases, the value of most probable value can be easily determined?

- a) Indirect method
- b) Direct method
- c) Method of correlates
- d) From observations

Answer: c

Explanation: Among the methods available, the method of correlates is capable of providing accurate values in every step. Due to its accuracy, it is adopted in solving complex problems.

9. Determine the most probable value of B from the equations $B = 65 \pm 21$ weighing 3 and $2B = 132 \pm 40$ weighing 2.

- a) $141 \pm 18 \pm 52.7$
- b) $114 \pm 18 \pm 52.7$
- c) $114 \pm 8 \pm 52.7$
- d) $411 \pm 18 \pm 52.7$

Answer: b

Explanation: The M.P.V of B can be found by multiplying the coefficient with the corresponding weight i.e., $3 \cdot B = 196 \pm 5$ and similarly $8B = 1061 \pm 22 \pm 40$. On addition, we get $11B = 1257 \pm 27 \pm 40$.
 $B = 114 \pm 18 \pm 52.7$.

10. From the set of observations (1.87+ 9.73+ 9.22), find the most probable value. The weights of the observations are given as 4, 7, 9 respectively.

- a) 2.97
- b) 9.72
- c) 7.92
- d) 7.29

Answer: c

Explanation: If the weights are unequal then the most probable value can be given as,
 $M = (V_1 + V_2 + V_3) / (w_1 + w_2 + w_3)$. On substitution, we get
 $M = (4 \cdot 1.87 + 7 \cdot 9.73 + 9 \cdot 9.22) / (4 + 7 + 9)$
 $M = 7.92$.

This set of Surveying Multiple Choice Questions & Answers (MCQs) focuses on "Survey Adjustments and Errors Theory" "Method of Correlates".

1. In order to form a normal equation _____ are needed.

- a) Algebraic coefficients
- b) Probability equation
- c) Probability law
- d) Probability curve

Answer: a

Explanation: This implies the rule 1 of the normal equation. It indicates that for the formation of the normal equation with unknown quantities, the algebraic coefficient must be multiplied with that unknown quantity and must add the obtained results.

2. Correlates can also be known as _____

- a) Unknown multiples
- b) Known multiples
- c) Eccentric multiples
- d) Centric multiples

Answer: a

Explanation: The correlates are also known as the unknown multiples, which are used for finding most probable values of unknowns. It is more preferable when the case is more complex to be solved.

3. All conditions are to be collected and used in which of the following case?

- a) Most probable value
- b) Normal equation
- c) Method of correlates
- d) Probability law

Answer: c

Explanation: The method of correlates is used in case of more complexity. In that case, it involves the usage all the information available and the conditions mentioned so that it provides the result regarding the problem raised.

4. Determine the value of correction if the wave length is given as 25m, having weight 6.

- a) 2.87
- b) 7.14
- c) 1.47
- d) 4.17

Answer: d

Explanation: The value of correction can be determined in correction method by using the formula mentioned as below,

$E = \hat{l} / w$. On substitution, we get

$$E = 25 / 6$$

$$E = 4.17.$$

5. Which of the following condition is to be used when the equal weights are introduced?

- a) $e_1^2 \hat{e} e_2^2 \hat{e} e_3^2 = 0$
- b) $e_1^2 + e_2^2 + e_3^2 = 0$
- c) $e_1^2 + e_2^2 \hat{e} e_3^2 = 0$
- d) $e_1^2 \hat{e} e_2^2 + e_3^2 = 0$

Answer: b

Explanation: In case of equal weights, the summation of squares of the corrections must be used. It must be equal to zero so as to reduce the errors introduced by this method.

6. In case of method of correlation, the error is distributed to every observation.

- a) True
- b) False

Answer: a

Explanation: It is a primary rule in every surveying method employed. It helps in equal distribution of error which can actually increase the rate of output and the accuracy of the output.

7. Find the value of E if the wavelengths of different lines are given as 63m and 54m, having weights 6 and 7 respectively.

- a) 8.27
- b) 2.87
- c) 2.78
- d) 7.28

Answer: c

Explanation: The determination of the value E involves in substitution of the values in the below-given equation, $E = \hat{l}_1 (1/w_1 + 1/w_2) \hat{e} \hat{l}_2 (1/w_1 + 1/w_2)$. On substitution, we get

$$E = 63 * (1/6 + 1/7) \hat{e} 54 * (1/6 + 1/7)$$

$$E = 2.78.$$

8. Which of the following describes the work done by the method of correlates?

- a) Reducing the mean work
- b) Neglecting the arithmetic work
- c) Increasing the arithmetic work
- d) Reducing the arithmetic work

Answer: d

Explanation: Method of correlates involve in reducing the arithmetic work. It includes determination of the corrections for wave length and their weights which help in establishing a network of information.

9. Ample conditions were used in method of correlates.

- a) False
- b) True

Answer: b

Explanation: Method of correlation involves in determining the multiples or the individual constants, which can be further used for finding the probable values of unknowns. For finding these, a lot of conditions were established.

10. If the value of wave length is given as 21m with different weights 6 and 2, find the value of E.

- a) 14
- b) 13
- c) 12
- d) 10

Answer: a

Explanation: The value of E for a single wave length with dual weights can be given as

$E = \lambda * (1/w_1 + 1/w_2)$. On substitution, we get

$E = 21 * (1/6 + 1/2)$

$E = 14$.

This set of Surveying Multiple Choice Questions & Answers (MCQs) focuses on “Field Astronomy” Celestial Body Position.

1. Position of a celestial body can be determined by _____

- a) Nadir
- b) Azimuth
- c) Zenith
- d) Co-ordinates

Answer: d

Explanation: Any particle can be determined the usage of co-ordinates. It is required to allocate certain co-ordinate system for the proper output. The allocation depends on the type of work employed.

2. The angle between observer meridian and declination circle is given as _____

- a) Hour angle
- b) Azimuth
- c) Bearing
- d) Zenith

Answer: a

Explanation: An hour angle can be described as the angle between observer meridian and declination circle which passes through the body. It is always prescribed to measure it from westward.

3. The imaginary sphere on which stars appear to lie is known as _____

- a) Cylindrical sphere
- b) spheroid
- c) Celestial sphere
- d) Zenithal sphere

Answer: c

Explanation: Celestial sphere is an assumption in which it is assumed that the stars lie on it. The radius of the sphere can be of any value that means it is varying. Because of the fact that the stars are far from us, we assume centre of earth as the centre of celestial sphere.

4. The point above which the satellite or any celestial body lies is known as _____

- a) Zenith
- b) Nadir
- c) Visible horizon
- d) Latitude

Answer: b

Explanation: Nadir point can be described as a point above which the satellite or any celestial body lies. This term is generally used in case of satellite related discussion. Zenith is a point which is present above the celestial body.

5. Which of the following doesn't represent the co-ordinate system used in determining position of celestial body?

- a) Spherical co-ordinate system
- b) Horizon system
- c) Dependent system
- d) Independent system

Answer: a

Explanation: For determining the celestial body position, certain co-ordinates are assumed and those are given as horizon system, independent equatorial system, dependent equatorial system, celestial latitude and longitude system.

6. The horizon system depends on which of the following?

- a) Visible horizon
- b) Nadir
- c) Zenith
- d) Observer's position

Answer: d

Explanation: The horizon system depends on the observer's position. The horizon acts as a plane of reference and the co-ordinates of a celestial body can be taken as azimuth and altitude.

7. Zenith distance can be given as $z =$ _____

- a) $z = 90^\circ + \hat{p}$
- b) $z = 90^\circ * \hat{p}$
- c) $z = 90^\circ - \hat{p}$
- d) $z = 90^\circ / \hat{p}$

Answer: c

Explanation: Zenith distance can be determined as the angular distance from body to point on upper portion of celestial body. It is given as $z = 90^\circ - \hat{p}$.

8. Equatorial circle is used as a reference in an independent equatorial system.

- a) False
- b) True

Answer: b

Explanation: The independent system is used for the publication of stars ephemerides and also the position of the stars. For this it requires circle of references, which can be taken as equatorial circle and declination circle.

9. All the co-ordinates in dependent system will depend on observer's position.

- a) False
- b) True

Answer: a

Explanation: Dependent system has two co-ordinates; among them the second co-ordinate is independent on the observer's position. And it will have a declination as its circle of reference.

10. In the dependent equatorial system, first co-ordinate represents on _____ and second co-ordinate represents on _____

- a) Nadir, zenith
- b) Zenith distance, hour angle
- c) Hour angle, declination
- d) Zenith, declination

Answer: c

Explanation: The dependent co-ordinate system contains two co-ordinates off which the first co-ordinate is depended on the observer's position and second is independent of it. Here, the first co-ordinate represents hour angle and the second one represents declination.

11. Determine the spherical excess, if the area of the triangle is given as 32sq. m with radius 65m.

- a) 1562.24 m
- b) 1526.24 m
- c) 1562.42 m
- d) 1652.24 m

Answer: a

Explanation: The value of spherical excess can be given by using the formula,

$E = \hat{p} / (R^2 * \sin 1^\circ)$. On substitution, we get

$E = 32 / (65^2 * \sin 1^\circ)$

$E = 1562.24 \text{ m}$.

12. If the radius of sphere is given as 43m and the spherical excess as 186.54m, find the area of a spherical triangle.

- a) 6109.85 sq. m
- b) 6019.58 sq. m
- c) 6091.85 sq. m
- d) 6019.85 sq. m

Answer: d

Explanation: The area of the spherical triangle can be given by

$A = \frac{1}{2} E / 180$. On substitution, we get

$A = \frac{1}{2} \times 43^2 \times 186.54 / 180$

$A = 6019.85 \text{ sq. m.}$

This set of Surveying Multiple Choice Questions & Answers (MCQs) focuses on “Field Astronomy”
Astronomical Triangle.

1. Which among the following is used in the formation of the astronomical triangle?

- a) Zenith
- b) Meridian
- c) Horizon
- d) Azimuth

Answer: a

Explanation: An astronomical triangle can be formed by zenith, combining the pole joints, and a star with reference to circles. By doing this, there might be chance of obtaining a relation between the zenith and the pole joints.

2. When the greatest distance is to the east of the meridian then the elongation is said to be _____

- a) Azimuthal elongation
- b) Meridian elongation
- c) Western elongation
- d) Eastern elongation

Answer: d

Explanation: In general, a star can be said to be in elongation when its greatest distance is at east or west of the meridian. Eastern elongation can be said only when the greatest distance is at the east of the meridian, which determines the position of azimuth.

3. Which of the following cases determine that the astronomical triangle is right angled?

- a) Star at horizon
- b) Star at prime vertical
- c) Star at culmination
- d) Star at elongation

Answer: b

Explanation: When the star is positioned at the prime vertical, it is having a chance of attaining a right angled astronomical triangle. By joining the prime vertical and the meridian, declination of the circle can be found out.

4. Napier’s rule is used for the calculation of _____

- a) Latitude
- b) Declination
- c) Hour angle
- d) Horizon

Answer: c

Explanation: Napier’s rule is generally used in case of field astronomy, which involves in the calculation of altitude and hour angle. These can be calculated by the usage of declination and latitude which are available when the astronomical triangle is right angled.

5. If the star is at horizon which of the following will be equal to zero?

- a) Prime vertical
- b) Altitude
- c) Declination of circle
- d) Meridian

Answer: b

Explanation: If at all the star is at horizon, it makes the altitude zero and by that influence zenith distance will be equal to 90° . By this condition, the value of azimuth and hour angle can be calculated using the value of $\hat{I} \pm = 0$.

6. A star crosses a meridian only once in its revolution.

- a) False
- b) True

Answer: a

Explanation: When the star is at culmination or at the state of transition, it will be able to cross the observer's meridian. It makes it obvious that the star crosses a meridian twice during its period of revolution.

7. Which of the following is obtained from astronomical triangle?

- a) Relation between cylindrical co-ordinates
- b) Relation between rectangular co-ordinates
- c) Relation between geometrical co-ordinates
- d) Relation between spherical co-ordinates

Answer: d

Explanation: Astronomical triangle involves the usage of spherical co-ordinates. By using the triangle, we are able to derive a relation for the spherical co-ordinates by using certain cases which provide different outputs based on the placement of the star.

8. Which of the following cases is not related to astronomical triangle?

- a) Star at culmination
- b) Star at elongation
- c) Star at vertical
- d) Star at prime vertical

Answer: c

Explanation: An astronomical triangle is obtained by joining the poles, zenith, and a star which is at an equidistant position. It involves certain cases, which are applied based on the position of the star. They include star at elongation, at culmination, at prime vertical and at horizon.

9. The stars which always move above the horizon are called as _____

- a) Circumpolar star
- b) Prime star
- c) Horizon star
- d) Culmination star

Answer: a

Explanation: A circumpolar star is the one which will move above the horizon, which doesn't set. It is useful for the observer in such a way that the observer can use it for describing a circle.

10. The culmination of the star depends upon which of the following factors?

- a) Zenith
- b) Altitude
- c) Meridian
- d) Horizon

Answer: b

Explanation: A star is said to be culminative when it crosses the observer's meridian. There is a possibility for the formation of two culminatives one is lower culminative and upper culminate. It depends on the altitude at which the star is placed.

11. If the star is at elongation, find the altitude of the celestial body having declination and latitude as $24^{\circ}56'$ and $21^{\circ}43'$.

- a) $16^{\circ}16'$
- b) $61^{\circ}61'$
- c) $16^{\circ}16'$
- d) $61^{\circ}16'$

Answer: d

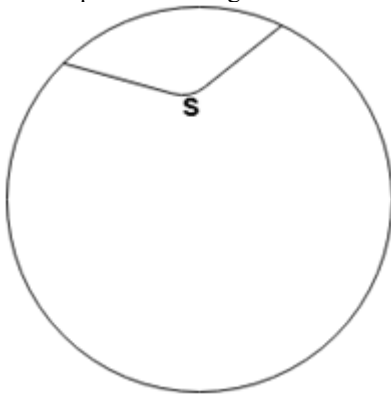
Explanation: The altitude of the celestial body can be determined by using the formula, $\sin \hat{I}_{\pm} = \sin \hat{I}_o * \operatorname{cosec} \hat{I}'$. Where \hat{I}_o = latitude of the observer and \hat{I}' = declination of the celestial body. On substitution, we get

$$\sin \hat{I}_{\pm} = \sin 21^{\circ}43' * \operatorname{cosec} 24^{\circ}56'$$

$$\sin \hat{I}_{\pm} = 0.87$$

$$\hat{I}_{\pm} = 61^{\circ}16'$$

12. The point in the figure indicates which among the following?



- a) Circumpolar star
- b) Circum centre star
- c) Polar star
- d) Circum star

Answer: a

Explanation: Circumpolar stars are located above the horizon which cannot be set. It can appear to the observer to describe a circle above the pole. It has a different path which is located at the poles of the sphere.

This set of Surveying Multiple Choice Questions & Answers (MCQs) focuses on “Field Astronomy – Relation Between the Co-ordinates”.

1. The relation between altitude and latitude of the observer can be given as _____

- a) Equal
- b) Minimum
- c) Maximum
- d) Not equal

Answer: a

Explanation: Relation between the co-ordinates must be established in such a way that they might form a relation. In case of altitude and latitude, they must be equal so that they can satisfy the required relation in case of solving problem.

2. The sign for the deflection angle depends upon _____

- a) Altitude
- b) Zenith
- c) Celestial body
- d) Horizon

Answer: c

Explanation: The placement of star defines the sign of the deflection angle. If the star is below the equator, then negative sign is allocated and if it is above then positive sign is allocated. By the allocation of sign to the deflection angle it might help in the determination of relation between latitude and declination.

3. Determine the latitude of the observer if the altitude of the pole is given as $23^{\circ}41'$.

- a) $32^{\circ}14'$
- b) $32^{\circ}41'$
- c) $23^{\circ}14'$
- d) $23^{\circ}41'$

Answer: d

Explanation: The relation between latitude and the altitude can be given as

$\hat{L}_p = \hat{L} \pm$. So, the value of latitude of the observer can be given as
 $\hat{L}_p = 23^{\circ}41'$.

4. Find the latitude of the observer if the declination is about $54^{\circ}32'$ having a meridian zenith of about 10m.

- a) $64^{\circ}22'$
- b) $64^{\circ}32'$
- c) $46^{\circ}32'$
- d) $64^{\circ}23'$

Answer: b

Explanation: The latitude in case of declination and zenith can be given as

$\hat{L}_p = \hat{L}' + z$. On substitution, we get

$\hat{L}_p = 54^{\circ}32' + 10$

$\hat{L}_p = 64^{\circ}32'$.

5. Find the difference of longitude between A = 30° E and B = 160° E.

- a) 130°
- b) 310°
- c) 13°
- d) 30°

Answer: a

Explanation: The difference can be calculated by

B – A = $160^{\circ} - 30^{\circ} = 130^{\circ}$. In case of change in direction, the angle must be subtracted or multiplied with 180. This will help in change in its direction.

6. If longitudes of A and B are given as $32^{\circ}12'$ W, $44^{\circ}22'$ W having latitude $29^{\circ}24'$. Find the distance in km between the points A and B.

- a) 19.54km
- b) 91.1km
- c) 11.9km
- d) 19.1km

Answer: d

Explanation: The distance can be calculated by

Distance = difference of longitude * cos latitude. On substitution, we get
 Distance = $(44^{\circ}24'W - 32^{\circ}12'W) \times \cos 29^{\circ}24' = 1.852$
 Distance = 19.1km.

7. Which of the following indicates the formula for hour angle of equinox?

- a) Hour angle of star- R.A of the star
- b) Hour angle of star+ R.A of the star
- c) Hour angle of star / R.A of the star
- d) Hour angle of star* R.A of the star

Answer: b

Explanation: The relation between right ascension and hour angle can be determined by using the hour angle of equinox, which can be given as hour angle of equinox = hour angle of star+ R.A of the star.

8. The distance between the points in a celestial body can be determined by using _____

- a) Napier's rule
- b) Celestial rule
- c) Zenithal rule
- d) Obligate rule

Answer: a

Explanation: Napier's rule is used in the determination of the distance between two points. It also involves in the measurement of altitude and hour angle if the declination and latitude are known.

9. Determine the zenith distance if the declination of star is given as $74^{\circ}32'E$ and the latitude of the observer as $54^{\circ}21'E$.

- a) $0^{\circ}12'E$
- b) $2^{\circ}11'E$
- c) $20^{\circ}11'E$
- d) $20^{\circ}15'E$

Answer: c

Explanation: Here, declination of a star is greater than the latitude the,

Zenith distance = ZP - AP

Zenith distance = $(90 - \delta) - (90 - \phi)$

Zenith distance = $90 - 54^{\circ}21'E - 90 + 74^{\circ}32'E$

Zenith distance = $20^{\circ}11'E$.

10. If the zenith distance is given as $26^{\circ}57'E$, find the altitude of the star at upper culmination.

- a) $63^{\circ}30'E$
- b) $36^{\circ}33'E$
- c) $3^{\circ}36'E$
- d) $63^{\circ}33'E$

Answer: d

Explanation: Altitude of the star at upper culmination can be given as

= $90 - \text{zenith distance}$

= $90 - 26^{\circ}57'E$

= $63^{\circ}33'E$.

This set of Surveying Multiple Choice Questions & Answers (MCQs) focuses on "Field Astronomy - Conversion of Time".

1. Correction for parallax is given as _____

- a) Horizontal parallax * sin of apparent altitude
- b) Horizontal parallax * cot of apparent altitude
- c) Horizontal parallax * tan of apparent altitude
- d) Horizontal parallax * cos of apparent altitude

Answer: d

Explanation: Parallax is a common error which makes a huge effect in obtained output. Correction for parallax is generally applied in all cases which includes the product of horizontal parallax and cos of apparent altitude. It is always an additive value, applied around the horizon.

2. Express the $24^{\circ}12'42''$ in hours, minutes and seconds.

- a) $4^h 36^m 50.8^s$
- b) $16^h 36^m 50.8^s$

- c) $1^{\text{h}} 36^{\text{m}} 50.8^{\text{s}}$
 d) $1^{\text{h}} 6^{\text{m}} 20.8^{\text{s}}$

Answer: c

Explanation: For expressing in hours, minutes and seconds, we have to divide each one with 15. So,

$24^{\circ} = 24^{\circ} / 15 = 1^{\text{h}} 36^{\text{m}}$; $12^{\circ} \text{E} = 12^{\circ} \text{E} / 15 = 0^{\text{h}} 0^{\text{m}} 48^{\text{s}}$; $42^{\circ} \text{E} = 42^{\circ} \text{E} / 15 = 0^{\text{h}} 0^{\text{m}} 2.8^{\text{s}}$. On addition, we get $1^{\text{h}} 36^{\text{m}} 50.8^{\text{s}}$.

3. Determine the local time if the standard time is $19^{\text{h}} 42^{\text{m}} 7^{\text{s}}$ and the difference in longitude can be given as $3^{\text{h}} 9^{\text{m}}$ towards west.

- a) $16^{\text{h}} 33^{\text{m}} 7^{\text{s}}$
 b) $61^{\text{h}} 33^{\text{m}} 7^{\text{s}}$
 c) $16^{\text{h}} 34^{\text{m}} 5^{\text{s}}$
 d) $6^{\text{h}} 33^{\text{m}} 7^{\text{s}}$

Answer: a

Explanation: The local time can be determined by using the formula,

Local time = standard time \pm difference in longitude. Here, longitude is towards west so we have to use negative direction.

On substitution, we get

Local time = $19^{\text{h}} 42^{\text{m}} 7^{\text{s}} - 3^{\text{h}} 9^{\text{m}}$

Local time = $16^{\text{h}} 33^{\text{m}} 7^{\text{s}}$.

4. Find G.M.T of a place if the L.M.T is given as $9^{\text{h}} 24^{\text{m}} 17^{\text{s}}$ and the longitude $10^{\text{h}} 23^{\text{m}} 32^{\text{s}}$ towards east.

- a) $19^{\text{h}} 47^{\text{m}} 4^{\text{s}}$
 b) $19^{\text{h}} 47^{\text{m}} 49^{\text{s}}$
 c) $9^{\text{h}} 47^{\text{m}} 49^{\text{s}}$
 d) $19^{\text{h}} 4^{\text{m}} 49^{\text{s}}$

Answer: b

Explanation: The G.M.T calculation can be done by using the formula,

G.M.T = L.M.T + longitude. On substitution, we get

G.M.T = $9^{\text{h}} 24^{\text{m}} 17^{\text{s}} + 10^{\text{h}} 23^{\text{m}} 32^{\text{s}}$

G.M.T = $19^{\text{h}} 47^{\text{m}} 49^{\text{s}}$.

5. Which of the following indicate the standard time meridian of India?

- a) $82^{\circ} 30' \text{E}$
 b) $28^{\circ} 30' \text{E}$
 c) $8^{\circ} 30' \text{E}$
 d) $82^{\circ} 30' \text{E}$

Answer: d

Explanation: The standard time meridian of India can be given as $82^{\circ} 30' \text{E}$. The time meridians are taken from Greenwich as a reference. These are adopted for having a different time lines which can have clarity on their respective zones.

6. The mean time associated with the standard meridian can be given as _____

- a) Meridian time
 b) Average time
 c) Standard time
 d) Absolute time

Answer: b

Explanation: Standard time involves mean time association with standard meridian. This difference between standard time and local time at a place is due to longitudinal difference with the standard meridian.

7. The formula of mean solar time can be given as _____

- a) Hour angle + 12^{h}
 b) Seconds angle + 12^{h}

- c) Minutes angle + 12^h
 d) Hour angle + 24^h

Answer: a

Explanation: Mean solar time can be expressed as the summation of hour angle of the mean sun with 12 hours. This can create the mean solar time which can be used for further scientific calculations.

8. Express the hours ($19^h 42^m 16^s$) in angles.

- a) $259^\circ 34'$
 b) $295^\circ 43'$
 c) $295^\circ 34'$
 d) $25^\circ 34'$

Answer: c

Explanation: For expressing in angles we must multiply each value with 15.

So, $19^h = 19 \times 15^\circ = 285^\circ$; $42^m = 42 \times 15' = 630'$; $16^s = 16 \times 15'' = 240''$. On addition, we get $295^\circ 34'$.

9. Which of the following indicates formula for green witch mean time?

- a) $G.M.T = L.M.T \times \text{longitude of the place}$
 b) $G.M.T = L.M.T \pm \text{longitude of the place}$
 c) $G.M.T = L.M.T + \text{longitude of the place}$
 d) $G.M.T = L.M.T / \text{longitude of the place}$

Answer: b

Explanation: The formula for green witch mean time can be given as

$G.M.T = L.M.T \pm \text{longitude of the place}$. The sign plus or minus depends upon the direction of the longitude, towards east plus and towards west minus.

10. Calculate mean solar time if the hour angle of the sun is $34^h 21^m 15^s$.

- a) $46^h 21^m 15^s$
 b) $64^h 21^m 15^s$
 c) $46^h 12^m 15^s$
 d) $46^h 21^m 51^s$

Answer: a

Explanation: The mean solar time can be given as

Mean solar time = hour angle of the sun + 12^h . On substitution, we get

Mean solar time = $34^h 21^m 15^s + 12^h$

Mean solar time = $46^h 21^m 15^s$.

This set of Surveying Multiple Choice Questions & Answers (MCQs) focuses on “Field Astronomy & Astronomical Corrections”.

1. Which of the following doesn't belong to the set of corrections applied in astronomical corrections?

- a) Correction of parallax
 b) Correction of sag
 c) Correction of refraction
 d) Correction of semi-diameter

Answer: b

Explanation: Astronomical corrections are applied in the case of celestial bodies. They generally include corrections for parallax, for refraction, for semi-diameter, for the dip of horizon. All these are not applied at once but are applied based on the necessity.

2. Magnitude of refraction depends upon which of the following factors?

- a) Density
 b) Surface tension
 c) Reflection
 d) Polarisation

Answer: a

Explanation: Due to the curvature of the earth surface, the layers of the atmosphere can be thinner as its distance

from surface increases. It may cause the deviation in the angle of ray which is equal to refraction angle. The magnitude of refraction depends on density of air, temperature, pressure of barometer, altitude.

3. Correction to the dip is always _____

- a) Zero
- b) Multiplicative
- c) Subtractive
- d) Additive

Answer: c

Explanation: Angle of dip can be assumed as the angle between true and visible horizon. Due to the curvature of the earth, the dip angle must be subtracted from the observed angle, which makes the correction as subtractive.

4. Determine the index error for face right, if the face left and face right readings were given as

$18^{\circ}24'52''$ and $18^{\circ}23'24''$.

- a) $+24''$
- b) $+49''$
- c) $+4''$
- d) $+44''$

Answer: d

Explanation: For determining the correction for index error, calculate the mean reading = $(18^{\circ}24'52'' + 18^{\circ}23'24'') / 2 = 18^{\circ}24'8''$

Index error for face right can be given as $18^{\circ}24'8'' - 18^{\circ}23'24'' = +44''$.

5. Find the altitude correction for semi-diameter which is having index error $25^{\circ}46'21''$ and semi-diameter $0^{\circ}26'21''$.

- a) $26^{\circ}12'42''$
- b) $62^{\circ}12'42''$
- c) $26^{\circ}21'42''$
- d) $26^{\circ}12'24''$

Answer: a

Explanation: The altitude correction for the semi-diameter can be given as the summation of index error with the semi-diameter mentioned i.e.,

$25^{\circ}46'21'' + 0^{\circ}26'21'' = 26^{\circ}12'42''$.

6. Determine the correction for refraction if the angle of azimuth is given as $62^{\circ}21'24''$.

- a) $10^{\circ}11'50.74''$
- b) $0^{\circ}1'50.74''$
- c) $0^{\circ}1'50.74''$
- d) $50^{\circ}1'50.74''$

Answer: b

Explanation: The correction for refraction can be given as $58'' \tan z$. Where, z is the Azimuthal angle. On substitution, we get

$58'' \tan (62^{\circ}21'24'') = 0^{\circ}1'50.74''$.

7. Determine the correction for parallax which has to be applied to $29^{\circ}42'31''$ for obtaining altitude of the sun, which is given as $32^{\circ}41'15''$.

- a) $53^{\circ}51'$
- b) $53^{\circ}15'$
- c) $35^{\circ}51'$
- d) $5^{\circ}51'$

Answer: a

Explanation: Correction for parallax can be given as

Correction for parallax = horizontal parallax * cos apparent latitude

Correction for parallax = $8'' \cos 1^{\circ}$. On substitution, we get

Correction for parallax = $53^{\circ}51'$, this has to be applied for $29^{\circ}42'31''$ in order to have the correct altitude of the sun.

8. Determine the corrected azimuth value if the azimuth is given as $54^{\circ}32'15''$ having $b = +23''$ with vertical angle $29^{\circ}42'31''$.

- a) $67^{\circ}39'40''$
- b) $67^{\circ}30'39.78''$
- c) $67^{\circ}39'39.78''$
- d) $76^{\circ}39'39.78''$

Answer: c

Explanation: The corrected azimuth can be determined by the summation of azimuth with correction applied.

Correction = $b \cdot \tan \hat{I}_{\pm} = 23 \cdot \tan 29^{\circ} 42' 31'' = 13^{\circ} 7' 24.8''$. On summation,

Corrected azimuth = $54^{\circ} 32' 15'' + 13^{\circ} 7' 24.8''$

Corrected azimuth = $67^{\circ} 39' 39.78''$.

9. Which of the following is always subtractive?

- a) Correction for reflection
- b) Correction for dip
- c) Correction for parallax
- d) Correction for polarization

Answer: b

Explanation: The correction applied for the dip is always subtractive. Dip is the angle between true and the visible horizon, the observations are taken from the sextant, the altitude of the star can be measured by this. Correction applied for the parallax is always additive.

10. Apply correction for dip angle if the height of the observer at the sea level is given as 54m.

- a) $23^{\circ} 13' 45.05''$
- b) $0^{\circ} 3' 45.05''$
- c) $0^{\circ} 31' 45.05''$
- d) $0^{\circ} 13' 45.05''$

Answer: d

Explanation: The correction for dip is found out by using the formula,

$\tan \hat{P} = \sqrt{2h/R}$. Where, R is the radius of earth.

$\tan \hat{P} = \sqrt{2 \cdot 54 / (6370 \cdot 1000)}$

$\hat{P} = 0^{\circ} 13' 45.05''$.

This set of Surveying Multiple Choice Questions & Answers (MCQs) focuses on “Field Astronomy Sextant”.

1. Which of the following can be used to sight two different objects simultaneously?

- a) Compass
- b) Sextant
- c) Theodolite
- d) Abney level

Answer: b

Explanation: A sextant involves in sighting two different objects simultaneously, which can be able to determine the angle between them. Horizontal as well as vertical angles can be measured with the help of sextant.

2. Sextant can be used to measure vertical angles.

- a) True
- b) False

Answer: a

Explanation: Sextant involves in the measurement of both vertical and horizontal angles. It consists of a movable arm by which the readings can be taken. It is based on the successive reflection of light ray.

3. Which of the following is not a classification of sextant?

- a) Box sextant
- b) Nautical sextant
- c) Vibrating sextant
- d) Sounding sextant

Answer: c

Explanation: Sextant is used in the measurement of vertical and horizontal angles, which has been classified based on various purposes. Those include box sextant, nautical sextant and sounding sextant.

4. Which of the following can justify the principle of sextant?

- a) $\hat{P} = \hat{I}_{\pm} / 2$
- b) $\hat{I}_{\pm} = \hat{P} \cdot 2$
- c) $\hat{I}_{\pm} = \hat{P} + 2$
- d) $\hat{I}_{\pm} = \hat{P} - 2$

Answer: d

Explanation: Sextant is based on the principle that when a ray of light is reflected successively from two mirrors, the

angle between the first and last directions of ray is twice the angle between the planes of two mirrors which can be mathematically represented as $\hat{I}_{\pm} = \hat{I}^2/2$.

5. Which of the following doesn't serve as an optical requirement in case of sextant?

- a) Optical axis must be parallel
- b) Mirrors if placed parallel should be zero
- c) Mirrors must be perpendicular
- d) Optical axis must be perpendicular

Answer: a

Explanation: The optical requirement of sextant include possession of two mirrors which should be perpendicular if parallel mirrors are placed reading should be zero and the optical axis must be parallel to plane of graduated arc.

6. Which classification of the sextant is used for navigation purposes?

- a) Box sextant
- b) Nautical sextant
- c) Vibrating sextant
- d) Sounding sextant

Answer: b

Explanation: The nautical sextant is used in case of navigational purposes. This can be also used in case of astronomical purpose, it so used because it is a very large instrument graduated with a silver arc about 15 to 20cm.

7. Which of the following instruments can be used for locating inaccessible points?

- a) Sounding sextant
- b) Vibrating sextant
- c) Box sextant
- d) Nautical sextant

Answer: c

Explanation: A box sextant, which is very small and easily transportable, it is used in the location of inaccessible points. It is also used for measuring horizontal and vertical angles and measuring chain angles.

8. Among the following, which doesn't come under permanent adjustment of sextant?

- a) Index glass perpendicular with graduated arc
- b) Horizon glass perpendicular with graduated arc
- c) Line of sight parallel to plane of graduated arc
- d) Line of sight perpendicular to plane of graduated arc

Answer: d

Explanation: The permanent adjustments include making index glass perpendicular with graduated arc, horizon glass perpendicular with graduated arc, and line of sight parallel to plane of the graduated arc etc. these are required for every instrument for having a better output.

9. Which of the following need not to be changed in case of box sextant?

- a) Line of sight
- b) Index glass
- c) Index error
- d) Lens

Answer: b

Explanation: At the time of manufacturing, the index glass is permanently fixed at right angles to the plane of the instrument. It also doesn't need a parallel line of sight, as it is already fixed.

10. If the index error is not large, error must be corrected.

- a) False
- b) True

Answer: a

Explanation: If the index error is not large, it is recommended not to correct the error. But the corrections need to be applied to the observed readings. We must have a clear idea of the index error from time to time.

This set of Surveying Multiple Choice Questions & Answers (MCQs) focuses on "Field Astronomy" Zenith Telescope.

1. Which of the following indicates the use of Zenith telescope?

- a) Zenith placement
- b) Zero error

- c) Low precision
- d) High precision

Answer: d

Explanation: Zenith telescope is used in case of obtaining high precision in the measurement of star positions. It involves the simplification of telescope construction. The actual purpose of designing it involves in the management of zenith.

2. Zenith telescope also known as _____

- a) Zenith sector
- b) Sextant
- c) Zenith horizon
- d) Azimuthal telescope

Answer: a

Explanation: A zenith telescope can also be determined as zenith sector, which is capable of employing azimuth, fitted with levelling screws. The eye piece is fitted to micrometer along with levels.

3. Which of the following describes the usage of zenith telescope?

- a) Determination of equator
- b) Determination of earth poles
- c) Determination of tropic of Capricorn
- d) Determination of tropic of cancer

Answer: b

Explanation: A zenith telescope is used in the determination of earth poles. It is a general usage of any type of zenith telescope adopted but zenith telescope is also able to determine the precise measurement of star positions.

4. Large zenith telescope is having a diameter of range _____

- a) 0.5-2m
- b) 1-2m
- c) 2-2.5m
- d) 3-4m

Answer: d

Explanation: Generally, zenith telescope is having a diameter of 3m aperture. But in case of large zenith telescope it is adopted with 6m diameter aperture which is capable of recording the minute measurements without error.

5. Zenith telescope has been replaced by _____

- a) Celestial telescope
- b) Astronomical telescope
- c) Radio astronomical quasar
- d) Abnormal telescope

Answer: c

Explanation: Though zenith telescope is capable of providing the required information, it is an old age method. In modern technique, radio astronomical quasar is adopted which can acquire information within minutes.

6. Zenith telescope can track the points other than its line of sight.

- a) True
- b) False

Answer: b

Explanation: Zenith telescope is only capable of tracking the points which are present in its line of sight. Other points can be tracked by the present modern techniques which require skill for accessing.

7. Large zenith telescope is used at _____

- a) Australia
- b) India
- c) South America
- d) North America

Answer: d

Explanation: Due to the high end technological usage and vast information obtained from zenith telescope, the usage is done at very limited placed. It is widely used in North America region, as researches are being conducted in a huge manner. It is opted as the third largest optical telescope.

8. Which of the following indicates the objective of the zenith telescope?

- a) Spectral energy consumption
- b) Spectral energy dissolution
- c) Spectral energy distribution
- d) Spectral energy reflection

Answer: c

Explanation: The main objective of the zenith telescope involves in spectral energy distributions and red shifts over numeral galaxies. This might help in determining the supernovae which is at a distant place.

9. Zenith telescope is more expensive.

- a) False
- b) True

Answer: a

Explanation: Zenith telescope liquid mirror will cost about 1% of the general telescopic mirror. This may help in its economical point of view, but in terms of work it might lag behind in some aspects.

10. Who among the following theorized zenith telescope for the first time?

- a) Sir Isaac Newton
- b) Albert Einstein
- c) Ramanujan
- d) Faraday

Answer: a

Explanation: Sir Isaac Newton was the first person to theorize the zenith telescope but couldn't build it because of the fact that he is not able to control the speed of rotation of the liquid present in it.

This set of Surveying Multiple Choice Questions & Answers (MCQs) focuses on "Photogrammetric Surveying â€" Photo-Theodolite".

1. Photo theodolite is a combination of _____

- a) Theodolite, terrestrial camera
- b) Electronic theodolite, terrestrial camera
- c) Theodolite, aerial camera
- d) Electronic theodolite, aerial camera

Answer: a

Explanation: A photo-theodolite is a combination of a terrestrial camera and a theodolite. It involves the usage of obtained photographs for the production of maps with a detailed description. It is able to provide information with utmost accuracy.

2. Focal length of photo theodolite is around _____

- a) 10-20 cm
- b) 10-15 cm
- c) 15-20 cm
- d) 15-30 cm

Answer: d

Explanation: The focal length of photo-theodolite will be around 15-30 cm, which is obtained by placing the lens at certain distance from the eye piece. If at all the lens is placed at other than this distance, it may fail to produce a correct set of observations.

3. Vertical circle provided in the photo theodolite is graduated up to _____

- a) 10 min
- b) 30 min
- c) 20 min
- d) 15 min

Answer: b

Explanation: A vertical frame is mounted with tangent scale is provided, which is pivoted with a magnetic needle having a graduation of 30 minutes. It is one of the basic parts which must be needed so as to produce fine result.

4. The plane perpendicular to the camera axis can be given as _____

- a) Vertical plane
- b) Horizontal plane
- c) Picture plane
- d) Azimuthal plane

Answer: c

Explanation: A picture plane can be given as the plane which is perpendicular to the camera axis at the focal distance in front of the lens. It can be represented as a photograph taken from a film.

5. Which of the following is having the same principle as that of photo-theodolite?

- a) Traverse surveying
- b) Theodolite surveying
- c) Compass surveying
- d) Plane-table surveying

Answer: d

Explanation: Photo-theodolite involves the direction of same objects in the photograph by which base is measured is known and positions are located with extremities. It is the same as that of plane table surveying which indicates both are having same principle.

6. Among the following, which doesn't belong to the parts of photo-theodolite?

- a) Vertical frame
- b) Theodolite
- c) Rectangular frame
- d) Tripod stand

Answer: b

Explanation: A photo-theodolite consists of a camera box with fixed focus, hollow rectangular frame, vertical frame, sensitized photographic plate and a tripod stand. Each of them is having their own importance.

7. Telescope fitted in the photo-theodolite can be rotated in a horizontal plane.

- a) False
- b) True

Answer: a

Explanation: Telescope fitted in a photo-theodolite is capable of rotating only in a vertical direction but not in any other direction. The plate on which the telescope is fitted can rotate in 360 degrees, by which sighting is possible.

8. The axis of camera passes through _____

- a) Centre of the lens
- b) Centre of the axis
- c) Centre of the aperture
- d) Centre of the camera lens

Answer: d

Explanation: The camera axis provided by the camera fitted on tripod will pass through the centre of the camera lens perpendicular to the camera plate and the picture plate. This will eliminate all imperfections and errors.

9. The formula of focal length used in case of the lens fitted in telescope is given as _____

- a) $1/f = 1/u + 1/v$
- b) $1/f = 1/u - 1/v$
- c) $1/f = 1/u + 1/v$
- d) $1/f = 1/u * 1/v$

Answer: c

Explanation: Focal length of any normal lens can be given as

$1/f = 1/u + 1/v$. here, u and v are the conjugate object and image distances respectively.

10. Which of the following describes the principle point?

- a) Intersection of the camera axis with picture plane
- b) Intersection of the camera axis with normal plane
- c) Intersection of the camera axis with image plane
- d) Intersection of the camera axis with plane

Answer: a

Explanation: Principle point is defined as the intersection of the camera axis with a picture plane or the camera plate. Either of them can be chosen based on our availability and the ability to do work.

This set of Surveying Multiple Choice Questions & Answers (MCQs) focuses on "Terrestrial Photogrammetry".

1. Stereoscopic measurement involves in _____

- a) Fusing photographs

- b) Stripping photographs
- c) Tilting photographs
- d) Placing vertical

Answer: a

Explanation: The main purpose of using stereoscopic measurement is to fuse the photographs in to a single spatial image which can parallaxically displace each of the photographs.

2. The errors caused due to terrestrial photogrammetry can be reduced by _____

- a) Stereo photogrammetry
- b) Terrestrial stereo photogrammetry
- c) Remote sensing
- d) GIS

Answer: b

Explanation: The errors caused due to the plane table photogrammetry can be reduced or eradicated by using another photogrammetry method which is terrestrial stereo photogrammetry. This involves modern techniques which can be used for further purposes.

3. Which process is capable of covering maximum area with minimum effort?

- a) Terrestrial photogrammetry
- b) Remote sensing
- c) GIS
- d) Traversing

Answer: a

Explanation: The coverage of maximum area involves more amount of information which can be done by terrestrial photogrammetry. This involves more information with less photographs taken.

4. Which among the following methods is easy in computing photographs?

- a) Remote sensing
- b) Plane table photogrammetry
- c) Terrestrial photogrammetry
- d) GIS

Answer: c

Explanation: Terrestrial photogrammetry involves modern techniques which are used and easily understood by everyone. In the case of plane table photogrammetry, the main problem occurs at pairing of photographs.

5. Which among the following is the best mapping procedure?

- a) Elite photogrammetry
- b) plane table photogrammetry
- c) Terrestrial photogrammetry
- d) Aerial photogrammetry

Answer: d

Explanation: Among the different mapping procedure involved, aerial photogrammetry is the best method till date. It is so because of the fact that more amount of information can be covered with less effort. But it is of high cost and due to this government will handle these types of works.

6. Which of the following is used in Terrestrial photogrammetry?

- a) Horizon
- b) Maps
- c) Zenith
- d) Azimuth

Answer: b

Explanation: The use of existing maps is done in case of terrestrial photogrammetry as it serves as a reference for its improvement in further approach. It is used in both the classifications for improving accuracy.

7. In terrestrial method, both plotting recording are done simultaneously.

- a) False
- b) True

Answer: a

Explanation: Though both terrestrial and plane table surveying indicate the same principle but in plane table both plotting and recording is done in the field, while terrestrial photogrammetry involves the same work but done at various places. This is the major difference between the two processes.

8. Which of the following processes cover entire area in a short span?

- a) Aerial photogrammetry
- b) Terrestrial photogrammetry
- c) Theodolite surveying
- d) Traverse surveying

Answer: b

Explanation: Terrestrial photogrammetry involves in the usage of photo theodolite which is capable of comprising a vast area in a short span of time. It is also capable of producing accurate value which is suitable for producing required output.

9. Which of the following indicates the correct set of terrestrial photogrammetric classification?

- a) Plane-table, stereo
- b) Theodolite, terrestrial
- c) Plane-table, terrestrial stereo
- d) Theodolite, terrestrial stereo

Answer: c

Explanation: Terrestrial photogrammetry involves two branches which are given as plane-table photogrammetry and terrestrial stereo photogrammetry. These are capable of studying ground from existing maps, and reconnaissance is made through this classifications.

10. Which among the following is capable of giving accuracy in its output?

- a) Traverse surveying
- b) Theodolite surveying
- c) Aerial photogrammetry
- d) Terrestrial photogrammetry

Answer: d

Explanation: A terrestrial photogrammetry involves in the usage of photo theodolite which is having precision in its obtained result. The classification is done so as to improve the accuracy in the output based on the type of field employed.

This set of Surveying Multiple Choice Questions & Answers (MCQs) focuses on "Aerial Photogrammetry".

1. The lens used in aerial photogrammetry is having a maximum coverage capacity of _____ (in angles)

- a) 93°
- b) 63°
- c) 53°
- d) 98°

Answer: a

Explanation: In general, the lens used in aerial photogrammetry having a minimum coverage area of 63° and a maximum coverage area of 93° . The usage of the coverage angle depends upon the type of land being surveyed and the accuracy needed in output.

2. Which of the following is not a type of shutter used in aerial photogrammetry?

- a) Between-the-lens shutter
- b) Louvre shutter
- c) Ideal shutter
- d) Focal plane shutter

Answer: c

Explanation: Shutter plays a prominent role in the process of aerial photogrammetry. The speed of shutter must be in such a way that it should function at a speed of 1/100 to 1/1000 second. It is classified as between the lens type, focal plane type, Louvre type.

3. For placing focal plane, which is used as a reference?

- a) Focal length
- b) Horizon
- c) Azimuth
- d) Collimation marks

Answer: d

Explanation: Collimation marks can be used as a reference while placing the focal plane. It may place the focal plane at a near distance from nodal plane from which the best possible image can be obtained.

4. Focal plane varies while aerial photogrammetry is carried out.

- a) True
- b) False

Answer: b

Explanation: In the process of aerial photogrammetry, the air-craft is placed at a considerable height so that it can cover a huge area while taking photographs. But the focal plane of the aerial camera is fixed at one location, rather than varying.

5. Which among the following surveying methods is meant to be having high precision?

- a) Aerial photogrammetry
- b) Terrestrial photogrammetry
- c) Theodolite surveying
- d) Traverse surveying

Answer: a

Explanation: Though terrestrial photogrammetry is having accuracy in the obtained values, aerial photogrammetry is capable of producing precise output when compared to the remaining methods. This accuracy makes it different from the remaining methods and is recommended when high quality works are conducted.

6. Vertical photograph coincides with the _____

- a) Direction of line of sight
- b) Direction of lens
- c) Direction of aperture
- d) Direction of gravity

Answer: d

Explanation: The aerial photograph consists of a vertical photograph which is made of the camera axis which is made to coincide with the direction of gravity. Optical axis must be first made straight in order to continue further.

7. How much inclination must be provided in a tilted photograph?

- a) 13°
- b) 20°
- c) 3°
- d) 34°

Answer: c

Explanation: In general, a tilted photograph consists of inclination up to 3°, which makes it to have an individual tilted scale. It might help in determining the objects which are inclined in the photograph.

8. If the apparent horizon is shown in a photograph, it is low oblique.

- a) True
- b) False

Answer: b

Explanation: Oblique photograph is used in case of aerial photography, with an intention that the camera axis lies in between horizontal and vertical. High oblique is obtained in case of possessing apparent horizon otherwise it isn't shown.

9. Perspective projection is produced from _____

- a) Straight lines radiating a common point
- b) Straight lines radiating different points
- c) Parallel lines radiating a common point
- d) Perpendicular lines radiating a common point

Answer: a

Explanation: The introduction of perspective projection is done by the straight lines radiating a common point and passing through point on the spherical surface. Aerial photogrammetry uses this phenomenon.

10. Flying height refers to _____

- a) Upper portion of the exposure station
- b) Bottom of the exposure station
- c) Depression of the exposure station
- d) Elevation of the exposure station

Answer: d

Explanation: Flying height indicates the elevation of the exposure station above the sea level. Any datum selected can act as a reference so that the flying height can be considered from them.

This set of Surveying Multiple Choice Questions & Answers (MCQs) focuses on “Photogrammetric Surveying” “Aerial Camera”.

1. Both Terrestrial and aerial cameras are having the same functionality.

- a) False
- b) True

Answer: b

Explanation: The functionality of the terrestrial and aerial camera is the same i.e., capturing pictures. In case of aerial photogrammetry, aerial camera is mounted on top of moving aeroplane. It must satisfy the required inputs, which it must possess.

2. Which of the following doesn't include in the lens?

- a) Filter
- b) Shutter
- c) Diaphragm
- d) Azimuth

Answer: d

Explanation: The lens which is used in aerial photogrammetry is having a certain combination. It consists of lens, diaphragm, shutter and the filter. Each one has its prominence in the process of aerial photogrammetry.

3. While using a large lens, which type of shutter is adopted?

- a) Between-the lens shutter
- b) Louvre shutter
- c) Focal plane shutter
- d) Ideal shutter

Answer: b

Explanation: Shutter is the most important component which will capture the photographs. The number of photographs captured will depend on the shutter speed. These are of 3 types of which for the large lens, Louvre lens are adopted for high speed.

4. Which among the following specifies the use of diaphragm?

- a) Adjusting focal plane
- b) Managing azimuth
- c) Adjusting horizon
- d) Managing size of aperture

Answer: d

Explanation: Diaphragm is placed in the aerial camera in order to increase or decrease the size of the aperture. By doing this the light rays entering the camera can be controlled and the shutter speed can be controlled. If the diaphragm opening is larger, shutter speed will be high.

5. Which of the following is not an essential part of the aerial camera?

- a) Shutter
- b) Lens
- c) Horizon
- d) Magazine

Answer: c

Explanation: In general, an aerial camera consists of a lens, shutter, focal plane, magazine, drive mechanism. These are having their priorities of their own based on the time of usage. Shutter will play a prominent role while capturing the photographs.

6. Which among the following is placed in between lens elements?

- a) Diaphragm
- b) Lens
- c) Line of sight
- d) Magazine

Answer: a

Explanation: A diaphragm is placed between the lens elements. It can act as an opening of the lens. By rotating it can actually zoom the object which is been sighted and also decrease the size.

7. Filter consists of _____

- a) piece of aperture
- b) piece of hole

- c) piece of glass
- d) piece of lens

Answer: c

Explanation: Filter can be described as the piece of glass which can be placed in front of the lens. Due to the condition of the atmosphere, different filters can be adopted so that the readings can be taken exactly but not approximately.

8. Focal plane is provided at _____

- a) Point of resection
- b) Point of intersection
- c) Point of contraction
- d) Point of collimation

Answer: b

Explanation: The provision of a focal plane is done at the point of collimation. These collimation marks are provided at the upper surface of the cone surface. It is suggested to place near nodal point.

9. Which of the following doesn't come under drive mechanism?

- a) Tripping the shutter
- b) Operating vacuum system
- c) Winding the film
- d) Binding the film

Answer: d

Explanation: A drive mechanism is involved in the camera body and is used for tripping the shutter, operating vacuum system and winding the film. This can be done by manual operation or automatic operation.

10. Which of the following can hold the films of the focal plane?

- a) Magazine
- b) Convergence
- c) Divergence
- d) Intersection

Answer: a

Explanation: Magazine involves in holding the films and houses the film flattening device at the focal plane. It plays a major role in the drive mechanism, which can help in moving parts of the system.

This set of Surveying Multiple Choice Questions & Answers (MCQs) focuses on "Photogrammetric Surveying" Scale of a Vertical Photograph.

1. Variation in scale of photograph can take place due variation in _____

- a) Datum
- b) Azimuth
- c) Zenith
- d) Elevation

Answer: d

Explanation: The process of finding scale involves joining the points of equal elevation. If there is a change in joining the points then it might affect the scale produced. So, the variation of elevation points can cause variation in scale produced.

2. Which of the following indicates the formula for scale?

- a) Ground distance / map distance
- b) Map distance / ground distance
- c) Map distance / elevation point
- d) Elevation point / map distance

Answer: b

Explanation: A scale is a parameter which is assumed in order to reduce the points on the ground to the drawing sheet. For that the ground distance and the map distance must be known. So, the value of scale can be determined by dividing map distance to ground distance.

3. Scale at elevation point in photograph can be given as _____

- a) $S = f / (H + h)$
- b) $S = f / (H - h)$
- c) $S = f / (H * h)$
- d) $S = f / (-H + h)$

Answer: a

Explanation: Joining of elevation points in a photograph is a crucial step which involves in the formation of scale of a photograph. Scale at elevation point can be given as, $S = f/H-h$. Where, f is the focal length, H is the height of the station, h is height from mean sea level.

4. Which of the following can also be used in order to determine the scale of a photograph?

- a) Recurring fraction
- b) Reciprocating fraction
- c) Representation fraction
- d) Reducing fraction

Answer: c

Explanation: Representation fraction is an expression which is used to determine the scale. It is simply the reciprocal of the scale value i.e., $R_h = 1 / (H-h/f)$. The values of H , h , f are the same as that of the values in scale.

5. If all the ground points are projected vertically downward on the mean sea level, which scale is recommended to be used?

- a) Datum scale
- b) Average scale
- c) Azimuth scale
- d) Reference scale

Answer: a

Explanation: A datum scale can be used in case of photograph, as it is capable enough for determining the effective scale value. The use of this scale is possible only when the ground points are projected vertically downwards on mean sea level.

6. The formula for average scale can be given as _____

- a) $S = f / (H+h_{av})$
- b) $S = f / (H \cdot h_{av})$
- c) $S = f / (-H+h_{av})$
- d) $S = f / (H-h_{av})$

Answer: d

Explanation: Average scale is a conditional scale, which is appointed only when it meets the required condition. It can be applied only when the ground points are projected upward or downward on a plane. It is given as, $S = f / (H-h_{av})$.

7. Which of the following indicates the right step for determination of scale?

- a) Measuring ground distance
- b) Comparing angles
- c) Joining elevation points
- d) Comparing zenith levels

Answer: c

Explanation: A scale can be determined by many factors. It involves many steps among the primary thing is to join the points of equal elevation. If this isn't done then the scale parameter will be reduced to an unknown value, which can't be used for drawing a map.

8. The value of horizontal distance can be determined by which of the following methods?

- a) Traversing
- b) Triangulation
- c) Theodolite surveying
- d) Compass surveying

Answer: b

Explanation: In order to determine the value of scale, the value of horizontal distance on the ground must be determined it can be given by the process of triangulation, as it involves quick output development.

9. Determine the scale at elevation point if the values of focal length, height of station and the height of mean sea level are given by 23cm, 76cm and 20cm.

- a) 0.41cm
- b) 0.4cm
- c) 4.41cm
- d) 1.41cm

Answer: a

Explanation: The scale at an elevation can be determined by

$S = f / (H - h)$. On substitution, we get

$S = 23 / (76 - 20)$

$S = 0.41 \text{ cm}$.

10. What will be the average elevation of terrain if the scale is given as 43m, focal length and height of the station as 4m and 20m?

a) 19.19 m

b) 91.91 m

c) 9.91 m

d) 9.9 m

Answer: d

Explanation: The average elevation of the terrain can be given as

$S = f / (H - h_{av})$. On substitution, we get

$43 = 4 / (20 - h_{av})$

$h_{av} = 19.91 \text{ m}$.

11. Photographic scale can be determined by using the photo distance.

a) True

b) False

Answer: a

Explanation: In case of a photograph, the value of scale can be determined by comparing the photo distance and the map distance which can be able to yield points of equal elevation and by joining them, scale can be determined.

12. For finding the scale of a photograph, the points must be equally elevated.

a) False

b) True

Answer: b

Explanation: Scale of photograph lies in joining the points of equal elevation and to know the horizontal distance on the photograph. By this, the scale can be determined by comparing ground length and photographic length.

This set of Surveying Multiple Choice Questions & Answers (MCQs) focuses on "Photogrammetric Surveying" "Scale of a Tilted Photograph".

1. Which of the following photographs may have a varying scale?

a) Datum photograph

b) Horizontal photograph

c) Vertical photograph

d) Tilted photograph

Answer: d

Explanation: Varying scale indicates joining points of unequal elevation, which means the ground is not flat.

Mainly, tilted photographs can be taken with or without reliefs. If it is taken with relief, scale cannot be uniform.

2. Among the following, which must be known for determining scale in a tilted photograph?

a) Focal length

b) Datum height

c) Azimuth

d) Zenith

Answer: a

Explanation: A scale in tilted photograph can be known by having certain parameters. They include swing, tilt, focal length, flying height. By using these, the varying scale of tilted photograph can be determined.

3. The geometric process involved in the determination of scale for titled photograph is _____

a) Spherical

b) Cylindrical

c) Analytical

d) Co-ordinate

Answer: c

Explanation: For determining the scale of tilted photograph, assumption of certain cases is must. While calculating

those cases, it is required to adopt one of the geometrical methods available. In this process, generally, analytical method is adopted along with directions.

4. Which of the following indicates the formula of scale for a tilted photograph?

- a) $s_h = (f \sec t / mn \sin t) / (H-h)$
- b) $s_h = (f \sec t * mn \sin t) / (H-h)$
- c) $s_h = (f \sec t + mn \sin t) / (H-h)$
- d) $s_h = (f \sec t - mn \sin t) / (H-h)$

Answer: d

Explanation: The scale of tilted photograph can be given as $s_h = (f \sec t - mn \sin t) / (H-h)$. Here, f is the focal length of the lens used, mn is the perpendicular erected, t is the angle measured, and H is the height of the station, h is the height of the mean sea level.

5. Which of the following is not recommended in case of determining the scale of a tilted photograph?

- a) Axis
- b) Focal length
- c) Height of the point
- d) Tilt

Answer: a

Explanation: The determination of the scale of a tilted photograph generally requires focal length, height of the point, tilt, height of flight etc. Each of these is required to be substituted in the formula of the scale of tilted photograph for obtaining the scale.

6. Length of the line considered in case of determining scale of tilted photograph can be determined by

- a) $(L = \sqrt{(X_a - X_b)^2 / (Y_a + Y_b)^2})$
- b) $(L = \sqrt{(X_a - X_b)^2 + (Y_a - Y_b)^2})$
- c) $(L = \sqrt{(X_a - X_b)^2 * (Y_a + Y_b)^2})$
- d) $(L = \sqrt{(X_a - X_b)^2 - (Y_a + Y_b)^2})$

Answer: b

Explanation: The length of the line established by using co-ordinates can be determined by using the formula, $(L = \sqrt{(X_a - X_b)^2 + (Y_a - Y_b)^2})$. This is established by using the co-ordinates of the points taken while having their measurements.

7. Which of the following type of photograph can be used for the generation of maps?

- a) Tilted photograph
- b) Vertical photograph
- c) Horizontal photograph
- d) Datum photograph

Answer: b

Explanation: Generation of map requires a photograph with a uniform scale, which is quite simple in case of vertical photograph. So, it is most probably adopted. But, in the case of tilted photograph the scale is not uniform with consideration of relief. Because of this reason, a combination of vertical and tilted photographs is considered sometimes.

8. Determine the length of the line AB having co-ordinates (2, 4), (6, 7).

- a) 3.16m
- b) 31.6m
- c) 13.6m
- d) 13.9m

Answer: c

Explanation: The length of the line AB can be determined by using the formula, $(L = \sqrt{(X_a - X_b)^2 + (Y_a - Y_b)^2})$. On substitution, we get $(L = \sqrt{(2-6)^2 + (4-7)^2})$
 $L = 13.6m$.

9. Flying height can be determined by using tilted photograph.

- a) True
- b) False

Answer: a

Explanation: Tilted photograph is used in the determination of flying height which is placed exactly above the horizon. For this image of the two points and their elevations must be known for accessing any further.

10. For identification of length of a line, co-ordinates must be known.

- a) True
- b) False

Answer: a

Explanation: The establishment of co-ordinates must be needed in order to have a clear idea about the length of line needed. Co-ordinates are substituted in the length of the line determination formula for obtaining the length required.

This set of Surveying Multiple Choice Questions & Answers (MCQs) focuses on "Flight Planning for Aerial Photography".

1. Overlapping in the direction of flight can be described as _____

- a) Forward overlap
- b) Side lap
- c) Backward overlap
- d) Adjacent overlap

Answer: a

Explanation: While taking photographs, each strip is placed at a pre-determined distance which might be able to provide side lap between the adjacent strips. Overlapping in the direction of flight can be defined as forward lap, as the flight moves forward. The frequency while taking photographs will be under control to avoid overlapping.

2. Which of the following indicates the correct set of overlapping percentage?

- a) 50-60%
- b) 55-70%
- c) 50-70%
- d) 55-60%

Answer: d

Explanation: Overlapping must be done at a desired rate. Excessive overlapping can cause the photograph more complex, with which the time for obtaining output increases. Frequency of the camera must be under control so as to avoid successive overlapping. The percentage of overlapping must be in a range of 55-60 %.

3. Overlapping occurred due to adjacent flight lines can be termed as _____

- a) Front lap
- b) Forward lap
- c) Side lap
- d) Straight lap

Answer: c

Explanation: While combining the photographs taken by two adjacent flights, it might lead to side lapping. The entire area in the photograph must be examined stereoscopically. This can be done only when the photographs are taken by adjacent flights.

4. Determine the distance of flight strips if the height lens placed is given as 56m.

- a) 68.32m
- b) 86.32m
- c) 68.56m
- d) 86.39m

Answer: a

Explanation: For calculation of distance of the flight strips, $W = 1.22 \cdot H$ is used. On substitution, we get

$$W = 1.22 \cdot 56$$

$$W = 68.32\text{m.}$$

5. What will be the distance between the flight strips if the value at point B is given as 6m?

- a) 28m
- b) 12m
- c) 21m
- d) 124m

Answer: b

Explanation: The calculation of distance between flight strips along with a point can be determined by using the

relation, $W = 2*B$. On substitution, we get

$$W = 2*6$$

$$W = 12m.$$

6. The formula for determining the distance between flight strips can be given as _____

- a) $W = 1.22+H$
- b) $W = 1.22-H$
- c) $W = 1.22/H$
- d) $W = 1.22*H$

Answer: d

Explanation: Distance between the flight strips can be calculated as $W = 1.22*H$. Here, H indicates the height of lens placed above the ground. By calculating the distance between the strips it can be useful for determining the complication of points observed.

7. Overlapping increases the amount of work to be done.

- a) True
- b) False

Answer: a

Explanation: Overlapping occurs due to the combination of photographs to cover the entire area. It depends upon of the frequency, shutter speed of the camera. The coverage area increases with increase in over lapping and side lapping, which means work to done at field and at office increases.

8. The relation between normal direction of flight and the rectangular area can be given as _____

- a) $2W = 2*B$
- b) $W = 2*B$
- c) $3W = 2*B$
- d) $4W = 2*B$

Answer: b

Explanation: In a maximum rectangular area, the rectangle must have the dimension in the direction of flight which has to be one-half the dimension normal to the direction of flight.

9. Calculate the flying height if the contour interval is given as 6m.

- a) 300km
- b) 300m
- c) 3000m
- d) 3000cm

Answer: c

Explanation: The flying height can be determined by using the formula,

Flying height = contour interval * c-factor. The value of c-factor lies in between 500-1500. On substitution, we get
Flying height = $6*500 = 3000m$.

10. Unless the area is mapped, W value must be reduced.

- a) False
- b) True

Answer: b

Explanation: The determination of distance between the flight strips is related to the area mapped. The area mapped is covered by a certain number of flight paths which in turn reduces the value of W.

11. The value of c-factor lies in between _____

- a) 500-1500
- b) 50-1500
- c) 50-150
- d) 150-550

Answer: a

Explanation: C-factor indicates a number, which is used for calculation of flying height. This factor depends on the conditions of the surroundings which cover the map-compilation operation, having a range 500-1500.

12. Which of the following is not considered while calculating distance between flight strips?

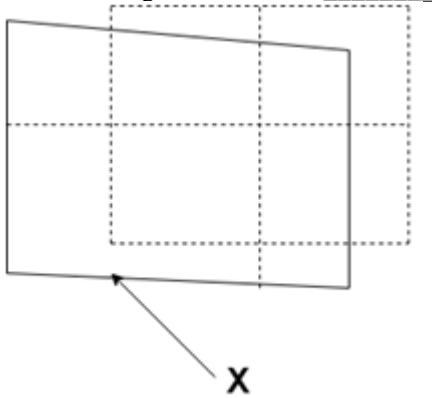
- a) Vertical photographs
- b) Mitigating crab
- c) Eradicating drift of the aircraft
- d) Line of sight

Answer: d

Explanation: The calculation of flight strips involves determination of level terrain, vertical photographs, mitigating crab and eradicating drift of the aircraft. All of these must be maintained for a better result.

This set of Surveying Multiple Choice Questions & Answers (MCQs) focuses on “Photogrammetric Surveying” Tilt Distortion or Displacement.

1. From the figure, X indicates _____



- a) Tilted photograph
- b) Vertical photograph
- c) Oblique photograph
- d) Terminated photograph

Answer: a

Explanation: X indicates the tilted photograph. When vertical photograph is placed on a tilted photograph, it can be visualized as shown. This is done to mitigate the errors while correcting the observations taken from the photographs.

2. Determine the tilt displacement if the values of point of rotation and a are 3 and 4m having tilt angle $43^{\circ}23'$ with focal length 4m.

- a) 4.72m
- b) 42.72m
- c) 24.27m
- d) 24.72m

Answer: d

Explanation: The tilt displacement is given as

$d = (i+a)^2 \sin t / f$. On substitution, we get

$$d = (3+4)^2 \sin 43^{\circ}23' / 4$$

$$d = 24.72\text{m.}$$

3. Distance from isocentre is taken into consideration in tilt displacement.

- a) False
- b) True

Answer: b

Explanation: Tilt displacement or distortion can be defined as the difference of a point in a tilted photograph from isocentre to distance of the same point in a photograph from isocentre. It clearly explains that the distance of the point is measured from isocentre.

4. Relief distortion depends on which of the following?

- a) Zenith
- b) Flying height
- c) Datum
- d) Focal length

Answer: b

Explanation: Relief displacement is a point on tilted photograph, which can be placed above nadir point. It depends upon flying height, distance of image from nadir point, elevation from ground and the position of that point from principle line. It can be applied in case of vertical photograph too.

5. The formula for tilt displacement can be given as _____

- a) $d = (i+a)^2 \sin t / f$
- b) $d = (i-a)^2 \sin t / f$
- c) $d = (i*a)^2 \sin t / f$
- d) $d = (i*a)^2 \sin t + f$

Answer: c

Explanation: The formula of tilt displacement involves sine of the tilt angle along with focal length of the lens, point of rotation and the displacement point. The entire representation can be done as

$$d = (i*a)^2 \sin t / f.$$

6. The formula of relief displacement can be given as _____

- a) $d = r*h / H$
- b) $d = r+h / H$
- c) $d = r*h * H$
- d) $d = r-h / H$

Answer: a

Explanation: Relief displacement involves the usage of radial distance from nadir point, height from mean sea level, height of the station point. The entire mathematical expression can be described as follows

$$d = r*h / H.$$

7. What is the position of relief displacement on vertical photograph?

- a) Horizontal
- b) Parallel
- c) Perpendicular
- d) Radial

Answer: d

Explanation: In a vertical photograph, the relief displacement is radial. It is able to connect all the points which are sighted afterwards for better result. In case of tilted photograph, it is not radial.

8. Flying height is used in case of tilted photograph.

- a) False
- b) True

Answer: b

Explanation: Flying height involves in the placing of a point on the horizon. For placing this nadir point is used as a reference. In general tilted photograph depends on flying height, elevation of the ground point.

9. Tilt displacement of a point on nadir point is _____

- a) Half inward
- b) Completely outward
- c) Half outward
- d) Completely inward

Answer: c

Explanation: The tilt displacement of a point on the downward or nadir point is half outward but not full. But in case of the point upward of a half tilted photograph is full inward.

10. Determine the relief displacement if the radial distance is given as 45m with a height from mean sea level and height of the station is given as 2m and 76m respectively.

- a) 1.18m
- b) 1.81m
- c) 9.18m
- d) 10.18m

Answer: a

Explanation: The relief displacement can be found out by using the formula,

$d = r \cdot h / H$. On substitution, we get

$d = 45 \cdot 2 / 76$

$d = 1.18\text{m}$.

This set of Surveying Multiple Choice Questions & Answers (MCQs) focuses on “Photogrammetric Surveying and Stereoscopic Vision”.

1. The distance between nodal point and the plane of the photograph depends on the _____

- a) Focal length of the mirror
- b) Aperture
- c) Line of sight
- d) Focal length of the lens

Answer: d

Explanation: Focal length of the lens depends up on the type of lens being used. This may affect the distance between nodal point and the plane of the photograph. These are used in the determination of the scale of the photograph.

2. Minimum 4 mirrors are used in case of a mirror stereoscope.

- a) True
- b) False

Answer: a

Explanation: Stereoscope is an instrument which is used in viewing stereo pairs. These are classified as mirror stereoscope and lens stereoscope, among the mirror stereoscope uses a minimum of 4 mirrors for propagation.

3. Which of the following doesn't indicate the purpose of stereoscope?

- a) Relation between convergence and accommodation
- b) Line of sight justification
- c) Perception of depth
- d) Assisting eyes on the image

Answer: b

Explanation: The purpose of stereoscope involves in assisting the eyes on the image, establishing a relation between convergence and accommodation and magnifying perception of depth.

4. Which of the following indicates the correct set of Stereoscope classification?

- a) Mirror stereoscope and prism stereoscope
- b) Mirror stereoscope and plane table stereoscope
- c) Mirror stereoscope and lens stereoscope
- d) Lens stereoscope and plane table stereoscope

Answer: c

Explanation: The stereoscope classification generally involves mirror stereoscope and lens stereoscope. Both of them can be employed based on the type of material available that is either a mirror or lens.

5. Which of the following processes help in placing the image on fovea?

- a) Convergence
- b) Magazine
- c) Focal length
- d) Aperture

Answer: a

Explanation: Convergence involves in placing the image on fovea. It is necessary that the image of the object sighted is placed on the sensitive part of the eye. Convergence can act as a clue to the distance between object and observer.

6. Which of the following is involved in obtaining spatial relation?

- a) Focal length
- b) Binocular vision
- c) Polarization
- d) Telescopic vision

Answer: b

Explanation: Spatial relation involves establishing a three dimensional view of the field which is sighted. This can be established by a binocular vision. It is having the capability of determining the impression of depth.

7. Which of the following won't serve as a reason for the impression of depth?

- a) Relative size of objects
- b) Light effects
- c) Calculation of azimuth
- d) Simultaneous view

Answer: c

Explanation: Impression of depth can be caused due to the relative size of the objects which can be near or far, effects caused due light and in shade and viewing an object with both eyes simultaneously. These are able to establish a three-dimensional view of the field.

8. The stereoscopic vision can be applied to _____

- a) Photogrammetry
- b) Theodolite surveying
- c) Traversing
- d) Compass surveying

Answer: a

Explanation: The principle of stereoscopic vision involves producing a three-dimensional image. It is fore most required in the process of photogrammetry as its main theme is to capture the maximum area.

9. Lens used in the stereoscope can be flattened by which among the following methods?

- a) Head parallax
- b) Divergence
- c) Convergence
- d) Accommodation

Answer: d

Explanation: Accommodation is the process involved in obtaining a flattened lens. Because of the accommodation process, we might be able to determine the approximate depth. We can have less strain on our eyes.

10. The difference between the images on retina is given as _____

- a) Retinal disparity
- b) Stereoscopic disparity
- c) Difference in retinal
- d) Stereoscopic retina

Answer: a

Explanation: The object which we are visualizing is somewhat different from the reality. Due to the combination of the picture from the left eye and right eye positions of the objects can be mismatched. This difference is known as retinal disparity.

11. Which of the following doesn't come under the ideal conditions of stereoscopic views?

- a) Elevation of camera position
- b) Measuring iso centric distance
- c) Making camera axis vertical
- d) Overlapping of photograph

Answer: b

Explanation: Aerial stereoscopic view involves in following certain ideal conditions that are required for proper functioning. They include sufficient overlapping of photographs, the elevation of camera positions, making camera axis vertical for having picture plane in a horizontal plane.

This set of Surveying Objective Questions & Answers focuses on "Photogrammetric Surveying" Parallax in Aerial Stereoscopic Views.

1. Difference in parallax can be obtained due to _____

- a) Distance between zenith
- b) Distance between bearing
- c) Distance between azimuth
- d) Distance between points sights

Answer: d

Explanation: Parallax is a state where there is an apparent movement of point viewed first with one eye and then viewed with another eye. If the difference in distance between the points sighted is measured then it can yield the difference in parallax.

2. Which of the following can be used to view stereo pair?

- a) Aerial camera
- b) Stereoscope
- c) Stereoscopic camera
- d) Telescope

Answer: b

Explanation: Stereo pair involves stereoscopic fusion, where the objects which are visualized from left eye and right eye are combined for generating output. Stereo pair can be viewed by using stereoscope and anaglyph.

3. Which of the following doesn't come under the category of depth perception?

- a) Accommodation
- b) Head parallax
- c) Divergence
- d) Retinal display

Answer: c

Explanation: Depth perception involves determining the relative distance between the objects from the observer. It involves certain clues which are required for photogrammetry. Those are head parallax, convergence, accommodation, retinal display.

4. Which of the following indicates the correct set of stereoscope classifications?

- a) Lens and azimuth stereoscope
- b) Mirror and azimuth stereoscope
- c) Mirror and lens stereoscope
- d) Mirror stereoscope and stereo pair

Answer: c

Explanation: Stereo pairs can be interpreted by using stereoscope, which is designed for assisting and magnifying perception of depth. Stereoscope has been classified as mirror stereoscope and lens stereoscope.

5. Which of the following indicate parallax equation for ground co-ordinate point?

- a) $X = B \cdot x + p$
- b) $X = B \cdot x - p$
- c) $X = B \cdot x \cdot p$
- d) $X = B \cdot x / p$

Answer: d

Explanation: The parallax equation for the ground co-ordinates of the point taken into consideration can be given as $X = B \cdot x / p$. Here, B is the point considered, p is the parallax and x is the numerical value.

6. The distance between nodal point and plane of photograph depends on datum height.

- a) False
- b) True

Answer: a

Explanation: The lens of stereoscope is having a greater importance in terms of visualizing an object. Two magnifying lens were used which makes it sight the object in accurate manner. The distance between nodal point and plane of photograph depends on the focal length of the lens.

7. Displacement due to successive exposures can be given as _____

- a) Visual parallax
- b) Multiple exposure
- c) Exposure
- d) Parallax

Answer: d

Explanation: Parallax in case of stereoscopic view can be given as the displacement of point in the image due to successive exposures. In order to minimize the parallax, difference in parallax is calculated. It is the successive difference in the points taken into consideration.

8. The value of overlapping parallax can be determined by _____

- a) $P = x / x'$
- b) $P = x - x'$
- c) $P = x * x'$
- d) $P = x + x'$

Answer: b

Explanation: The overlapping parallax indicated by symbol p can be determined by the difference of x-coordinate of the point measured on the left hand photograph to the x-coordinate of the point on right hand photograph.

9. Determine the value of parallax, if the x-coordinate on left hand photograph is 54 and on right hand photograph is 32.

- a) 24
- b) 12
- c) 22
- d) 27

Answer: c

Explanation: The parallax can be determined by using the formula,

$P = x - x'$. On substitution, we get

$P = 54 - 32$

$P = 22$.

10. Which of the following doesn't serve as a condition for an aerial stereoscopic view?

- a) Excessive overlapping
- b) Elevation of camera for exposure
- c) Vertical camera axis
- d) Sufficient overlapping

Answer: a

Explanation: The conditions for aerial stereoscopic view include photographs with sufficient overlapping, elevation of the camera for exposure and vertical camera axis. These are meant to be ideal conditions.

This set of Surveying Multiple Choice Questions & Answers (MCQs) focuses on "Remote Sensing - Basic Principles".

1. The relation between velocity, wavelength and frequency can be given as _____

- a) $\lambda = c / r$
- b) $\lambda = c / f$
- c) $\lambda = c / h$
- d) $\lambda = h * c / f$

Answer: b

Explanation: Photons are the main constituent particles in the electromagnetic energy. The relation between

velocity, wavelength and frequency is determined as $\lambda = c / f$, where λ represents wavelength, f is the frequency of the wave and c represents the velocity of the wave, which is equal to speed of light.

2. Remote sensing uses which of the following waves in its procedure?

- a) Electric field
- b) Sonar waves
- c) Gamma- rays
- d) Electro-magnetic waves

Answer: d

Explanation: Electro-magnetic waves are used in case of remote sensing. The different waves present in this spectrum enables us to use a variety of waves based on the condition present and can be able have a better output.

3. Which of the following is not a principle of remote sensing?

- a) Interaction of energy with satellite
- b) Electromagnetic energy
- c) Electro-magnetic spectrum
- d) Interaction of energy with atmosphere

Answer: a

Explanation: Remote sensing involves certain principles which are applied for having a good result of the desired output. The principles are electromagnetic energy, electro-magnetic spectrum, interaction of energy with atmosphere etc.

4. Which among the following waves is having less wavelength range?

- a) 0.03mm
- b) 0.03nm
- c) 0.03m
- d) 0.03km

Answer: b

Explanation: A wide range of waves are present in case of electromagnetic spectrum, off which the gamma-rays are having a nano level wave length capacity i.e., less than 0.03nm.

5. In visible region, the blue light is having a wave length range of _____

- a) 0.42-0.52 micrometer
- b) 0.24-0.52 micrometer
- c) 0.42-0.92 micrometer
- d) 0.22-0.32 micrometer

Answer: a

Explanation: Visible region consist of three color waves red, blue and green remaining are the combination of those. The blue light is having a wavelength range of 0.42-0.52 micrometer.

6. Which of the following field is used by the EM waves?

- a) Solar field
- b) Polarized field
- c) Electric field
- d) Micro field

Answer: c

Explanation: EM waves used two major sources of fields i.e., electric and magnetic fields. Both are placed orthogonal to each other in a wave pattern. The electric components are placed in vertical manner and magnetic components in horizontal manner.

7. Among the following, which describes Stefan- Boltzmann formula?

- a) $M = \sigma f / T^4$
- b) $M = \sigma f - T^4$
- c) $M = \sigma f + T^4$
- d) $M = \sigma f * T^4$

Answer: d

Explanation: Stefan- Boltzmann law is based on the radiation produced and emitted by the body. This can be mathematically represented by $M = \sigma f * T^4$. Here, σ is the Stefan- Boltzmann constant, T is the absolute temperature, M is the spectral existence of the body.

8. Which of the following is not a classification of scattering principle?

- a) Faraday scattering
- b) Rayleigh scattering
- c) Mie scattering
- d) Non-selective scattering

Answer: a

Explanation: Scattering involves in distribution of the light ray in more than two directions. It can be further classified as Rayleigh scattering, Mie scattering, non-selective scattering.

9. Which of the following can act as an example for air-borne platform?

- a) LISS-III
- b) Dakota
- c) MOS
- d) LISS-II

Answer: b

Explanation: At present, the air-borne platforms in use are Dakota, AVRO and beach-craft. A sensor is mounted on them and is placed at an altitude which can be able to access the specified object.

10. Polar orbiting satellites are generally placed at an altitude range of _____

- a) 7-15km
- b) 7000-15000km
- c) 700-1500km
- d) 70-150km

Answer: c

Explanation: Polar orbiting satellites are also known as sun-synchronous satellites, which are generally placed at an altitude range of 700-1500km from the ground level. These are able to deliver accurate information about the object which we need access to.

This set of Surveying Multiple Choice Questions & Answers (MCQs) focuses on “Remote Sensing” Electromagnetic Energy.

1. Which of the following has the maximum value in an electric or magnetic field?

- a) Wave length
- b) Focal length
- c) Frequency
- d) Amplitude

Answer: d

Explanation: In an electromagnetic field, the electric and magnetic fields are present in the form of waves in horizontal and vertical patterns. In order to be present in that pattern, it is necessary to have maximum amplitude.

2. Velocity of light can be given as _____

- a) 1×10^8 m/s
- b) 3.9×10^8 m/s
- c) 3×10^8 m/s
- d) 3×10^{18} m/s

Answer: c

Explanation: The velocity of light is generally determined by using the electro-magnetic wave principle and the plank's law. These will help in derivation of the speed of light in vacuum, which is approximately 3×10^8 m/s.

3. In EM waves, electric field is not used.

- a) False
- b) True

Answer: a

Explanation: The EM wave field uses both electric and magnetic fields, which will form a complex wave structure. Electric field is placed in vertical manner and magnetic field in horizontal manner.

4. Determine the wave length if the frequency is given as 67Hz.

- a) 1.044×10^8 m
- b) 0.044×10^8 m

- c) $0.44 \times 10^8 \text{ m}$
 d) $0.044 \times 10^{10} \text{ m}$

Answer: b

Explanation: We know that, $\lambda = c / f$. Where, c is the velocity of light = $3 \times 10^8 \text{ m/s}$ and f is the frequency. On substitution, we get

$$\lambda = 3 \times 10^8 / 67$$

$$\lambda = 0.044 \times 10^8 \text{ m}.$$

5. Find the value of energy if the wave length is given as 43m.

- a) $0.46 \times 10^{-26} \text{ J}$
 b) $0.46 \times 10^{-26} \text{ J}$
 c) $0.46 \times 10^{-26} \text{ J}$
 d) $0.46 \times 10^{-26} \text{ J}$

Answer: d

Explanation: The value of energy can be given as by using plank's relation.

$Q = h \cdot c / \lambda$. Here, $h = 6.625 \times 10^{-34} \text{ J.s}$. On substitution, we get

$$Q = 6.625 \times 10^{-34} \times 3 \times 10^8 / 43$$

$$Q = 0.46 \times 10^{-26} \text{ J}.$$

6. If the intensity of wave length decreases, the energy released will _____

- a) Increase
 b) Decrease
 c) Remain same
 d) Zero

Answer: a

Explanation: The relation between wave and energy released is inversely proportional i.e., if wave length increase, energy produced by the body decrease. This can be given by the plank's theory.

7. What will be the wave length if the energy produced is 36J?

- a) $0.5 \times 10^{-26} \text{ m}$
 b) $0.55 \times 10^{-26} \text{ m}$
 c) $0.55 \times 10^{-16} \text{ m}$
 d) $0.55 \times 10^{-6} \text{ m}$

Answer: b

Explanation: The value of wave length can be determined by using the energy produced by using the relation, $Q = h \cdot c / \lambda$. On substitution, we get

$$36 = 6.625 \times 10^{-34} \times 3 \times 10^8 / \lambda$$

$$\lambda = 0.55 \times 10^{-26} \text{ m}.$$

8. In an EM field, which field is placed horizontal?

- a) Gamma rays
 b) Sonar field
 c) Electric field
 d) Magnetic field

Answer: d

Explanation: The EM field consists of electric and magnetic fields. Each of them plays a major role in their perspective areas. The placement of the electric and magnetic fields depends up on the intensity of wave length. Electric fields are placed in vertical manner and magnetic field in a horizontal manner.

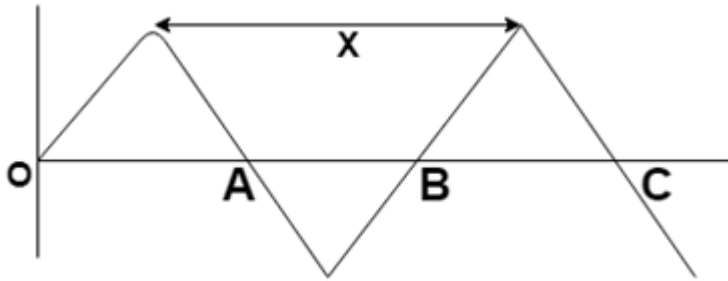
9. The wave length sensed in remote sensing are _____

- a) Nano meters and giga meters range
 b) Nano meters and deci meters range
 c) Nano meters and micro meters range
 d) Nano meters and meters range

Answer: c

Explanation: In case of remote sensing, the wave lengths are expressed in nano meters and micro meters range. These are capable of recording information in a minute range.

10. In the following figure, X represents _____



- a) Length
- b) Time period
- c) Frequency
- d) Wave length

Answer: d

Explanation: X represents Wave length, it the calculated distance between a crest and a trough. Crest is the upper portion of the wave and trough is the lower portion of the wave.

This set of Surveying Multiple Choice Questions & Answers (MCQs) focuses on “Idealized Remote Sensing System”.

1. Which of the following doesn’t indicate a stage in remote sensing?

- a) Reflectance of energy
- b) Transmission of energy
- c) Energy source
- d) Absorption of energy

Answer: d

Explanation: Remote sensing can be defined as the process of obtaining information without any contact with the object. In this process, it undergoes several steps for obtaining the required output. They include energy source, propagation of energy, interaction of energy, reflectance of energy, transmission and usage of data.

2. The electromagnetic wave travelling from source to the object is having same wave length.

- a) True
- b) False

Answer: b

Explanation: The electromagnetic waves while travelling from source to the object under goes interaction with the atmosphere. During this interaction, the EM waves will undergo scattering, refraction due to this it can undergo loss in information.

3. Which of the following indicates the functioning of a sensor?

- a) Transmits energy
- b) Absorbs wave length

- c) Sensitive to wave length
- d) Reflects energy

Answer: c

Explanation: A sensor can be defined as an electromagnetic instrument, which serves as a path for recording and transmitting energy. It is sensitive to wave length and yields data on the wavelength of the wave transmitted.

4. Among the following, which indicates the correct set of classification of data?

- a) Analog, digital
- b) Digital, binary
- c) Binary, analog
- d) Vector, raster

Answer: a

Explanation: The data obtained at the end of the transmission can be classified as analog and digital formats. The usage of the data depends upon the type of bit the software can adopt to show the result. In general, digital format is most probably used.

5. Which type of remote sensing uses its own source of electromagnetic energy?

- a) Passive
- b) Active
- c) Satellite
- d) Orbital

Answer: b

Explanation: Active remote sensing involves the usage of its own electromagnetic energy, which emits and absorbs the reflected energy. Camera with flash is an example for this process. In the case of passive remote sensing, it uses other source of energy.

6. The correct sequence of transmission of electromagnetic waves in remote sensing system can be given as

- a) Energy source, transmission of signal, propagation of signal
- b) Transmission of signal, propagation of signal, energy source
- c) Propagation of signal, transmission of signal, energy source
- d) Energy source, propagation of energy, transmission of signal

Answer: d

Explanation: In the process of remote sensing, it undergoes certain series of stages for obtaining the data. The sequence is given as energy source, propagation of energy, interaction of energy, reflectance of energy, transmission of the signal and usage of data.

7. Signal can be generated by _____

- a) Interaction of EM waves with surface
- b) Interaction of EM waves with energy source
- c) Interaction of EM waves with atmosphere
- d) Interaction of EM waves with sensor

Answer: a

Explanation: When the electromagnetic waves interact with the earth's surface, it generates signals which are emitted from the surface. They contain spectral signature, which is useful in earth's surface material.

8. Which among the following is the first Indian remote sensing satellite?

- a) Quick Bird
- b) SPOT
- c) IRS-1A
- d) MOS

Answer: c

Explanation: IRS-1A is the first Indian remote sensing satellite which was launched in the mid 1980s. It is capable of recording the reflected EM waves from the surface and transmits them to the ground station.

9. Among the following, the correct set of remote sensing classification can be given as _____

- a) Active, orbital
- b) Active, passive
- c) Passive, orbital
- d) Orbital, satellite

Answer: b

Explanation: Remote sensing is the process of obtaining information without any contact with the object. This includes using its own source of energy or using another source for reflecting and absorbing. The classification includes active and passive remote sensing.

10. The data obtained by the process of remote sensing needs great knowledge to understand it.

- a) True
- b) False

Answer: a

Explanation: After receiving the reflected energy from satellite to the ground station, the data is all set to use. It may be in digital or analog format. But the usage requires a great depth of knowledge regarding the signal formation and generation of data.

This set of Surveying Multiple Choice Questions & Answers (MCQs) focuses on “Remote Sensing of Electromagnetic Spectrum”.

1. Energy of the discrete particles can be given by _____

- a) Photons
- b) Protoplasm
- c) Electrons
- d) Neutrons

Answer: a

Explanation: Photons act as a constituent particle in case of electromagnetic wave. These possess certain properties like energy and momentum which is able to deliver it to the wave and helps in certain classifications.

2. Which among the following is having more wavelengths?

- a) X-rays
- b) Cosmic waves
- c) Radio waves
- d) Gamma rays

Answer: c

Explanation: Radio waves possess the longest wavelength in the electromagnetic spectrum, which makes it suitable in the usage of classified radars for operating in a particular region.

3. Which among the following wave is not employed in case of remote sensing?

- a) X-ray
- b) Visible ray
- c) Thermal IR
- d) Radio waves

Answer: a

Explanation: Gamma rays, X-rays and UV rays will be absorbed by the atmosphere so that the sensor which is mounted on the satellite can't use the facilities which can be provided by these rays and also these possess very less wavelength.

4. Optical mechanical scanner is used in which type of electromagnetic waves?

- a) X-rays
- b) Cosmic waves
- c) Radio waves
- d) Thermal IR

Answer: d

Explanation: Infrared region has been classified into thermal IR and reflected IR. Thermal IR is equipped with the optical mechanical scanner and a special system which is free from a film produces images by using wavelengths of range 3-5 micrometer.

5. Radio waves are having the longest wavelength among all the electromagnetic waves.

- a) False
- b) True

Answer: b

Explanation: In an electromagnetic spectrum, certain classifications were made to determine the wave properties. Among them, radio and television waves stand at last having a long wavelength parameter. This makes it suitable for usage of radars.

6. Gamma rays are having a wavelength of _____

- a) Zero
- b) Greater than 0.03nm
- c) Less than 0.03nm
- d) Equal to 0.03nm

Answer: c

Explanation: In an electromagnetic spectrum Gamma rays are having second least wavelength. It can be clearly observed that these rays are absorbed by the atmosphere which makes it possess least wavelength, which is less than 0.03nm.

7. Which of the following waves can be used in case of remote sensing?

- a) UV rays
- b) X-rays
- c) Gamma rays
- d) Visible rays

Answer: d

Explanation: Electromagnetic spectrum consists of a wide range of classifications among those some of them are absorbed by the atmosphere and most of them are used in remote sensing those include visible rays, IR rays, Radar waves, Radio waves etc.

8. Which of the following indicates the correct set of combination in radio waves?

- a) Shorter wavelength & high frequency
- b) Longer wavelength & less frequency
- c) Shorter wavelength & less frequency
- d) Longer wavelength & high frequency

Answer: a

Explanation: From the relation it can be clearly seen that wavelength and frequency are inversely proportional to each other which makes it form a relation that is shorter wavelength must possess high frequency which makes it suitable in case of cosmic rays and radio waves.

9. How much wave length is reflected back by the earth surface from the absorbed sun radiation?

- a) 0.5meter
- b) 0.5 micrometer
- c) 0.5 centimeter
- d) 0.5 decimeter

Answer: b

Explanation: In general, the radiation received from sun is distributed to all over the world in a manner that the entire radiation is useful. But some of this is reflected back, which is 0.5 micrometer, a minute one.

10. EM waves varies from _____ to _____

- a) Meters to nano-meters
- b) Meters to micro-meters
- c) Nano to micro-meters
- d) Centimeters to nano-meters

Answer: a

Explanation: The EM wave is continuum of energy, which under goes certain propagations. During this course, it may undergo some undulations which result in decrease of the wave length capacity. Generally, these vary from meters to nano-meters.

11. The formula of energy produced from the body can be given as _____

- a) $Q = h \cdot c / \lambda$
- b) $Q = h \cdot c \cdot \lambda$
- c) $Q = h + c / \lambda$
- d) $Q = h \cdot c / \lambda$

Answer: d

Explanation: The energy propagated from the body can be determined by $Q = h \cdot c / \lambda$. From this, the wave length can be determined by having an energy value. This help in the determination of the wavelength by using plank's constant.

This set of Surveying Multiple Choice Questions & Answers (MCQs) focuses on "Remote Sensing Characteristics of Solar Radiation".

1. Diameter of sun can be given as _____

- a) 1.39×10^7 km
- b) 1.9×10^6 km
- c) 1.39×10^6 km
- d) 1.39×10^{16} km

Answer: c

Explanation: Sun is the most prominent star among all the stars available. The radiation emitted by sun can be used in case of passive remote sensing. The diameter of the sun can be estimated as 1.39×10^6 km.

2. The energy radiated from sun in visible region will be around _____

- a) 43%
- b) 45%
- c) 47%
- d) 50%

Answer: a

Explanation: The radiation emitted from sun will be in a huge manner. Emitted radiation can be visualized up to some extent and remaining is not visible to naked eye. It can be estimated that 43% can be visualized and remaining 48% is transferred to IR region.

3. The value of solar constant can be given as _____

- a) 1637 W/m^2
- b) 1367 W/m^2
- c) 136 W/m^2
- d) 3167 W/m^2

Answer: b

Explanation: The energy received from the sun can be distributed all over the surface of earth and by doing this an average incident flux density can be established. It is determined as solar constant, having a value of 1367 W/m^2 .

4. Temperature on the sun is around _____

- a) $575 \pm 600 \text{ K}$
- b) $7550 \pm 8000 \text{ K}$
- c) $5570 \pm 6000 \text{ K}$
- d) $5750 \pm 6000 \text{ K}$

Answer: d

Explanation: Sun, being the most vulnerable among all the stars, is set to emit a lot of radiation. In order to emit such radiation, it must possess a large amount of temperature. The temperature range would be around $5750 \pm 6000 \text{ K}$.

5. Around how much percentage, the incident radiant flux can be absorbed by the materials present on earth?

- a) 48%
- b) 37%
- c) 42%
- d) 50%

Answer: a

Explanation: The radiation which is being spread around all over the world is set to possess an incident flux density of 1367 W/m^2 . This is divided into certain classes in which 48% of this is absorbed by the earth's surface materials.

6. Determine the spectral existence of a black body if the absolute temperature can be given as 300K.

- a) $1968 \times 10^{-11} \text{ W/sq. m}$
- b) $1689 \times 10^{-11} \text{ W/sq. m}$
- c) $6298 \times 10^{-11} \text{ W/sq. m}$
- d) $1698 \times 10^{-11} \text{ W/sq. m}$

Answer: d

Explanation: By using Stefan-Boltzmann law, the spectral existence of a black body can be determined. The formula can be given as $M = \sigma T^4$. On substitution, we get

$$M = 5.66 \times 10^{-11} \times 300$$

$$M = 1698 \times 10^{-11} \text{ W/sq. m.}$$

7. Find the value of λ , if the temperature of the body is given as 560K.

- a) $4.16 \times 10^{-14} \text{ m}$
- b) $6.16 \times 10^{-14} \text{ m}$
- c) $5.16 \times 10^{-14} \text{ m}$
- d) $5.16 \times 10^{-4} \text{ m}$

Answer: c

Explanation: From Wien's displacement law,

$\lambda = A / T$. here, A is the Wien's constant $= 2.89 \times 10^{-11} \text{ mK}$. On substitution, we get

$$\lambda = 2.89 \times 10^{-11} / 560$$

$$\lambda = 5.16 \times 10^{-14} \text{ m.}$$

8. Determine the spectral existence of a body by using plank's law, if the wave length is given as 456m and the absolute temperature is 765K.

- a) $3.6 \times 10^{30} \text{ W / sq. m}$
- b) $4.6 \times 10^{30} \text{ W / sq. m}$
- c) $6.6 \times 10^{30} \text{ W / sq. m}$
- d) $3.6 \times 10^{30} \text{ W / sq. m}$

Answer: a

Explanation: From the plank's law, $M = C_1 / (\lambda^5 \cdot e^{\frac{C_2}{\lambda T}})$. Here, C1 and C2 are the radiation constants. On substitution, we get

$$M = 3.74 \times 10^{16} / ((765^5 \cdot e^{\{1.43 \cdot \frac{10^2}{456 \cdot 765}\}}))$$

$$M = 3.6 \times 10^{30} \text{ W / sq. m.}$$

9. Determine the absolute temperature of the body from Stefan's Boltzmann law if spectral existence of the body is $3.55 \times 10^{-10} \text{ W/sq. m.}$

- a) 19.58 K
- b) 1.58 K
- c) 15.58 K
- d) 1.85 K

Answer: b

Explanation: The Stefan's Boltzmann law can be given as, $M = \sigma \cdot T^4$. On substitution, we get

$$3.55 \times 10^{-10} = 5.66 \times 10^{-11} \cdot T^4$$

$$T = 1.58 \text{ K.}$$

10. From Wien's displacement law, determine the absolute temperature if wave length is given as 0.05m.

- a) $7.8 \times 10^{-3} \text{ K}$
- b) $75.8 \times 10^{-3} \text{ K}$
- c) $57.25 \times 10^{-35} \text{ K}$
- d) $57.8 \times 10^{-3} \text{ K}$

Answer: d

Explanation: The formula for Wien's displacement law can be given as

$\lambda = A / T$. On substitution, we get

$$0.05 = 2.89 \times 10^{-3} / T$$

$$T = 57.8 \times 10^{-3} \text{ K.}$$

This set of Tough Surveying Questions and Answers focuses on Remote Sensing Interaction of EM Radiation with Earth's Surface.

1. Which among the following is not a phenomenon in case of interaction of EM waves on earth surface?

- a) Reflection
- b) Absorption
- c) Transmission

d) Refraction

Answer: d

Explanation: While the interaction of EM wave with surface of the earth, it can undergo reflection, absorption and transmission. This phenomenon depends on the texture of the surface which can make any this happen.

2. Which of the following can be changed while interaction of EM wave with a surface?

- a) Intensity
- b) Diffraction
- c) Wave length
- d) Direction

Answer: b

Explanation: During the interaction of EM waves with the surface of the earth, intensity, direction, wave length, polarization and phase of wave length can be changed. The change in these depends on the surface of the material it is being in contact.

3. Which of the following indicates a volume phenomenon?

- a) Refraction
- b) Reflection
- c) Transmission
- d) Diffraction

Answer: c

Explanation: Transmission and absorption can be indicated as volume phenomena because of the fact that these can be determined by certain internal characteristics like matter, density and condition in which it is present.

4. Determine the energy of the wave length, if the reflected, absorbed and transmitted energies were given as 56J, 24J and 7J respectively.

- a) 87J
- b) 78J
- c) 89J
- d) 17J

Answer: a

Explanation: The energy of the wavelength can be expressed by using the energy balance equation, which is given as $E_{\hat{I}} = E_{\hat{R}} + E_{\hat{A}} + E_{\hat{T}}$. On substitution, we get

$$E_{\hat{I}} = 56 + 24 + 7$$

$$E_{\hat{I}} = 87J.$$

5. Find the value of reflectance if the reflected and incident energies are given as 43J and 87J.

- a) 0.94
- b) 0.42
- c) 0.99
- d) 0.49

Answer: d

Explanation: The reflectance can be given as the ratio of reflected energy by incident energy, which is given as $E_{\hat{R}} / E_{\hat{I}}$. On substitution, we get

$$43 / 87 = 0.49 \text{ is the reflectance value.}$$

6. What will be the value of absorbance, if the absorbed and incident energies are given as 67J and 109J respectively?

- a) 0.16
- b) 0.61
- c) 0.69
- d) 0.72

Answer: b

Explanation: The formula of absorbance can be given as the ratio of absorbed energy by incident energy, which is represented as $E_{\hat{A}} / E_{\hat{I}}$. On substitution, we get

$$67 / 109 = 0.61 \text{ is the value of absorbance.}$$

7. Find the transmittance, if the transmitted and incident energies are given as 156J and 987J respectively.

- a) 0.51
- b) 0.45

- c) 0.15
- d) 0.5

Answer: c

Explanation: The value of transmittance can be given as $E_{T\lambda} / E_{i\lambda}$, which is the ratio of transmitted energy by incident energy. On substitution, we get $156 / 987 = 0.15$ is the value of transmittance.

8. What will be reflectance value if the possess an emissivity of 56.

- a) 55
- b) 50
- c) 54
- d) 52

Answer: a

Explanation: The relation between reflectance and emissivity can be given as $\rho_{\lambda} = 1 - \epsilon_{\lambda}$. Here, ϵ is the emissivity.

On substitution, we get

$\rho_{\lambda} = 1 - 56 = -55$. (Negative indicates reflectance).

9. When emissivity is zero, what will be the value of reflectance?

- a) One
- b) Zero
- c) Ten
- d) Not equal to one

Answer: d

Explanation: When emissivity is zero, the reflectance value would be equal to one, which means the total energy incident on the object is reflected and recorded by the system. Best example for this case is snow.

10. Generally, the value of reflectance varies from _____

- a) 10-20
- b) 0-10
- c) 0-1
- d) 0-0.5

Answer: c

Explanation: The variance of the reflectance is generally due to the emissivity and the reflectance. The variation is under control when the emissivity is not equal to one and reflectance is equal to zero.

This set of Surveying Multiple Choice Questions & Answers (MCQs) focuses on “Remote Sensing Sensors”.

1. Strength of signal doesn't depend upon which of the following factors?

- a) Energy flux
- b) Dwell time
- c) Altitude
- d) Reflection

Answer: d

Explanation: A signal can have the capacity of recording and displaying numerical data or an image. It depends on energy flux, altitude, spectral band width, dwell time and instantaneous field of view.

2. Which of the following indicates the correct set of bands operated in LISS- III satellite?

- a) Visible ray, near IR
- b) Near IR, radio wave
- c) Radio wave, near IR
- d) Far IR, near IR

Answer: a

Explanation: LISS-III also known as Linear Imaging Self Scanning Sensor is mounted on Indian satellite IRS-1A. It is capable of operating three bands, which comprises one visible ray, near IR and in short wave IR regions.

3. Energy flux may affect which of the following?

- a) Lens
- b) Strength of the signal
- c) Aperture
- d) Declination

Answer: b

Explanation: The value of energy flux will affect the strength of the signal as they are interconnected with each other. Not only energy flux, altitude, spectral band width will also affect the strength of the signal.

4. Which of the following can merge the imagery of LISS-III and PAN?

- a) IRS 1B
- b) IRS 1A
- c) IRS 1C
- d) IRS multi sensor

Answer: d

Explanation: IRS multi sensor is having the capacity to merge the imageries of LISS-III and the PAN. This will improve the quality of the output and enhance the image for better resolution.

5. Which among the following indicates the correct expansion of WiFS?

- a) Wide Field Sensor
- b) Wireless Fidelity Sensor
- c) Wide Fidelity Sensor
- d) Wireless Field Sensor

Answer: a

Explanation: The expansion of WiFS can be given as Wide Field Sensor, which is placed on the boards of IRS 1C and 1D satellites. These play a major role in the determination of object specifications.

6. IRS P3 satellite uses which of the following sensors?

- a) PAN
- b) LISS-III
- c) MOS
- d) LISS-II

Answer: c

Explanation: Modular Opto -Electronic Scanner, having a wide range capacity is mounted on the IRS P3 satellite. This is having great importance in this satellite as it having a wide coverage capacity.

7. PAN sensor uses two band operators.

- a) True
- b) False

Answer: b

Explanation: Panchromatic sensor is placed on the boards of IRS 1C and 1D. This is having the capability of handling only a single band which will be any of the waves in the EM spectrum.

8. While mapping land use and land cover, which scale is recommended?

- a) 1: 25000
- b) 1: 50000
- c) 1: 250000
- d) 1: 25

Answer: a

Explanation: In general, the mapping of the land use and land cover is done so as to have a detailed description about each and every aspect. For this, a scale of 1: 25000 scale is recommended as it can have better visuals.

9. The sensor used in the digital elevation model can identify contour heights greater than _____

- a) 5 m
- b) 30 m
- c) 20 m
- d) 10 m

Answer: d

Explanation: Every sensor is having the capacity to record and display information. The display of information is bounded within its limits. The sensors used in digital elevation model can determine the object height greater than 10m, which is useful in detailed interpretation.

10. IRS 1A and 1B satellites can carry which of the following sensors?

- a) LISS-IV
- b) LISS-III
- c) LISS-I
- d) LISS-V

Answer: c

Explanation: The satellites IRS 1A and 1B may have the LISS-I and LISS-II sensors, which are mounted on their boards. These will enhance the capacity of the satellite and in turn increases the covering capacity.

This set of Surveying Multiple Choice Questions & Answers (MCQs) focuses on “GIS” Four Marks.

1. Which of the following indicates the correct set of MTMs used in the case of GIS?

- a) Manipulating, monitoring, mapping, modeling
- b) Measuring, manipulating, mapping, modeling
- c) Measuring, monitoring, marketing, modeling
- d) Measuring, monitoring, mapping, modeling

Answer: d

Explanation: GIS follows certain principles which are accompanied as measuring the parameters, developing maps, monitoring the changes, modeling the alternatives of the process. This is the methodology followed for obtaining a better output.

2. Which of the following works involves modeling?

- a) Tectonic plate movement
- b) Drainage network
- c) Roadway line
- d) Railway line

Answer: b

Explanation: Modeling is used in the environmental works, drainage network and model terrains which are usual in acquiring information of the required object. This helps in covering information about the specific object in a wide range.

3. Mapping involves which of the following?

- a) Soil details
- b) Boundary details
- c) Cadastral details
- d) Population details

Answer: c

Explanation: Mapping is done in order to assess a particular area or object in a detailed manner. It includes land use land cover details, cadastral details, agriculture and hydrological details.

4. In which aspect of agriculture GIS is used?

- a) Soil analysis
- b) Seed requirement
- c) Fertilizer
- d) Pesticides

Answer: a

Explanation: Agriculture field is having a wide range of classifications among them usage of GIS is having more priority. The usage of GIS can be seen in farm management, soil analysis and crop monitoring.

5. Which of the following software can be used in case of property tax assessment?

- a) STAAD Pro
- b) Revit
- c) Remote sensing
- d) GIS

Answer: d

Explanation: Though different kinds of softwareTMs are available, GIS is having its priority in case of estimating the property tax. GIS can be used in case of economic development, Market analysis and transportation.

6. Which of the following softwareTMs are used for developing vehicle route?

- a) Autodesk Revit
- b) STAAD Pro
- c) GIS
- d) Remote sensing

Answer: c

Explanation: GIS is used in the field of transportation for having a clear idea about transportation and the traffic flow in a particular area. This helps in diverting the vehicles in order to reduce the traffic.

7. Population forecast can be done by using GIS.

- a) False
- b) True

Answer: b

Explanation: GIS is not only used in terms of planning of a city but also in estimating the present population and upcoming population. This can be done by enabling all the features in GIS which can reduce the work of estimating population, which is conventionally done by applying formulae.

8. Which of the following is not a property of coordinate in GIS?

- a) Line of sight
- b) Origin
- c) Axis
- d) Units of measurement

Answer: a

Explanation: The coordinates which are used in GIS are having three properties those include origin, axis and units of measurement. Each of these will be applied in every aspect of the GIS software.

9. Which of the following represents the correct set of coordinate classification in GIS?

- a) Spherical, projected systems
- b) Geographic, projected systems
- c) Geographic, spherical systems
- d) Geographic, geometric systems

Answer: b

Explanation: In GIS, the coordinates are classified into geographic and projected systems. Geographic coordinates are used for spherical and non linear systems and projected coordinates are used for planar and linear systems.

10. Longitudes are used to represent which of the following directions?

- a) Northâ€œEast
- b) South
- c) North
- d) East

Answer: d

Explanation: The directions east and west are represented by the longitudes, which cover the entire surface of the earth. Every longitude is divided based on the standard meridian and is placed equidistant from each other.

This set of Surveying Multiple Choice Questions & Answers (MCQs) focuses on â€œGIS â€œ Componentsâ€œ.

1. GIS uses the information from which of the following sources?

- a) Non- spatial information system
- b) Spatial information system
- c) Global information system
- d) Position information system

Answer: b

Explanation: Among the various information sources available, GIS chose spatial information system as its source for obtaining the required information for developmental process. This spatial information system serves as a base for different type of works done by the use of GIS.

2. Among the following _____ can be expressed as an example of hardware component.

- a) Keyboard
- b) Arc GIS
- c) Auto CAD
- d) Digitalization

Answer: a

Explanation: GIS comprises certain key components such as hardware, software, data and user. Hardware consists of the components used in the computer which include a keyboard, monitor, CD-ROM etc.

3. Which of the following formats can be used for GIS output?

- a) DXF
- b) PDF
- c) GIF
- d) HTML

Answer: c

Explanation: GIS output can be handled with a wide range of formats available. Among them, the most commonly used are GIF, JPEG, TIFF etc., usage of the format depends upon the software used in computer and also its bit performing capacity.

4. In the process of GIS, digitalization is done for better output.

- a) True
- b) False

Answer: a

Explanation: Digitalization involves the conversion of the data from raster to vector so that the hardware data can be obtained in software. It can be done either by manual interpretation or by digital scanning.

5. Which among the following is not related to GIS software™s?

- a) CAD
- b) Arc GIS
- c) Arc View
- d) STAAD Pro

Answer: d

Explanation: GIS involves a different procedure which consists of several steps. So it requires a high end processing system and a software, which must adapt to its capability. Among them, STAAD Pro is not used in case of GIS. It is permitted to only structures and its analysis.

6. Among the following, which do not come under the components of GIS?

- a) Hardware
- b) Software
- c) Compiler
- d) Data

Answer: c

Explanation: GIS consists of certain components which denote the entire process of the system. It comprises hardware, software, user and data. These are having certain features which are accomplished at their stage.

7. Data can be shared in the process of GIS.

- a) True
- b) False

Answer: b

Explanation: The entire functioning of GIS involves developing a map or detailed analysis of the area taken for development. In this, data can be analyzed but can't be shared. This is one of the major drawbacks in GIS procedure.

8. Which of the following doesn't determine the capability of GIS?

- a) Defining a map
- b) Representing cartographic feature
- c) Retrieving data
- d) Transferring data

Answer: d

Explanation: Capability of GIS determines its ability to accomplish the work assigned. It can define a map with database, can represent cartographic feature, can store and retrieve data and many more. By doing these, it can act as a source for development of errors.

9. Which of the following acts a benefit of GIS?

- a) Maintaining geo spatial data
- b) Data sharing
- c) Accurate data information
- d) Presence of data retrieval service

Answer: a

Explanation: There are a lot of advantages regarding the usage of GIS. They include maintaining geo spatial data, value added products, productivity and efficiency of data, can save time and money etc.

10. Which among the following is a server based hardware platform of GIS?

- a) Autodesk Revit
- b) STAAD Pro
- c) Arc GIS

d) Google-maps

Answer: d

Explanation: GIS is a place based information derivative platform, which can have a spatial feature not related to location. There are certain platforms which can have the ability to access the GIS interface. Here, Google Maps is a server based platform and remaining are offline applications.

This set of Surveying Multiple Choice Questions & Answers (MCQs) focuses on “GIS” Topology.

1. Study of geometric objects will come under the category of _____

- a) Surveying
- b) Cartography
- c) Surface geometry
- d) Topology

Answer: d

Explanation: Topology can be determined as the study of geometric objects that remain invariant under major circumstances which include bending and stretching. It can be able to determine the spatial relation between adjacent vector features.

2. Which type of data set is not used in GIS related software’s?

- a) Vertex
- b) Point
- c) Poly line
- d) polygon

Answer: a

Explanation: Data set plays a major role in the determination of the output developed in the GIS software. Point feature can be used for identification of certain area, poly line for identifying road network, pipe lines and polygon for two-dimensional features.

3. Among the available formats, which are most commonly used in case of GIS?

- a) GIF
- b) TIFF
- c) JPEG
- d) DXF

Answer: b

Explanation: TIFF format is the most commonly used format in case of GIS. It is because of the fact that most of the computers are equipped with this software and also it can be easily accessed with the help of GIS software. Other software might create any trouble, but this serve at its best.

4. The point data feature can be used to represent _____

- a) Location
- b) Area
- c) 3D area
- d) Volume

Answer: a

Explanation: The different data features like point, poly line and polygon can be used to identify different poly graphic features. Among them, the point is used to locate the feature of the object like location.

5. The polygonal data feature uses which of the following data format?

- a) Scientific character
- b) Math
- c) Character
- d) Integer

Answer: d

Explanation: The data formats which are generally used in case of GIS are integer, float, and text format. These are selected in the GIS software based on the type of work being carries out.

6. Which of the following justifies the usage of topology?

- a) Terrain of the area
- b) Geometry of the model
- c) Climatic conditions
- d) Atmospheric conditions

Answer: b

Explanation: The topology can be used for having an idea about the geometry of the model, how it can change from feature of the class on integration. This helps in the interpretation of the image.

7. Spatial relationship can be established by using GIS.

- a) False
- b) True

Answer: b

Explanation: The usage of GIS involves determining the spatial relationship between the object of our sight. This can be useful in data compilation and also in the analysis of the spatial relationship.

8. Which feature of GIS can share the boundary of the polygon?

- a) Polygons
- b) Poly lines
- c) Dangle nodes
- d) Silver polygons

Answer: a

Explanation: The polygons generated in the GIS software sometimes may share their boundary. This might lead to the creation of silver polygons. In this case, area feature of the polygon will be shared.

9. Which of the following indicate topological primitive?

- a) Poly line
- b) Point
- c) Node
- d) Polygon

Answer: c

Explanation: In GIS, topological primitives are used. Those include nodes, faces and edges. These are defined by representing the feature geometries in a planar graph of a topological element.

10. Which of the following acts as a key to GIS?

- a) Topology
- b) Platform
- c) Software
- d) Terrain

Answer: a

Explanation: Topology acts as a key to GIS, which can access every aspect of GIS. It is accompanied by some set of rules and determines the point, polygon and poly line features.

This set of Surveying Multiple Choice Questions & Answers (MCQs) focuses on "Errors in GIS".

1. Which of the following doesn't indicate a topology error?

- a) Polygonal features
- b) Gaps between polygons
- c) Silver polygons
- d) Unclosed polygons

Answer: c

Explanation: Topology errors generally include polygonal features, gaps between polygons, overlapping polygon borders and unclosed polygons. Some of these are negligible and some of them can be reduced by following certain precautions and by applying some parameters.

2. Which of the following acts as a source of inaccuracy?

- a) Format of data
- b) Silver polygon
- c) Unclosed polygon
- d) Dangle nodes

Answer: a

Explanation: Difference in scale, age of data, format of the data, qualitative and quantitative errors act as a source of inaccuracy. Inaccuracy develops due to lack of technique in the work which is being done.

3. Among the errors occurring in GIS, which can cause a drastic change or fail the entire process?

- a) Format of data
- b) Unclosed polygons

- c) Dongle nodes
- d) Silver polygons

Answer: d

Explanation: Development of silver polygons leads to the creation of similar polygonal features, which arises a lot of confusion to the user as well as the software. It can't differentiate them and in turn merges them to make a single feature.

4. Which of the following is not a category of error?

- a) Change in format
- b) Areal cover
- c) Map scale
- d) Density of observation

Answer: a

Explanation: Sources of errors include aging of data, areal cover, map scale, density of observation, etc., these are temporary and can be adjusted by following certain parameters. These can be prevented if proper care is taken while the procedure is carried out.

5. Age of data can act as a source of error.

- a) False
- b) True

Answer: b

Explanation: Aging of data acts as a major source of error. Past data may contain a lot of unknown standards which can't be used in the present day. They might be irrelevant to the present situation and sometimes they won't exist.

6. Which of the following can be represented as an example of format error?

- a) Silver polygons
- b) Dongle nodes
- c) Changing from raster to vector
- d) Areal cover

Answer: c

Explanation: After completion of interpretation using GIS software, the data must be stored in any type of software which can be easily accessible. If the stored data undergone any change in format, it may or may not be able to open. If it doesn't open, then the entire data present in it can be erased.

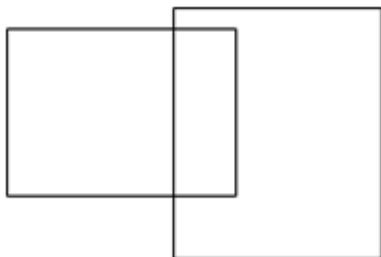
7. Silver polygons occur due to excessive overlaying.

- a) False
- b) True

Answer: b

Explanation: GIS process involves overlaying procedure in which the data can be placed layer by layer without any confusion. While placing, there is a chance of developing silver polygons which means the development of polygons one on another. It leads to merging of data and ends up creating a single polygon rather than many.

8. The figure represents which type of error in GIS?



- a) Pseudo node
- b) Silver polygon
- c) Dongle node
- d) Poly line feature

Answer: b

Explanation: The figure represents the silver polygon, which is a condition where the overlapping polygon takes place in the GIS software. This can be removed by deleting unnecessary data.

9. The figure given below represents which topological error?



- a) Pseudo nodes
- b) Silver polygon
- c) Dongle nodes
- d) Polygonal feature

Answer: a

Explanation: The figure represents pseudo nodes, which is a condition where nodes of the poly lines aren't connected. In order to connect them, vertex must be corrected for having a better result.

10. Dongle nodes can be removed by _____

- a) Undo
- b) Eraser
- c) Behind shoot
- d) Over shoot

Answer: d

Explanation: Dongle node is a condition where the edge of the polygon is improperly connected to the second poly line. The removal of dongle nodes can be done by applying undershoot or over shoot operations.

This set of Surveying Multiple Choice Questions & Answers (MCQs) focuses on “Topographic Maps and Projection Systems”.

1. Which of the following can be used for representing a real world feature on two dimensional surfaces?

- a) Plan
- b) Drawing
- c) Scale
- d) Map

Answer: d

Explanation: A map can be used for the representation of real world feature on a two dimensional surface. It can help in identification of location, locate route to a particular point. Generation of the map can be done in various ways, but the ultimate result is the same.

2. Which of the following sets represent the correct set of map classification?

- a) Cadastral, thematic
- b) Thematic, geographic
- c) Cadastral, geographic
- d) Geographic, topographic

Answer: a

Explanation: In general, map has been classified into three categories. They include cadastral maps, topographic sheets and thematic maps. Each one is having particular importance and can be used only when it meets the requirement.

3. Which type of map can explain a particular feature in detail?

- a) Cadastral map
- b) Topographic map
- c) Thematic map
- d) Geographic map

Answer: c

Explanation: A thematic map involves in the generation of a world class feature, which can be able to determine the parameters and features in the area of interest. This can be in Arc GIS software.

4. If the number on scale is less then it represents a large scale map.

- a) True
- b) False

Answer: a

Explanation: Scale can be defined as the distance on map to the distance on the ground. There are different types of scales available which can be selected based on the type of output needed. In order to have more accuracy, we need to go less number on scale which indicates a large map with good details.

5. In which of the following ways, meridians are projected in cylindrical projection?

- a) Mathematically
- b) Geometrically
- c) Horizontally
- d) Vertically

Answer: b

Explanation: A cylindrical projection involves in the generation of map in a cylindrical shape. Latitudes are prepared on hollow cylinder. Meridians will be projected geometrically on the cylindrical surface whereas the latitudes are projected mathematically.

6. Which type of map projection is used in the preparation of atlas?

- a) Cylindrical projection
- b) UTM projection
- c) Poly conic projection system
- d) Lambert- Azimuthal equal area projection

Answer: d

Explanation: Atlas consists of a detailed description of maps and locations in and around the world. It needs at most

accuracy and care in every step of its preparation. Generally, these types of works use Lambert “ Azimuthal equal area projection system, which uses the spherical surface as its reference.

7. The entire earth surface is divided into zones in which type of map projection?

- a) Poly conic projection system
- b) Cylindrical projection
- c) UTM projection
- d) Lambert- Azimuthal equal area projection

Answer: c

Explanation: UTM projection is developed by US. It is capable of dividing the entire earth surface into zones with 6 dimensions, so that accurate location can be made by subdividing the classes.

8. Which of the following can also be termed as un projected co-ordinate system?

- a) Lambert- Azimuthal equal area projection
- b) Latitude “ longitude geographic co-ordinate system
- c) Poly conic projection system
- d) Cylindrical projection

Answer: b

Explanation: Latitude “ longitude geographic co-ordinate system can also be termed as un projected co-ordinate system because in this system rectangular co-ordinates were taken into consideration and represented in decimal degrees. It extends from 180 degrees eastern hemisphere to 180 degrees western hemisphere.

9. Determine the scale of the map if the distance on the map is given as 2cm which is equal to 1km on the ground.

- a) 1: 50000
- b) 1: 5000
- c) 1: 100000
- d) 1: 500

Answer: a

Explanation: The scale of a map can be determined by taking a ratio of the distance on the map to distance on the ground i.e., $2 / 100000 = 1: 50000$.

10. Which of the following is not a method of representation of the scale of the map?

- a) Ratio method
- b) Verbal method
- c) Geographical method
- d) Non-verbal method

Answer: d

Explanation: In general, the scale of a map can be represented by three methods those include ratio method, verbal method and geographical method. Any of these can be used but in case of professional output geographical scale is generally preferred.

This set of Surveying Multiple Choice Questions & Answers (MCQs) focuses on “Topographic Maps” CIM Series♦.

1. Which of the following indicates the correct set for the division of map numbering?

- a) CIM, IAC series
- b) CIM, IAF
- c) IAC, CIA
- d) IAF, IAC

Answer: a

Explanation: Map numbering denotes the type of system adopted for designating the scale on map. It depends on the accuracy of the work and the precise levels of the output. Most probably small scale must be preferred for obtaining good details. It consists of CIM series and IAC series of map numbering.

2. The CIM series can be used in _____ scale.

- a) 1:2,50,000
- b) 1:50,000
- c) 1:25,000
- d) 1:10⁶

Answer: d

Explanation: The international system, CIM, can be used in case of international maps which having a large scale

number. It might decrease the accuracy in output, but it is the best and most commonly used method, which consumes less time.

3. Which of the following processes is involved in CIM series?

- a) Decoupled integration
- b) Integration
- c) Decoupled differentiation
- d) Differentiation

Answer: a

Explanation: CIM series involves decoupled integration which consists of series of the objective. The CIM data modeling can be done with the help of decoupled integration.

4. Which of the following is the right expansion of CIM?

- a) Commerce Information Model
- b) Common Information Model
- c) Common Informational Modem
- d) Common Information Modem

Answer: b

Explanation: CIM can be elaborated as Common Information Model is a standard developed in North America with an objective of exchanging information among the power systems and among the utilities.

5. Which of the following is used in CIM?

- a) STAAD Pro
- b) Remote sensing
- c) GIS
- d) Revit

Answer: c

Explanation: CIM uses network operations like GIS and OMS, which can transmit the network where ever possible. It can also provide asset tracking, work scheduling and customer billing.

6. What is the common language interpreted in the CIM system?

- a) Spanish
- b) French
- c) Italian
- d) English

Answer: d

Explanation: CIM can use our common language in the inter system communication. Since the CIM is based on integration, it can have the capability to understand the input which is given by the user and can show the output based on the interest.

7. CIM was adopted by which of the following commissions?

- a) ICE
- b) IEI
- c) ICI
- d) IEC

Answer: d

Explanation: CIM is basically approved by the electric power research institute which is having a more amount of electrical work involved in it, because of this the IEC approved it and the usage of this has become one of the most used products in GIS.

8. Which of the following is not one of the softwareâ€™s of GIS?

- a) Arc GIS
- b) RS GIS
- c) Q GIS
- d) Super GIS

Answer: b

Explanation: GIS involves different varieties of softwareâ€™s. These are developed based on different topological variations and are able to solve those in a quick manner. Those include Arc GIS, Q GIS, and Super GIS etc.

9. ESB integration model is developed based on _____

- a) CIM series
- b) GIS

- c) Remote sensing
- d) Arc GIS

Answer: a

Explanation: CIM data modeling involves in decoupled integration which is used in the development of the ESB model with the help of GIS. GIS can control over ESB at the time of integration.

10. Swiss Alps farming can be monitored by using _____

- a) Revit
- b) Remote sensing
- c) GIS
- d) Auto CAD

Answer: c

Explanation: The cultivation of land on a slope region in Swiss Alps can be detected by using GIS software because direct manual interpretation can't be done so easily because of the climatic conditions present in that particular area and it is critical for successful crop growth.

This set of Surveying Multiple Choice Questions & Answers (MCQs) focuses on "GPS" Operational Control Segment (OCS).

1. Which of the following is used for shaping the velocity of the satellite orbit?

- a) User segment
- b) Control segment
- c) Ground segment
- d) Space segment

Answer: b

Explanation: The entire process of GPS has been categorized into user segment, control segment. These are allocated with a certain part of the entire work. Control segment helps in monitoring the shape and velocity of satellite orbits.

2. Which type of band can be used in the control segment?

- a) N-band
- b) M-band
- c) K-band
- d) S-band

Answer: d

Explanation: For the proper functioning of the control segment, usage of certain bands like L-band and S-band is involved. L-band facilitates the path of GPS radio frequency and S-band facilitates the information transfer sessions.

3. Which among the following describes the usage of the S-band?

- a) Merging wave length
- b) Measuring wavelength
- c) Duplex information transmission
- d) Identifying signals

Answer: c

Explanation: S-band usage plays a crucial role in the control segment as it helps in conducting duplex information transfer sessions with space vehicle and secure communication data links.

4. For coupling globally distributed ground assets which among the following can be used?

- a) S-band
- b) L-band
- c) K-band
- d) M-band

Answer: a

Explanation: Secure communication data links are used in coupling globally distributed ground assets. These are produced from the S-bands, which are important in control segments.

5. Which of the following indicates the operations performed by the control segment?

- a) Identifying bands
- b) Merging signals
- c) Controlling space vehicle
- d) Determining wavelengths

Answer: c

Explanation: Control segment can perform operations like controlling and maintaining status and configuration of the space vehicle, support system interfaces to associated services, manage and schedule the ground assets.

6. Which of the following is not included in the Operation Control segment?

- a) Master control station
- b) Alternate master control station
- c) Commands
- d) Program

Answer: d

Explanation: An Operation Control Segment generally involves a master control station, an alternate master control station, commands and control antennas. Monitoring sites were also developed which can access the progress of work.

7. Which of the following can be used to generate navigational messages?

- a) Control station
- b) User segment
- c) Space segment
- d) Delivery segment

Answer: a

Explanation: The generation of the navigational message can be done by using the master control station. The generated signals can be sent to the satellite. It can also provide command and control of the GPS constellation.

8. Ground antennas can be communicated using _____

- a) N-band
- b) K-band
- c) S-band
- d) M-band

Answer: c

Explanation: The satellite to ground antenna communication can be established by using the s-band. The s-band can perform and provide the anomaly resolution with the early orbit support.

9. Satellite segment receives which of the following information?

- a) Signals
- b) Uplink control
- c) Location
- d) Gamma rays

Answer: b

Explanation: Satellite segment receives the uplink control and position data from the ground segment. This can also create time related and satellite position messages, which can be transmitted by using frequencies.

10. Which of the following satellites can use OCS?

- a) LISS-III
- b) IRS-1B
- c) IRS-1A
- d) IIF

Answer: d

Explanation: OCS can be used in the GPS mounted satellites like IIR-M and IIF which are currently in the orbit of rotation. These are having high accuracy GPS tracker which can function better than any other satellites.

This set of Surveying Multiple Choice Questions & Answers (MCQs) focuses on “GPS” Position Determination Principle.

1. Which of the following is having same principle as that of determining the position in GPS?

- a) Compass
- b) Traversing
- c) Trisection
- d) Resection

Answer: d

Explanation: The principle of position determination involves the same principle as that of resection in surveying. It indicates location of a set point by the help of the reference point and then transferring to another point and locating the remaining points. Later, on joining it can end up obtaining the result.

2. Among the following, which indicates the correct set of methods followed for fixing position?

- a) Pseudo ranging, absolute positioning
- b) Carrier wave, pseudo ranging
- c) Absolute positioning, relative positioning
- d) Carrier wave, absolute positioning

Answer: b

Explanation: The methods for fixing the position of an object can be given as using pseudo ranging and usage of carrier wave. Both are having their own importance. Pseudo ranging uses time parameter as its main constituent.

3. Which is the main parameter used in pseudo ranging?

- a) Time
- b) Distance
- c) Velocity
- d) Frequency

Answer: a

Explanation: The position of an object in GPS using pseudo ranging can be done by the calculation time of travel of the signal. It also uses PRN code for decoding the signal related information.

4. GPS user solution depends on which of the following?

- a) Absolute positioning
- b) Satellite vehicle
- c) Space vehicle
- d) Relative positioning

Answer: c

Explanation: GPS user solution may depend either on space vehicle adopted or the time scale information provided. The navigational data provided by the operational control segments involve in determining user solution determination.

5. Satellite generates which type of signals?

- a) Visible rays
- b) X-rays
- c) Cosmic waves
- d) Radio waves

Answer: d

Explanation: In general, the waves generated must possess more wave length so as to satisfy certain parameters. Among the classification of the electromagnetic spectrum, radio waves possess the longest wavelength, which is capable of serving in the process of GPS.

6. Which of the following indicates the principle of GPS?

- a) Resection
- b) Trilateration
- c) Trisection
- d) Traversing

Answer: b

Explanation: Trilateration is the principle involved in the case of GPS. This can be used to track or locate any movable object location. It involves mathematical operations, which is regularly used in case of surveying.

7. Which among the following is used to locate an object?

- a) GPS
- b) GIS
- c) RS
- d) IRS

Answer: a

Explanation: GPS, also known as Global Positioning System, is used in an unusual manner for obtaining the location of the object. The position can be determined by measuring the distance from the satellite.

8. Which of the following can indicate the correct set of GPS segments?

- a) Navigation, space
- b) User, navigation
- c) Control, user
- d) Control, navigation

Answer: c

Explanation: GPS contains three main segments which can be given as user segment, control segment, space segment. The user segment receives the signals from satellites, control segment controls the position of satellite and space segment utilizes navigation system.

9. Which of the following segments can use GPS receiver?

- a) Navigation segment
- b) Space segment
- c) Control segment
- d) User segment

Answer: d

Explanation: The usage of GPS receiver is done by the user segment, which receives signals from the GPS satellites and can be used to determine how far away it is from the satellite.

10. Which of the following indicate the functioning of the Space segment?

- a) Navigational signals
- b) Space signals
- c) User signals
- d) Control signals

Answer: a

Explanation: The functioning of the space segment is to use the navigational signals and retransmit the navigational message sent by the control segment. These can be controlled by atomic clocks placed on the satellites.

This set of Surveying Questions & Answers for Exams focuses on “GPS” Determining Satellite to User Range.

1. In pseudo ranging, travel time is measured by _____

- a) PRN code
- b) Noise code
- c) SPS
- d) GPS

Answer: a

Explanation: GPS can generate PRN codes that indicate Pseudo Random Noise. It is transmitted along with the signal. While travelling along with the signal, it is capable of determining the travel time of the signal which is correlated with the reference PRN codes for processing.

2. Satellite to user range can be calculated by using which of the following methods?

- a) Relative positioning
- b) Absolute positioning
- c) Carrier wave
- d) Pseudo ranging

Answer: d

Explanation: Pseudo ranging is the measure of distance between satellite and the receiver antenna. It can refer the time of emission and reception of codes by which the satellite and user range can be detected and further used in many cases.

3. For obtaining relative time of transmission and reception of signals, it is required to calculate clock offset.

- a) False
- b) True

Answer: b

Explanation: Clock offset must be placed in the satellite containing GPS so that it can be able to compute the relative time of transmission and reception of radio signal. By knowing this, the satellite to user range can be defined.

4. GPS can also be known as _____

- a) GOS
- b) Arc GIS
- c) GIS
- d) NavStar

Answer: d

Explanation: The Global Positioning System can also be determined as NavStar. The main functioning of GPS is to track the location of the specified place or object using the satellites and the receiver.

5. Determine the distance between satellite and user if the time difference can be calculated as 3 min.

- a) 54×10^{19} m
- b) 45×10^2 m
- c) 54×10^9 m
- d) 45×10^9 m

Answer: c

Explanation: The distance between satellite and user can be determined by using the formula,

Distance = speed of light * time difference

Distance = $3 \times 10^8 \times (3 \times 60)$ m

Distance = 54×10^9 m.

6. In order to determine the satellite to user range, which of the following is exceptionally required?

- a) Time difference of polarized signals
- b) Time difference of signals
- c) Time difference of refracted signals
- d) Time difference of reflected signals

Answer: b

Explanation: For the determination of the satellite to user range, the time difference between the signal sent and the signal received is compulsory. This can be recorded only if there is a signal. So, for determining range a precise signal is necessary.

7. Almanac contains information about _____

- a) Status of the signals
- b) Status of the reflection
- c) Status of the satellites
- d) Status of the aperture

Answer: c

Explanation: The determination of data by GPS involves two procedures almanac and ephemeris. Almanac contains information about the status of the satellites and the approximate orbital information.

8. Trilateration is a plane surveying method.

- a) False
- b) True

Answer: b

Explanation: Trilateration is the basic principle involved in the GPS surveying. This was originally used in case of basic surveying, where the calculation involves a couple of mathematical operations.

9. Accuracy of the position through can be influenced by _____

- a) Refraction
- b) Reflection
- c) Signal strength
- d) Position of satellite

Answer: d

Explanation: There are certain factors which can affect the accuracy of the position obtained by GPS. Those include the position of satellite, atmospheric conditions, satellite clock errors and ephemeris errors.

10. Error in altitude will be twice the horizontal error.

- a) True
- b) False

Answer: a

Explanation: The error in the accuracy of GPS can also be caused due to the increase in altitude of the satellite. The error caused due to the horizontal increase in distance is less when compared to altitude error.

This set of Surveying Multiple Choice Questions & Answers (MCQs) focuses on “GPS” Calculation of User Position.

1. Which of the following is necessary for further processing in code based positioning?

- a) Frequency
- b) Carrier wave
- c) Receiver clock error
- d) Satellite

Answer: c

Explanation: In pseudo ranging, code based positioning takes place, which needs a certain parameter to continue further. Those include receiver clock error and the position of co-ordinates. By using these, equations can be developed for solving the unknowns.

2. Two satellites are enough for finding accurate position of the object.

- a) False
- b) True

Answer: a

Explanation: GPS is used in finding the location of object. In order to have an accurate location of the object, it is recommended to have at least four satellites in contact of the object to locate the point. Otherwise, it may consume more time for having the output.

3. Carrier phase uses the principle of _____

- a) Compass
- b) Theodolite
- c) EDM
- d) Traversing

Answer: c

Explanation: Carrier phase uses the principle of EDM, where the measurement of phase is done. GPS can measure the difference between the phase of oscillator and receiver satellite. It can attain accuracy up to 3-10 mm.

4. Which of the following can be identified as the correct set for position fixing method?

- a) Carrier phase, relative positioning
- b) Code phase, absolute positioning
- c) Absolute positioning, relative positioning
- d) Code phase, carrier phase

Answer: d

Explanation: In GPS, fixing position plays an important role which must be done with accuracy. So as to attain accuracy, it involves certain methods like code phase and carrier phase.

5. Cycle slip occurs due to change in _____

- a) Wave length
- b) Phase
- c) Frequency
- d) Velocity

Answer: b

Explanation: In a carrier phase, the determination of initial ambiguity is foremost important as it has to measure the carrier phase. Ambiguity must be fixed so that the phase can be locked. If at all the phase loses its lock formation of cycle slip occurs.

6. Kinematic positioning will come under which of the following classification?

- a) Relative positioning
- b) Absolute positioning
- c) Resection method
- d) Carrier wave method

Answer: a

Explanation: Relative positioning involves certain classifications. Those are given as kinematic positioning, static positioning, stop-and-go GPS positioning. Each one can be adopted based on the type of work being done as all of them yield better results.

7. Base receiver is kept stationary in which of the following operations?

- a) Stop-and-go positioning
- b) Kinematic positioning
- c) Fast static positioning
- d) Static positioning

Answer: c

Explanation: Fast static positioning follows the same principle of static positioning. In static positioning, all receivers are kept stationary where as in fast static positioning, only base receiver is kept stationary.

8. If the connection of the number of satellites decreases, the accuracy of the positioning increases.

- a) True
- b) False

Answer: b

Explanation: The accuracy of the position can be improved only if the numbers of satellites connected to the user are more. In general, a maximum of four satellites must be connected to the user for having a better output.

9. Which of the following indicates the correct set of GPS data classification?

- a) Almanac and ephemeris
- b) Ephemeris and user segment
- c) Ephemeris and space segment
- d) Almanac and user segment

Answer: a

Explanation: The GPS data has been classified so as to have a correct idea about the work going on. The classification includes almanac and ephemeris. This data is continuously transmitted by the GPS satellites and the GPS receivers.

10. The GPS time must be very accurate.

- a) True
- b) False

Answer: a

Explanation: For the calculation of the time that the GPS signal took, we need to have an accurate time of the signal. The GPS satellites possess atomic clocks, which are able to keep the time very precise. Sometimes it is not feasible to set an atomic clock.

This set of Surveying Multiple Choice Questions & Answers (MCQs) focuses on “GPS Surveying Techniques”.

1. Which of the following can be affected by atmospheric path disturbances?

- a) Modern GPS surveying
- b) Conventional GPS
- c) Absolute positioning
- d) Resection method

Answer: a

Explanation: Modern GPS surveying can be affected by atmospheric conditions. It can produce more accuracy in its output when compared to pseudo ranging method. This method costs more and is effective for engineering applications.

2. Which among the following can be described as an application of pseudo ranging?

- a) Computation of distance between satellite and user
- b) Computation of distance between GPS antenna and satellite
- c) Computation of distance between GPS antenna and user
- d) Computation of distance between satellite and object

Answer: b

Explanation: Application of pseudo ranging involves in computing distance between GPS antenna and satellite by correlation between transmitted code and reference code. It needs synchronization between transmitter and receiver clock signal.

3. By using pseudo ranging method, two dimensional and three dimensional GPS positions can be located.

- a) True
- b) False

Answer: a

Explanation: In the process of pseudo ranging, at least four observations are taken. By using these, the solution of 2D and 3D GPS positions can be determined. But in general, only three are required for 2D GPS positions.

4. Which of the following error occurs due to atmospheric conditions?

- a) Natural error
- b) User error

- c) Propagation error
- d) Signal multipath error

Answer: d

Explanation: Signal multipath is an error in GPS tracking, which is generated by atmospheric interference errors. It can be expressed in terms of the reflected signal from geographic based buildings, high rocks.

5. Which of the following is not used in the tracking system?

- a) Multiple frequency
- b) Dual frequency
- c) Single frequency
- d) Military navigation

Answer: a

Explanation: The GPS surveying includes tracking system, off which the civilian navigation, military navigation, single frequency and the dual frequency are used. These possess carrier waves which can be used for further processing of the function.

6. Which of the following doesn't belong to the relative positioning techniques?

- a) Real-time kinematic technique
- b) Viscous GPS technique
- c) Kinematic GPS surveying technique
- d) Differential GPS technique

Answer: b

Explanation: The relative positioning technique involves static and kinematic GPS surveying technique, differential GPS technique, and real-time kinematic technique. These are to be identified before conducting the GPS surveying method.

7. Which of the following classes of positioning technique possess high precision?

- a) GPS
- b) Viscous technique
- c) Real time technique
- d) Kinematic technique

Answer: d

Explanation: The real time kinematic technique is having a high precision, which use carrier phase measurements in the instantaneous positioning mode. It is considered as the most powerful GPS positioning technology.

8. Which among the following indicates the correct set of static GPS surveying technology classification?

- a) Long and normal base lines
- b) Medium and short baselines
- c) Long and short baselines
- d) Normal and short base lines

Answer: c

Explanation: The classification of the static GPS surveying involves long baseline GPS technique and Short baseline GPS technique. Both are determined based on the length of the base line taken into consideration.

9. What will be the length of the base line in case of short baseline method of GPS surveying?

- a) Less than 50km
- b) Greater than 50km
- c) Less than 2km
- d) Greater than 100km

Answer: a

Explanation: In the case of short baseline of GPS surveying, baselines would be typically less than 50km. they can support the control network applications with data processing packages.

10. Which of the following is considered as modern GPS technology?

- a) GIS
- b) GPS mode
- c) Instantaneous mode
- d) Kinematic positioning technique

Answer: d

Explanation: Among the different GPS surveying techniques available, the kinematic positioning technique is

considered as the modern GPS surveying technology. It requires the usage of all the specialized hardware and software as well as new field procedures.

This set of Surveying Multiple Choice Questions & Answers (MCQs) focuses on "GPS Accuracy".

1. Which among the following is more accurate in its output?

- a) Absolute positioning
- b) Resection method
- c) Modern GPS surveying
- d) Conventional GPS method

Answer: d

Explanation: Though there might be an improvement in modern GPS surveying, it lags behind the conventional GPS method in terms of accuracy. Conventional GPS methods serve as an ideal method for obtaining accurate output by having less impact of the orbital error.

2. Absolute positioning is not useful in precise GPS.

- a) False
- b) True

Answer: b

Explanation: Absolute positioning is not much recommended in case of precise GPS because of the fact that it lacks accuracy in its output. It can find its application in case of military areas and in the commercial GPS system.

3. Precise positioning service is having an accuracy range of _____

- a) 1-5 m
- b) 5-9 m
- c) 10-12 m
- d) 15-20 m

Answer: c

Explanation: Precise Positioning Service is equipped with a receiver which is able to track P-code. Its accuracy range is about 10-12 m which receives single frequency, with more precision in output.

4. Which of the following indicates the correct set of classification for absolute positioning?

- a) Carrier wave, pseudo range
- b) Pseudo range, SPS
- c) SPS, carrier wave
- d) Absolute positioning, SPS

Answer: a

Explanation: Absolute positioning involves a huge procedure which is sub divided into categories. Those include usage of the carrier wave and usage of pseudo range. Based on the type of work carried out, these are employed.

5. Which of the following process is adopted in case of navigation system?

- a) SPS
- b) Carrier wave
- c) Relative positioning
- d) Pseudo ranging

Answer: d

Explanation: Pseudo ranging can be adopted in case of navigation because it contains reference systems, which must be defined and maintained without direct access to the origin. Carrier wave fails in this case.

6. Which process can obtain more accuracy in position?

- a) Carrier wave method
- b) Absolute positioning
- c) Relative positioning
- d) Resection method

Answer: c

Explanation: Relative positioning is capable of delivering the accuracy in its output as it takes observations with respect to one another. This process is beneficial for differentiating horizontal geodetic network.

7. Which of the following will affect the accuracy of the GPS positioning?

- a) Receiver station
- b) Strength of signal
- c) Position of satellite

d) Atomic clock

Answer: a

Explanation: The GPS accuracy depends upon the receiver station and the atmospheric conditions. In case of dull atmosphere, the information transmitted cannot reach the receiver end at a full length.

8. Which among the following can act as a cause wrong GPS tracking?

- a) Refraction of signal
- b) Strength of signal
- c) Atomic clock
- d) Reflection of satellite signals

Answer: d

Explanation: It is known that sometimes GPS shows wrong placement of the location tracked. This is due to blockage of the satellite signal by buildings, reflection of satellite signals, jamming of the signals.

9. The accuracy speed of the GPS depends on _____

- a) Reflection of signal
- b) Signal blockage
- c) Refraction of signal
- d) Position of satellite

Answer: b

Explanation: The factors which can affect the accuracy speed of the signal include satellite geometry, signal blockage, atmospheric conditions and receiver design quality. All of these can create a huge impact on the speed of accuracy of the signal.

10. The clock used in GPS will synchronize to _____

- a) Greenwich
- b) ITC
- c) UTC
- d) IS

Answer: c

Explanation: GPS uses an atomic clock which can help in recording the time of signal receiving and transferring. This needs to be in sync with the Co-ordinated Universal Time (UTC) which is maintained by the U.S. This helps the time recording process at the ground station too.

This set of Surveying Multiple Choice Questions & Answers (MCQs) focuses on “Hydrographic Survey” Introduction.

1. Which of the following does not describe the use of hydrographic surveying?

- a) Laying an Alignment
- b) Making underground investigations
- c) Nautical charts for navigation
- d) Establishing mean sea level

Answer: d

Explanation: Hydrographic surveying can find its use in making nautical charts for navigation, making underground investigations for construction, establishing mean sea level, determining shore line etc.

2. The process of measuring depth below the water surface is called _____

- a) Sounding
- b) Chaining
- c) Traversing
- d) Compass traversing

Answer: a

Explanation: Sounding indicates the process of measuring depth below the water surface. It involves calculation of the time travel by the sound waves. This can reduce the manual power and can have an enhanced report.

3. Which among the following can be possessed by the horizontal control?

- a) Chaining
- b) Triangulation
- c) Theodolite
- d) Compass

Answer: b

Explanation: The horizontal and vertical control can possess either triangulation or a traverse. This is considered as the preliminary survey procedure as it can be done for second or third order triangulations which can be used as a main control.

4. Transit tape is used in case of small survey.

- a) False
- b) True

Answer: b

Explanation: In case of small scale surveys, the triangulation will be more than required and usage of tape is preferred over it. This can have an advantage in economic perspective and also in terms of obtaining result.

5. Gauge readings are obtained after _____

- a) Compass survey
- b) Chaining
- c) Sounding
- d) Traversing

Answer: c

Explanation: After the completion of the sounding procedure, the next step involved is figuring gauge readings. Gauge reading is taken because of the continuous change in level of water, which might affect the result of the survey.

6. Which of the following doesn't come under the category of shore line survey?

- a) Delineation of shore line
- b) Location of shore details
- c) Determination of the low and high water lines
- d) Sounding

Answer: d

Explanation: Shore line survey involves in the delineation of shore line, location of shore details and their prominent features and in the determination of the low and high water lines for spring tides.

7. Which among the following doesn't indicate the purpose of sounding?

- a) Volume measurements
- b) Nautical charts for navigation
- c) Making sub-aqueous investigations
- d) Measurement of area

Answer: a

Explanation: Sounding is conducted in order to make nautical charts for navigation, measurement of area which are subjected to scour and making sub-aqueous investigations which is needed to secure the information of construction.

8. What will be the salinity of the sea water if the temperature of the sea water is about 45°C and the velocity of sound is given as 1678 m/s?

- a) 314.62
- b) 214.62
- c) 134.62
- d) 143.62

Answer: c

Explanation: From the relation, $V = 1410 + 4.21 * T - 0.037 * T^2 + 1.14 * S$. we can calculate the salinity content. On substitution, we get

$$1678 = 1410 + 4.21 * 45 - 0.037 * 45^2 + 1.14 * S$$
$$S = 134.62.$$

9. Among the following, which is having more prominence while conducting sounding?

- a) Labor
- b) Signal
- c) Sounding pole
- d) Suitable climatic conditions

Answer: c

Explanation: Sounding involves in measuring the depth of water below the water surface, which requires certain equipments like, sounding boat, lead lines, fathometer, sounding machine, sounding pole.

10. What is length of the sounding rod or pole?

- a) 7-8 m
- b) 5-8 m
- c) 10-18 m
- d) 15-18 m

Answer: b

Explanation: Sounding rod or pole, which is used in case of sounding process, is having a length of 5-8 m with 5-8 cm diameter. They are suitable for shallow and quiet water areas, where the rod is visible for placing.

11. The velocity of sound in sea can be determined by _____

- a) Refraction
- b) Reflection
- c) Polarization
- d) Sounding machine

Answer: d

Explanation: Sounding process involves certain machines, which record the velocity of the sound waves produced. The machine can be named as sounding machine, which was invented by Weddell.

12. Determine the velocity of the sound in sea water if the surface temperature can be given as 32°C and the salinity is given as 2.43.

- a) 1590.6 m/s
- b) 1509.6 m/s
- c) 5109.6 m/s
- d) 1590.9 m/s

Answer: b

Explanation: The velocity of the sound in sea water can be determined by using the formula,

$$V = 1410 + 4.21 \cdot T + 0.037 \cdot T^2 + 1.14 \cdot S. \text{ on substitution, we get}$$

$$V = 1410 + 4.21 \cdot 32 + 0.037 \cdot 32^2 + 1.14 \cdot 2.43$$

$$V = 1509.6 \text{ m/s.}$$

13. Find the value of the surface temperature, if the velocity of the sound in sea water can be given as 2000 m/s and the salinity as 5.32.

- a) 57°C
- b) 75°C
- c) 52°C
- d) 72°C

Answer: a

Explanation: From the velocity of the sound of sea water relation, we can determine the surface temperature. The relation is given as $V = 1410 + 4.21 \cdot T + 0.037 \cdot T^2 + 1.14 \cdot S$. on substitution, we get

$$2000 = 1410 + 4.21 \cdot T + 0.037 \cdot T^2 + 1.14 \cdot 5.32$$

$$T = 57^\circ\text{C (approximately).}$$

This set of Surveying Multiple Choice Questions & Answers (MCQs) focuses on "Hydrographic Survey" Rain Gauging.

1. Rain gauge is used for _____

- a) Hydrological survey
- b) Measuring precipitation
- c) Marine survey
- d) River survey

Answer: b

Explanation: Rain gauge is used by the meteorologists for measuring the amount of precipitation over the time period considered. The instrument gives the best result when it is placed in an open area.

2. Rain gauge is expressed in terms of _____

- a) Decimeters
- b) Meters
- c) Centimeters
- d) Millimeters

Answer: d

Explanation: The amount of precipitation measured in terms of the height of the precipitated water accumulated in the container per given time and is expressed in terms of millimeters.

3. Calculate the total rainfall in an interval, where volume of the bucket is taken as 24cu. m and time interval $N = 3$.

- a) 72cu. m
- b) 2cu. m
- c) 27cu. m
- d) 72sq. m

Answer: a

Explanation: The total rainfall in the given interval is determined by using the formula,

Rainfall = $N \times v$. on substitution, we get

Rainfall = $3 \times 24 = 72\text{cu. m}$.

4. Find the least count of the instrument used in case of rainfall determination, if the volume of the bucket is 50cu. m and the area of the funnel is about 21 sq. m.

- a) 3.38 m
- b) 2.83 m
- c) 2.38 m
- d) 4.38 m

Answer: c

Explanation: The least count of the instrument can be given as

$K = v / A$. on substitution, we get

$K = 50 / 21 = 2.38 \text{ m}$.

5. What would be the rate of rainfall if the value of N can be given as 2 and the difference in time can be given as 24 sec with the L.C of the instrument as 1m?

- a) 50m-sec
- b) 48m-sec
- c) 42m-sec
- d) 49m-sec

Answer: b

Explanation: The rate of rainfall can be determined by using the formula,

$R = N \times k \times I \times t$. On substitution, we get

$R = 2 \times 1 \times 24$

$R = 48\text{m-sec}$.

6. Tipping bucket used in the rain gauge will turn under the action of _____

- a) Battery
- b) Hand movement
- c) Gravity
- d) Motor

Answer: c

Explanation: Tipping bucket is provided in the rain gauge for collecting the required amount of rainfall needed for measurement of the precipitation in the atmosphere. After being filled to the maximum level, the tipping bucket will turn under the action of gravity.

7. Which of the following rain gauge equipment is used in case of remote areas?

- a) Reflective rain gauge
- b) Acoustic rain gauge
- c) Optical rain gauge
- d) Tipping bucket

Answer: d

Explanation: Due to the unavailability of the machinery and all other equipments in the remote areas, tipping bucket method can find its advantage. It requires no machine interpretation and is able to deliver accurate value for measuring precipitation.

8. Rain gauge is also known as _____

- a) Udometer
- b) Opto meter
- c) Luda meter
- d) Rio meter

Answer: a

Explanation: The equipment which involves in the determination of the precipitation levels in the atmosphere is termed as a rain gauge. It is also known as ombro meter or the udometer based on the area it is in use.

9. Which of the following will not come under the classification of rain gauge?

- a) Tipping bucket gauge.
- b) Reflective rain gauge
- c) Optical rain gauge
- d) Acoustic rain gauge

Answer: b

Explanation: Rain gauge has been classified based on the type of work being conducted to adapt the situations. Those include optical rain gauge, acoustic rain gauge and tipping bucket gauge.

10. Acoustic rain gauge can also be known as _____

- a) Hydro gauge
- b) Hydro remote
- c) Hydrophone
- d) Hydro cable

Answer: c

Explanation: Acoustic rain gauge is also referred as a hydrophone, is able to sense the sound signature from each drip of rainfall that strikes the surface. It is possible to invert the underground sound field to estimate the drop size distribution.

This set of Surveying Multiple Choice Questions & Answers (MCQs) focuses on “Hydrographic Survey” Marine Survey.

1. Which of the following survey is adopted while inspecting a vessel and the systems of boats?

- a) Marine survey
- b) Rain gauge survey
- c) River gauge survey
- d) Land survey

Answer: a

Explanation: Marine survey involves in the inspection of the vessel and the systems of the boats. This involves an overall inspection which is done for having a better journey in the boat and also helps in the underground construction works.

2. Which of the following devices can be used in marine survey?

- a) RS
- b) GPS
- c) GIS
- d) RMS digital multi-meter

Answer: d

Explanation: The marine survey involves certain high technological devices like, RMS digital multi-meter, bore scopes, ultrasonic testing instruments and thermo-imaging camera.

3. The time range of marine survey can be given as _____

- a) 3-18 hrs
- b) 2-8 hrs
- c) 3-8 hrs
- d) 13-18 hrs

Answer: c

Explanation: In general, the entire process of marine survey will take 3-8 hrs. During this period, it undergoes certain important measurements which are later used in the determination of the survey output.

4. Time range of the marine survey will depend on _____

- a) Strength of signal
- b) Size of boat
- c) Atomic clock
- d) GPS location

Answer: b

Explanation: The time of completion of the marine survey depends up on the size of boat and its condition. If the boat is clean and simple, the time range will reduce and will have a great positive effect on the result.

5. Yacht survey involves in _____
- a) Detailed inspection of the boat
 - b) Detailed inspection of the boat
 - c) Detailed inspection of the boat
 - d) Detailed inspection of the boat

Answer: a

Explanation: Yacht survey or the boat survey is simply the detailed inspection of the boat, which must be done by an experienced surveyor. The vessels used in case of boat are surveyed for having a better scope.

6. Which of the following will not come under the marine surveying category?
- a) Cargo survey
 - b) Water survey
 - c) Yacht survey
 - d) Machinery survey

Answer: b

Explanation: Marine surveying involves certain classifications which can be given as yacht survey, machinery survey and cargo survey. All these are under the roof of marine surveying, which done to improve the benefit of the instrument or object used.

7. Which of the following indicates the necessity of the marine surveying?
- a) To have an idea about the still water features
 - b) To have an idea about the water features
 - c) To have an idea about the ground water features
 - d) To have an idea about the underwater features

Answer: d

Explanation: The main purpose of conducting marine surveying is to have an idea about the underwater features, which are used while under water construction and it is also applied in case of boat designing.

8. The problems occurred in the boat can be mitigated by _____
- a) Rain survey
 - b) Vehicle survey
 - c) Marine survey
 - d) Water survey

Answer: c

Explanation: Marine survey involves yacht survey, which completely involves about the designing and functioning of the boat. This can clear the problems occurred in boat functioning and makes it sustain further.

9. Cargo surveying involves in _____
- a) Calculation of the cargo's efficiency
 - b) Calculation of the cargo's volume
 - c) Calculation of the cargo's area
 - d) Calculation of the cargo's turbulence

Answer: b

Explanation: Cargo surveying is a specialized branch of marine surveying, which focuses on the measurement and calculation of the cargo's volume for stowage purposes and verify its condition by recording all visible damages.

10. Marine surveying is a necessary in case of boat designing.
- a) True
 - b) False

Answer: a

Explanation: Marine survey involves certain features which are capable of determining the boat functioning and its capabilities. The main purpose of marine surveying includes the processing of an errorless functioning boat, which can be used while underground surveying.

This set of Surveying Multiple Choice Questions & Answers (MCQs) focuses on "Railway Project Survey".

1. Which of the following is not a stage of railway line survey procedure?
- a) Marine survey
 - b) Reconnaissance survey
 - c) Selection of good alignment
 - d) Preliminary survey

Answer: a

Explanation: Railway line surveying involves various important steps like reconnaissance survey, selection of good alignment, preliminary survey, marking of tentative alignment and finally survey report.

2. Reconnaissance survey is done in case of railway line alignment.

- a) False
- b) True

Answer: b

Explanation: Reconnaissance survey is a study of entire area which may be a land, road or an air field. The purpose of this is to eliminate the sides which are unfeasible, which is important in case of railway alignment.

3. Which of the following must be considered while laying an alignment?

- a) Tectonic plate movements
- b) Terrain
- c) Line of sight
- d) Population

Answer: d

Explanation: Laying of alignment for a railway line involves various considerations like population, bridges, and tunnels, gradient and contour of the area. It also involves a deep study of in and around the area of consideration.

4. Alignment considered must be _____

- a) Wide
- b) Long
- c) Short
- d) Broad

Answer: c

Explanation: The determination of alignment will play a major role in determining the railway line. The alignment considered should be as short as possible in order to avoid further complications and also we can extend any further if required.

5. While designing an alignment number of curves should be more.

- a) False
- b) True

Answer: a

Explanation: The alignment considered for a railway line must be as straight as possible and the number of curves must be minimized. This is so because the provision of curves leads to overturning of the train.

6. Which of the following is used while selecting an alignment for railway line?

- a) compass
- b) Traversing
- c) Theodolite
- d) Soil survey

Answer: d

Explanation: The selection of alignment for railway line requires information like water table level, Soil survey, Determination of magnetic bearings, Culverts and gradients. All of these are used and are required in each and every aspect of designing.

7. Which of the following comes under the preliminary survey of the railway line?

- a) Establishment of R.L
- b) Establishment of bench marks
- c) Establishment of station points
- d) Establishment of intervals

Answer: b

Explanation: The preliminary survey of the railway line consists of several steps like cross level interval, Magnetic bearing, Route survey map, Establishment of bench marks, bearing capacity of soil and water table level.

8. Which process must be adopted before selecting an alignment?

- a) Compass survey
- b) Traversing
- c) Preliminary survey
- d) Theodolite survey

Answer: c

Explanation: The selection of alignment requires certain preprocessing method like preliminary survey, which is done for obtaining the good alignment without any error.

9. The final survey report consist which of the following?

- a) Angles
- b) Bearings
- c) Alignments
- d) Revenue of the project

Answer: d

Explanation: Final survey report is done after the selection of final alignment. The report includes the introduction of the project, necessity of the project, justification of the alignment selected, revenue of the project etc.

10. Along with the final report which of the following are to be attached?

- a) Culverts
- b) Route survey map
- c) Instrument details
- d) Bearings

Answer: b

Explanation: Besides the final survey report some maps with suitable scale are to be attached. Those include route survey map, longitudinal section of the alignment, map of the station yards and the drawings of culverts buildings etc.

11. While doing final alignment survey, which of the following must be taken into consideration?

- a) Level crossing
- b) Angles
- c) Gradient
- d) Bearings

Answer: a

Explanation: The final alignment survey involves certain proceedings like fixing of station yards, level crossing, bridge provision places, tangents of the points of curvature and compensation of properties.

12. While handling railway line project, which factor must be given first priority?

- a) Plan of the project
- b) Nearby areas
- c) Alignments
- d) Economic factor

Answer: d

Explanation: During the construction of any project, economic factor must be given first priority since it can decide future of any project. The material selected while construction will determine the economy of the project. In case of railway line project, the length of alignment will determine the cost of construction.

13. Which of the following will be used in case of a reconnaissance survey?

- a) STAAD Pro
- b) Revit
- c) Aerial photographs
- d) GIS

Answer: c

Explanation: Reconnaissance survey involves studying of the area whether it may be road or air field the output of this survey will determine the feasibility of the land. The usage of existing maps and aerial photographs can act as an added advantage.

14. The alignment selected can be certified as good if _____

- a) Less number of vertical curves are present
- b) More number of vertical curves are present
- c) Less number of gradient curves are present
- d) More number of horizontal curves are present

Answer: a

Explanation: The certification of the good alignment can be done on the basis of certain factors like economic factor, earth excavation factor, presence of less number of vertical curves and the location of station yards.

This set of Surveying Multiple Choice Questions & Answers (MCQs) focuses on "Road Project Survey".

1. Which of the following must be considered while conducting a road survey?

- a) Density
- b) Alignment of the curves
- c) Specific gravity
- d) Atmospheric condition

Answer: b

Explanation: Road survey is conducted for having a better output with the right alignment of the curves. The placement of the curve must be noticed while determining the alignment. Consideration of slopes is an important task while handling road survey.

2. Skid resistance is calculated while conducting road survey.

- a) True
- b) False

Answer: a

Explanation: The determination of skid resistance is must be done while conducting a road survey because this determines the efficiency of the road. The application of skid resistance can be calculated by the amount of super elevation provided.

3. Which of the following indicates the objective of road survey?

- a) Specific gravity
- b) Density
- c) Pavement design
- d) Detailed layout of road way

Answer: d

Explanation: The main objective of road survey is to have detailed layout of road way, observation of potholes, speed breakers and determination of loss of effective width at different locations.

4. Density of the road is not taken into consideration.

- a) True
- b) False

Answer: b

Explanation: The determination of density of road plays a major role in the lifespan of the road. If the density is more the average life span of the road will increase and vice-versa. The decrease in density is due to the formation of pot holes.

5. Which of the following will come under the manual method of road survey?

- a) GIS
- b) Walking and windshield survey
- c) Walking survey
- d) Windshield survey

Answer: c

Explanation: Road survey can be done either in manual method or by an automatic method. The manual methodology includes walking survey, windshield survey and the combination of both.

6. Which of the following software's can be useful while conducting road survey?

- a) GIS
- b) RS
- c) STAAD Pro
- d) Revit

Answer: a

Explanation: Among the following, GIS can be used in the process of Road survey. It is having the properties of the classification methods which can be accessed to have a better result.

7. Which of the following road survey method is a time consuming method?

- a) Walking and windshield survey
- b) Walking survey
- c) Windshield survey
- d) GIS

Answer: b

Explanation: Among all the methods available, the walking survey is a tedious procedure and involves walking on

the pavement for taking observations. Even though it is a lengthy procedure, it is proven as the best method for an accurate result.

8. Which of the following procedure involves both technological and human interpretation?

- a) GIS
- b) Windshield survey
- c) Walking survey
- d) Walking and windshield survey

Answer: d

Explanation: Manual method is sometimes elected as the best method based on the conditions and the output obtained. In the manual methods available, a combination of walking and windshield survey involves usage of both technological and human activities.

9. Among the interpretation methods available, which is opted as the best?

- a) STAAD Pro
- b) RS
- c) GIS
- d) Walking survey

Answer: c

Explanation: Road survey can be done either manually or by machine. Both are capable of giving the best results. But in terms of time, the automatic methods are chosen. Among them, GIS method is the best as the interpretation is easy and accurate.

10. Which of the following is included in the road project survey report?

- a) Location
- b) Terrain
- c) Slope
- d) Gradient

Answer: a

Explanation: After completion of the road survey, a report has to be submitted to clarify certain things regarding the selection of alignment. It includes observation details, justification, location, time and date, duration etc.

This set of Surveying Multiple Choice Questions & Answers (MCQs) focuses on “Hydrographic Survey”
River Gauging

1. River gauge is used to measure _____

- a) Still level
- b) Water level
- c) Turbulence
- d) Current

Answer: b

Explanation: River gauge involves measuring the water level and the water flow. The information provided by the river gauge is used to determine the safety of the paddling of our time of interest.

2. Which of the following instrument uses a rating curve?

- a) River gauge
- b) Rain gauge
- c) Tipping bucket
- d) Marine gauge

Answer: a

Explanation: Rating curve is used in case of river gauge. Rating curve can be given as the functional relation between stage and the discharge, which is determined by making repeated discrete measurements.

3. Rating curve can be used for _____

- a) Reflecting signal
- b) Determining strength of signal
- c) Stage measurements
- d) Polarization of signal

Answer: c

Explanation: Rating curve established by discrete measurements of stream flow by velocimeter, which can be used at the stage measurements to determine the volumetric stream flow discharge.

4. Which of the following constructions are used in the case of the application of river gauge?

- a) Culverts
- b) Bridges
- c) Dams
- d) Weirs and notches

Answer: d

Explanation: Hydraulic structures like weirs, notches are used in the application of river gauge. The usage of these will improve the reliability of the water level and allows a surrogate flow of water.

5. Which of the following equipment is used in stream gauge?

- a) Stilling well
- b) Ultrasonic device
- c) Par shall fume
- d) Stage encoder

Answer: a

Explanation: Stream gauge involves the usage of cable ways and stilling well. Cable ways are used for suspending a current meter whereas, stilling well is used to provide calm water level.

6. Which of the following doesn't come under the classification of water level gauge?

- a) Ultrasonic device
- b) Par shall fume
- c) Stage encoder
- d) Electro-magnetic gauge

Answer: b

Explanation: A water level gauge usually involves certain classifications like staff gauge, water pressure measuring device, stage encoder and electro-magnetic gauge. The main purpose of these is to visualize the water depth but at different scenarios.

7. Current meter is used in case of _____

- a) Ultrasonic device
- b) Staff gauge
- c) Stage encoder
- d) Electro-magnetic gauge

Answer: d

Explanation: Electro-magnetic gauge involves the determination of the discharge measurement of a stream. For obtaining the result, a current meter is used which can establish a stream gauge.

8. Which of the following classification of water level gauge can measure the water level?

- a) Stage encoder
- b) Electro-magnetic gauge
- c) Ultrasonic device
- d) Staff gauge

Answer: c

Explanation: All the water level gauges are capable of measuring water depth but, ultrasonic device is capable of determining the water in a stilling well or directly in a canal.

9. A potentiometer is used in stage encoder.

- a) True
- b) False

Answer: a

Explanation: Stage encoder is a classification of water level gauge, which is installed with a potentiometer to a wheel and pulley system. It is placed on the stilling well, which can provide the electronic measurement.

10. Which of the following is used for suspending a hydro grapher?

- a) Cloth tape
- b) Cable ways
- c) Wires
- d) Suspenders

Answer: b

Explanation: Hydro grapher is used in case of the river gauge equipment which is capable of determining the high flow measurement. It is suspended in the flow of water by using cable ways.

This set of Surveying Multiple Choice Questions & Answers (MCQs) focuses on "Flow Irrigation Survey".

1. Which of the following is a classification of irrigation survey?

- a) Direct method
- b) Weir method
- c) Notch method
- d) River method

Answer: a

Explanation: Irrigation survey project can be classified into direct and indirect methods. Each of these classifications can be explained under certain sections. Both are applied in case of surface water schemes, sanitary water scheme etc.

2. The area that can be irrigated by a canal can be determined as _____

- a) Canal area
- b) Paddy area
- c) Irrigated area
- d) Commanded area

Answer: d

Explanation: Commanded area is the area that can be irrigated by a canal system which can be either gross command area or culturable command area. The application of both of these depends upon the area that has to be irrigated.

3. Percentage of irrigation proposed to be irrigated annually yields _____

- a) Density of irrigation
- b) Intensity of irrigation
- c) S.G of irrigation
- d) Extent of irrigation

Answer: b

Explanation: Intensity of irrigation deals with the percentage of irrigation to be irrigated annually. In general, the area which has to be irrigated needs to be expressed in percentage of CCA which is able to represent the intensity of irrigation for the crop season.

4. Storage irrigation method is also known as _____

- a) Weir method
- b) Direct method
- c) Indirect method
- d) Notch method

Answer: c

Explanation: Indirect method or the storage irrigation method involves in the irrigation of excess water of a river during monsoon season. This is done to flow the excess water into the river which will be later filled in the reservoir or the tank.

5. Which of the following methods is adopted in case of the flow of excess water?

- a) Weir method
- b) Traverse irrigation method
- c) Direct irrigation method
- d) Storage irrigation method

Answer: d

Explanation: The usage of storage irrigation method is done in case of excess water scheme. This helps in storing the excess water in the upstream side of the dam which is constructed across the river, which is later adopted when flow of river is excess.

6. Which of the following indicates a storage structure?

- a) Dam
- b) Weir
- c) Notch
- d) Culvert

Answer: a

Explanation: A structure can be determined as a storage structure if it is having the ability to store excess water in case of floods. In general dams, spill ways and sluices are considered as the storage structures and also as appurtenant works.

7. Which of the following can be used as a diversion structure?

- a) Dam
- b) Barrage
- c) Reservoir
- d) Culvert

Answer: b

Explanation: A diversion structure involves the change in the direction of flow of stream or river, which can decrease the load or flow of water in a particular direction. Diversion structures generally include a barrage, a canal head and a river training head.

8. Which of the following can be indicated as the classification of the surface irrigation method?

- a) Gradient method
- b) Irrigation method
- c) Flooding method
- d) Drowning method

Answer: c

Explanation: Surface irrigation method generally involves flooding method in which water is allowed to cover the surface of the land in a continuous sheet of water which is sufficient to allow the field to absorb the water for increasing the field capacity.

9. A small basin is adopted in case of _____

- a) Sandy soil
- b) Clay soil
- c) Rocky soil
- d) Metamorphic soil

Answer: a

Explanation: The usage of the basin not only depends upon slope but also on the type of soil it is placed. A small basin is adopted in case of steeper slope of the land, sandy soil, small stream size and small irrigation depth.

10. Flat land can adopt large basins.

- a) False
- b) True

Answer: b

Explanation: The usage of the large basin is done when the slope of the land is flat, presence of clay soil, large stream size, large depth of irrigation and in the presence of a mechanized field.

This set of Surveying Multiple Choice Questions & Answers (MCQs) focuses on “Project Survey” Water Supply Scheme.

1. Which of the following can be identified as the objective of water supply scheme?

- a) Chlorination of water
- b) Treat water
- c) Safe water supply
- d) Ionization of water

Answer: c

Explanation: In general, the objective of water supply scheme includes safe water supply, sufficient quantity of water, supply of water to a convenient point with reasonable cost and encouraging personal and house hold cleanliness of the users.

2. Which of the following indicates the component of a water supply scheme?

- a) Impure water
- b) Chlorination of water
- c) Sub surface water
- d) Intake of the water

Answer: d

Explanation: The protected water supply scheme consists of four components. Those include the source of water from where it is being produced, intake of the water, treatment of the water and finally the distribution of the treated water.

3. Surface water can act as a source of water in water supply scheme.

- a) True
- b) False

Answer: a

Explanation: The source of water is classified as surface water and sub surface water. Generally in the water supply scheme surface water is having more priority than the sub surface water. The different sources of surface water include river, streams, lakes, canals etc.

4. While considering the design period, which must be given more priority?

- a) Area of land
- b) Population
- c) Usage of water
- d) Arrangement of pipes

Answer: b

Explanation: Design period is considered based on the population present in a particular area. While considering design period, population forecast methods has to be used for the determination of the upcoming population in that area. By doing this the design period can be estimated for a particular water tank construction.

5. The design period of storage reservoir can be given as _____

- a) 50 yr
- b) 20 yr
- c) 30 yr
- d) 10 yr

Answer: a

Explanation: Every water storage structure is having certain design periods based on the population present in that particular area. A storage reservoir is generally having a design period of 50 years.

6. Which of the following can be designated as an intake structure?

- a) Culvert
- b) River
- c) Dam
- d) Reservoir

Answer: d

Explanation: Intakes are the structures which can collect water from the surface sources and are used for the treatment plant. Reservoir intake, Lake Intake and canal intakes are some of the examples of an intake structure.

7. Which type of water is generally used in the treatment of water?

- a) Chlorinated water
- b) Treated water
- c) Raw water
- d) Sulphated water

Answer: c

Explanation: Water treatment plant generally uses raw water which is obtained from different sources containing various impurities. It is not recommended to be used directly without treatment and hence it is supplied to the treatment plant for treatment.

8. Which of the following does not act as a major factor that effects per capita demand?

- a) Human activity
- b) Industrial activities
- c) Usage of water
- d) Placement of pipe

Answer: b

Explanation: The factors effecting per capita demand include cost of water, climatic condition, pressure in the distributed system, industrial activities, commercial activities and economical status of the consumers.

9. The amount of water required for 1 percent per day is determined as _____

- a) Daily demand
- b) Monthly demand
- c) Annual demand
- d) Per capita demand

Answer: d

Explanation: Per capita demand can be defined as the amount of water required for 1 percent per day. It includes commercial, industrial, domestic, public uses and also in case of fire demand.

10. Which of the following can act as a type of variation in water demand?

- a) Monthly variation
- b) Annual variation
- c) Crop variation
- d) 10 year variation

Answer: a

Explanation: Variation in water demand is generally due to seasonal variation, monthly variation, daily and hourly variations. The demand for water in these variations is generally high and consumes more amount of water than daily consumption.

This set of Surveying Multiple Choice Questions & Answers (MCQs) focuses on “Project Survey” Sanitary Scheme.

1. Which of the following can act as sanitation technology?

- a) Environmental sanitation
- b) Wet sanitation
- c) Weir sanitation
- d) Notch sanitation

Answer: a

Explanation: A wide range of sanitation technologies are available like container based sanitation, community-led total sanitation, environmental sanitation etc. Each of these is a different approach and is proven best.

2. Which of the following is not a sanitation system?

- a) Storm water drainage system
- b) Solid waste management system
- c) Excreta management system
- d) Night soil sanitation system

Answer: d

Explanation: Sanitation process includes certain system, which are to be monitored for having a clean environment. Those include excreta management system, waste water management system, solid waste management system and storm water drainage system.

3. Disease transmission cycle can be stopped by _____

- a) Wet sanitation
- b) Water usage
- c) Sanitation system
- d) Night soil

Answer: c

Explanation: Improper sanitation can lead to the development of disease transmission. This can be avoided by adopting certain sanitation systems, which are used based on the type of conditions present in and around the area.

4. Which of the following can act as the main transmission element of fecal-oral diseases?

- a) Fungi
- b) Fingers
- c) Fire
- d) Air

Answer: b

Explanation: The transmission of fecal-oral diseases occurs due to the improper maintenance of the sanitation system as well as our surroundings. The objects like fingers, flies, fluids and food can act as a transmitter of diseases.

5. Which of the following places involve the usage of sanitation technology?

- a) Public places
- b) Houses
- c) Open environment
- d) Water treatment area

Answer: d

Explanation: The usage of sanitation technology must be done everywhere. But in case of water treatment areas, this must be adopted for sure as it can be contagious. Installing a sanitation technology can serve as a resistant to disease transmission cycle.

6. Which of the following is involved in a sanitary chain?

- a) Ecological sanitation

- b) Dry sanitation
- c) Waste water collection method
- d) Container-based sanitation

Answer: c

Explanation: Sanitary chain involves everything related to sanitary conditions like user, excreta and the waste water collection methods. Sanitary chain is developed based on the type of conditions present in and around the installed sanitary technology.

7. The transportation of excreta in sealed container is done in _____
- a) Container-based sanitation
 - b) Dry sanitation
 - c) Environmental sanitation
 - d) Ecological sanitation

Answer: b

Explanation: Container-based sanitation involves in the collection of human excreta in a container than can be sealed after filling and can be transported to the treatment unit, for further purposes.

8. Which of the following ended the open defecation practice?
- a) Community-led total sanitation
 - b) Dry sanitation
 - c) Environmental sanitation
 - d) Ecological sanitation

Answer: a

Explanation: The development of community-led total sanitation practice brought a behavioral change in many rural and urban areas by highlighting the importance of sanitation and the defects of improper sanitation.

9. Which of the following is not a type of sanitation practice?
- a) Ecological sanitation
 - b) Community-led total sanitation
 - c) Dry sanitation
 - d) Environmental sanitation

Answer: d

Explanation: Different type of sanitation practices were adopted in India, those include dry sanitation, community-led total sanitation, ecological sanitation, emergency sanitation. The main purpose of all these is proven to be same i.e., being healthy by having proper sanitation methods.

10. Which of the following is used as a transporter of waste to the treatment plant?
- a) Fertilizers
 - b) Bleach
 - c) Water
 - d) Soil

Answer: c

Explanation: In order to reach the treatment plant, waste materials are to be mixed with any other agent. In general, water is considered as that agent because of the fact that it is easily available.

This set of Surveying Multiple Choice Questions & Answers (MCQs) focuses on “Project Survey” Docks, Harbours and Port.

1. Which of the following can be considered as inland water transportation?
- a) Transportation by river
 - b) Transportation by culvert
 - c) Transportation on bridge
 - d) Transportation by barrage

Answer: a

Explanation: Inland transportation includes transportation by river or canal, which is considered only for human transportation. In case of ocean transportation, trade and commerce will be conducted with high flexibility.

2. Which of the following can act as an advantage of water transportation?
- a) Tides
 - b) Less development
 - c) Costly mode of transportation
 - d) Cheap mode of transportation

Answer: d

Explanation: There are many advantages while considering water transportation. Some of those include the provision of defense, cheap mode of transportation, high load carrying capacity, overall development etc.

3. Goods can be transported within less time.

- a) True
- b) False

Answer: b

Explanation: Though it is the cheapest mode of transportation, it is more time consuming process. Its slow operation makes it a time consuming travel and it can lead to accidents in case of storms.

4. A basin which can protect water well from the actions of wind and waves can be designated as _____

- a) Quarry
- b) Basin
- c) Harbor
- d) Port

Answer: c

Explanation: Harbor can be defined as the basin which can protect water well from the actions of wind and waves. This can be along the sea-shore, river estuary, lake or canal, which is connected to the sea shore.

5. Which of the following is considered in case stable floating condition of ship?

- a) Vertical measurement
- b) Horizontal measurement
- c) Linear measurement
- d) Draft

Answer: d

Explanation: For having stability in case of floating a ship in the water, a vertical linear draft is considered. This is immersed in the water surface along with the ship for improving the stability.

6. Which of the following is used as a basis for the classification of harbor?

- a) Protection
- b) Placement
- c) Area
- d) Climatic condition

Answer: a

Explanation: Harbor can be classified based on the protection, utility and the location. Based on the condition of the area present, the harbor must be constructed. It must be able to adapt to the situations and withstand for a longer period.

7. Which of the following will not come under the category of harbor classification?

- a) Natural harbor
- b) Semi artificial harbor
- c) Artificial harbor
- d) Semi natural harbor

Answer: b

Explanation: Under the protection basis, harbor has been classified into 3 types. Those include the natural harbor, semi natural harbor and artificial harbor. These are adopted based on the placement of the sea coast.

8. Bombay harbor will come under the classification of _____

- a) Semi natural harbor
- b) Artificial harbor
- c) Natural harbor
- d) Semi artificial harbor

Answer: c

Explanation: Natural harbor is having a protected inlet from storms and waves, developed by natural land. It can afford safe discharge facility for a ship on sea coast in the form of creek and basins.

9. On what basis a harbor can be designated as natural roadstead?

- a) Semi artificial harbor
- b) Artificial harbor
- c) Navigable channel
- d) Semi natural harbor

Answer: d

Explanation: The presence of navigable channel with a protective natural bank towards seaward can make a harbor as natural roadstead. These are having naturally developed structures rather than manmade structures.

10. Which of the following harbor areas are having artificial protection?

- a) Vishakhapatnam port
- b) Mumbai port
- c) Kakinada port
- d) Yanam port

Answer: a

Explanation: The provision of artificial protection at the entrance is made to the Vishakhapatnam port because it is having protection only on the sides and having more chances of being affected to winds.

This set of Surveying Multiple Choice Questions & Answers (MCQs) focuses on “Project Survey”
Tunnelling

1. Tunneling is required in case of _____

- a) Laying pavement
- b) Laying road
- c) On ground passage
- d) Underground passage

Answer: d

Explanation: Tunnel can be defined as artificial underground passage, which is created for different purposes. It is required in case of highways, railways, sewerage and water supply.

2. The line at which the tunnel wall breaks from sloping outward can be given as _____

- a) Spring line
- b) Oval line
- c) Centre line
- d) Middle line

Answer: a

Explanation: Spring line is determined as the line at which the wall breaks from sloping outward to sloping inward toward the crown. This acts as a barrier between the outward and inward regions.

3. Which of the following should be considered while aligning a tunnel?

- a) Atmospheric conditions
- b) Hydrological conditions
- c) Climatic conditions
- d) Surface limits

Answer: b

Explanation: The determination of the alignment for tunnel can be done based on geological and hydrological conditions, cross-section and length of the continuous tunnel, time of consideration and limit of the surface.

4. Among the following, which doesn't belong to tunnel classification?

- a) Firm ground
- b) Running ground
- c) Rocky ground
- d) Soft ground

Answer: c

Explanation: Tunneling has been classified based on the type of strata present. It includes firm ground, soft ground and running ground. These will determine the bearing capacity of the soil.

5. Which method can be adopted if full face excavation is not possible?

- a) Back bearing method
- b) Plotting
- c) Trenching
- d) Benching

Answer: d

Explanation: In case of no possibility of full face excavation, top heading method is adopted for having a better output. Benching process is also adopted for digging small tunnels.

6. Among the following, which can be adopted for providing support for soft strata?

- a) Bents of aluminum
- b) Bents of iridium
- c) Bents of steel
- d) Bents of plastic

Answer: c

Explanation: The provision of soft strata must be done for withstanding the excavation. It can be provided by bents of wood, bents of steel, liner plates and poling, which are placed to retain material between the adjacent bents.

7. A steel cylinder which is pushed in the soft soil is determined as _____

- a) Jar born
- b) Shield
- c) Rod
- d) Pole

Answer: b

Explanation: In the case of soft grounds, tunneling can be dangerous and cave-ins are common. To prevent this, an iron or steel cylindrical element called shield is placed in the soft soil, which can carve the hole perfectly.

8. Which method can be adopted in case of rock tunneling?

- a) Full face method
- b) Benching
- c) Tracing
- d) Back bearing method

Answer: a

Explanation: Rock tunneling involves the same principle as of the tunneling in the ground. Those include full face method, top heading method and drift method. Based on the conditions of the area, these can be adopted.

9. Which of the following can act as an alternative for blasting?

- a) Tunneling
- b) Continuous blasting
- c) Sequential blasting
- d) Fire-setting

Answer: d

Explanation: Blasting is the conventional method which is adopted in case of rock tunneling. In the case of fire-setting, tunnel is heated with fire and then cooled with water. Rapid expansion and contraction weakens and rock and tends to break.

10. Which of the following involves in the sequence of rocky strata?

- a) Marking profile
- b) Placing rocks
- c) Improving foul gases
- d) Recording values

Answer: a

Explanation: Rocky strata involve usage of blasting method for developing tunnels. The sequence contains marking profile, loading explosive, removing foul gases, checking, scaling, mucking and bolting.

This set of Surveying Multiple Choice Questions & Answers (MCQs) focuses on "Airport Survey".

1. Which of the following can fulfill the objective of the airport survey?

- a) Electric line map
- b) Characteristics of soil
- c) Water line map
- d) Cable line map

Answer: b

Explanation: The purpose of conducting airport survey is to determine the characteristics of soil, land acquisition details, meteorological conditions, determining provision for the future expansion and preparing suitable drawings.

2. Which of the following comes under the category of airport survey?

- a) Cable lines
- b) Electric lines
- c) Poles
- d) Drainage survey

Answer: d

Explanation: Different units are present in airport survey which is categorized as approach zone survey, drainage survey, soil survey, traffic survey, topographical survey and natural resources survey.

3. Which of the following data is used in case of meteorological survey?

- a) Fog intensity
- b) Soil
- c) Rock
- d) Rain

Answer: a

Explanation: The process of meteorological survey involves the collection of data regarding barometric pressure, duration and intensity of the wind, fog intensity, low visibility periods, temperature and rainfall intensity.

4. Which among the following will help in the designing of pavement and airport drainage system?

- a) Marine survey
- b) Topographical survey
- c) Meteorological survey
- d) Soil survey

Answer: c

Explanation: Meteorological survey is applied in case of determining the pavement and drainage system of airport. The accuracy in rainfall at the area of airport construction is needed for the design of pavement.

5. Determination of best location of airport can be done by _____

- a) Topographical survey
- b) Marine survey
- c) Soil survey
- d) Airport survey

Answer: c

Explanation: Soil survey helps in the determination of best land or area for any construction. In the case of airport survey soil survey will play a major role as it requires sufficient information in designing the pavement and in establishing the top and bottom elevations of an embankment.

6. Which among the following comes under the category of soil sampling method?

- a) Deep boring
- b) Test pits
- c) Probing
- d) Workability

Answer: d

Explanation: Soil sampling is a laboratory method of determining the ability and capability of the soil to with stand the structure which is built on it. The soil sampling methods generally include test pits, probing, wash boring, deep boring and geo physical method.

7. Which of the following indicates the characteristic of the soil to be present for any construction?

- a) Color of soil
- b) Density
- c) Specific gravity
- d) Durability

Answer: a

Explanation: The characteristics of the soil can be determined by soil testing methods. The test yields different parameters like color of soil, field moisture, grain shape, presence of fines, state of compaction and specific gravity.

8. The study of features like hills is done in case of _____

- a) Township survey
- b) Topographical survey
- c) Marine survey
- d) Airport survey

Answer: b

Explanation: Topographical survey involves the study of surface features like hills, rivers, levels etc. This is done for having a detailed description of nature of the property, estimation of the excavation quantity and also in the preparation of accurate contour map.

9. Which of the following will come under the preliminary information for airport survey?

- a) Climatic conditions
- b) Surveying methods
- c) Area of the map
- d) Directions

Answer: d

Explanation: In order to conduct an airport survey, certain information must be collected before conducting the survey. Those include maps of the area, directions, duration of wind and the intensity of the wind.

10. Cross wind is perpendicular to the direction of travel.

- a) False
- b) True

Answer: b

Explanation: Cross wind can be designated as a perpendicular component of the wind in the direction of travel. It is considered as the wind that is blown across the runway, during landing and during take offs.

This set of Surveying Multiple Choice Questions & Answers (MCQs) focuses on "Topographic Survey".

1. Which survey involves in the collection of information about the elevation of points?

- a) Topographic survey
- b) Marine survey
- c) Township survey
- d) Road survey

Answer: a

Explanation: Topographic survey involves in the gathering of data of the elevation points of land, which are used in the preparation of contour lines on a plot. It can be able to differentiate man made and naturally occurring lands.

2. Which of the following describes the usage of the topographic survey?

- a) Sanitary line maps
- b) Water line maps
- c) Electric line maps
- d) Topographic maps

Answer: d

Explanation: Topographic survey output is used in case of different fields. Those include the production of topographic maps, construction of topographic profiles and establishing vertical and horizontal control for defining locations.

3. Among the following, which is not a principle of the topographic survey?

- a) Establishing horizontal and vertical control
- b) Orientation of each survey
- c) Orientation of only main station
- d) Work with most accurate methods

Answer: c

Explanation: The general principles of the topographic survey includes the selection of scale in advance, work with most accurate methods, orientation of each survey, establishing horizontal and vertical control.

4. Horizontal distance measurement can be done by using _____

- a) Chaining
- b) Tachymetry
- c) Theodolite survey
- d) Compass survey

Answer: b

Explanation: Tachymetry is adopted in case of topographical surveying for measuring the horizontal distance. This is the optical means of measuring distance using a telescope with a stadia rod.

5. Difference in elevation levels can be determined by using _____

- a) Chaining
- b) Vertical staff
- c) Leveling staff
- d) Level telescope

Answer: d

Explanation: The difference in elevation can be determined by using the level telescope and a stadia rod. It can also be done by measuring the vertical angles and slope distances. These are obtained by calculating the sine of the angle obtained.

6. Which of the following doesn't include in the method of the topological survey?

- a) Vertical distance
- b) Horizontal distance
- c) Direction
- d) Difference in elevation

Answer: a

Explanation: Topological survey involves certain methodology, which can be given as horizontal distance, difference in elevation and direction. Each of these is having certain instrumental usage which makes it best in certain conditions.

7. Vernier scale is used in which of the following methodology?

- a) Horizontal angle
- b) Direction
- c) Vertical angle
- d) Marine survey

Answer: b

Explanation: The usage of vernier scale is done in the direction method of topological survey. This is used for having a precise output in the measurements that are recorded. Compass is used while taking horizontal angles.

8. Which of the following is not a type of horizontal angle used in case of topographic survey?

- a) Bearing
- b) Azimuth
- c) Horizontal angle
- d) Deflection angle

Answer: c

Explanation: In general, topographic survey involves in the usage of different types of horizontal angles, which are given as bearings, azimuth, deflection angle, interior angle. These are used in the calculations of topological survey.

9. Open traverse is used in case of topological survey.

- a) False
- b) True

Answer: b

Explanation: Topological survey uses the different types of traverses among which, open traverse is commonly adopted. This involves surveying from a known position to unknown position.

10. Shape of the earth can act as an error in case of topological survey.

- a) True
- b) False

Answer: a

Explanation: Topological survey can have certain errors related to the shape of the earth (geoid). This is considered only in the case of geological survey but not in plane surveying. Both of these methods will be adopted based on the accuracy of the output.

This set of Surveying Multiple Choice Questions & Answers (MCQs) focuses on "City and Township Surveying".

1. Township survey is also known as _____

- a) Congressional township
- b) Harbor survey
- c) Land survey
- d) Airport survey

Answer: a

Explanation: Township survey is also known as the congressional township, which is used in case of planning and establishing a city or a township. This survey is later subdivided into section lines, which can be virtually assessed.

2. Which of the following indicates the purpose of the township survey?

- a) Establishing boundaries for harbor

- b) Establishing boundaries for government
- c) Establishing boundaries for public
- d) Establishing boundaries for individual land ownership

Answer: d

Explanation: The actual purpose of the township survey is to establish boundaries for land ownership for decreasing the complications any further. The civil township can be applied for local governments.

3. Among the following, which map is necessary for the establishment of the township?

- a) Environmental map
- b) Terrain map
- c) Property map
- d) Area map

Answer: c

Explanation: Township establishment requires a proper map for each and every unit. Those include topographic map, street map, property map, electrification map, telephone line map.

4. Leveling staff is used in the process of city survey.

- a) False
- b) True

Answer: b

Explanation: The preparation maps require proper surveying, which can be achieved by proper instrumental usage. The instruments used in the surveying of city include leveling staff, theodolite, chain, tape, ranging rod etc.

5. Which surveying is the best method in case of preparation of topographic maps?

- a) Plane table surveying
- b) Theodolite surveying
- c) Compass surveying
- d) Traverse surveying

Answer: a

Explanation: The preparation of topographic maps needs more care and must be done with utmost priority. Plane table surveying is adopted in case of topographic map preparation which can cover a large area in short span.

6. _____ scale is used in case of preparation of street maps.

- a) Least
- b) Medium
- c) Small
- d) Large

Answer: d

Explanation: During the preparation of street maps, it is recommended to use large scale than that of the scale used in topographic maps. This is so because street maps involve the division of entire area into sections for quick result.

7. Which among the following can be located by using street maps?

- a) Property points
- b) Elevation points
- c) Pipe lines
- d) Road way line

Answer: c

Explanation: Street maps are used in the location of pipe lines, cable lines, and telephone lines. These are laid in the underground with different colors for easy identification. Important points will be specified with different symbols.

8. Bench marks are located in _____

- a) Electric line maps
- b) Street maps
- c) Road maps
- d) Pipe line maps

Answer: b

Explanation: The location of bench marks is done in case of development of street maps. Street maps use these benchmarks for further references, which can be applied by fly leveling.

9. Property map preparation is done by _____

- a) Least scale

- b) Medium scale
- c) Small scale
- d) Large scale

Answer: d

Explanation: A large scale map like property map is used to connect public and private properties. For establishing boundaries, plane table surveying is used, which is capable of providing accurate value in the output.

10. Which map uses more specific symbols for representation?

- a) Electric line map
- b) Topology map
- c) Water supply map
- d) Property map

Answer: c

Explanation: The usage of symbols is more in case of water supply and sanitary map preparation because it involves some important locations like tunnels, manholes, inspection chambers etc.,