

Code : 011508

B.Tech 5th Semester Examination, 2016

Advanced Surveying

Time : 3 hours

Full Marks : 70

Instructions :

- (i) There are Nine Questions in this paper.
- (ii) Attempt Five questions in all.
- (iii) Question No. 1 is compulsory.
- (iv) The marks are indicated in the right-hand margin.

1. Choose the correct answers of the following (any seven):

2×7=14

- (i) The shortest distance between two places measured along the surface of the earth, is:
  - (a)  length of the parallel between their longitudes
  - (b) length of the equator between their longitudes
  - (c) length of the arc of the great circle passing through them
  - (d) none of the these
- (ii) The point on the celestial sphere vertically below the observer's position, is called:
  - (a)  celestial point

- (b)  nadir
  - (c) zenith
  - (d) pole
- (iii) The station which is selected close to the main triangulation station, to avoid intervening obstruction, is not known as:
- (a) eccentric station
  - (b) pivot station
  - (c)  satellite station
  - (d) false station
- (iv) Systematic errors:
- (a) can be removed by applying corrections to the observed values
  - (b) either make the result too great or too small
  - (c)  are also known as cumulative errors
  - (d)  all of the above
- (v) The necessary geometrical condition for triangulation adjustment, is :
- (a) The sum of the eight angles of a braced quadrilateral should be  $360^\circ$
  - (b) The sum of the angles around a station should be  $360^\circ$

- (c) ✓ The sum of the three angles of a plane triangle should be  $180^\circ$
- (d) All of the above
- (vi) The equation which is obtained by multiplying each equation by the coefficient of its un-knowns and by adding the equations thus formed, is known as:
- (a) Observation equation
- (b) conditional equation
- (c) ✓ normal equation
- (d) none of these
- (vii) Pick up the correct statement from the following:
- (a) Refraction correction is zero when the celestial body is in the zenith
- (b) Refraction correction is  $33'$  when the celestial body is on the horizon
- (c) Refraction correction of celestial bodies depends upon their altitudes
- (d) All of the above
- (viii) The radius of curvature of the arc of the bubble tube is generally kept:
- (a) 10 m
- (b) 25 m
- (c) 50 m

- (d) 100 m
- (viii) The law of weight applicable to the Method of Least squares error, is:
- (a) The weight of the arithmetic mean of a number of observations of unit weight, is equal to the number of observations
- (b) The weight of the sum of the quantities added algebraically is equal to the reciprocal of the sum of the reciprocals of the individual weights
- (c) The weight of the weighted arithmetic mean of a number of observations, is equal to the sum of the individual weights of observations
- (d) ✓ The weight of the product of any quantity multiplied by a constant is equal to the weight of that quantity divided by the square of that constant.
- (ix) The difference of level between a point below the plane of sight and one above, is the sum of two staff readings and an error would be produced equal to:
- (a) twice the distance between the zero of graduation and the foot of the staff

- (b) **the distance between the zero of gradient and the foot of the staff**
- (c) **thrice the distance between the zero of graduation and the foot of the staff**
- (d) **none of the above**
2. **What is a transition curve? Explain the methods used for determining the length of a transition curve? Where are reverse curve provided? Explain the function of a transition curve?** 7
3. **Two straight AI and BI meet at a chainage of 3450 m. A right handed simple circular curve of 250 m radius joins them. The deflection angle between the two straights is  $50^\circ$ . Tabulate the necessary data to layout the curve by Rankine's method of deflection angles. Take the chord interval as 20 m.**
4. **Explain briefly the principle underlying "electronic distance measurement". Write a short note on the errors in EDM. What do you mean by infra-red and microwave EDM instruments? Explain Total station and its importance in surveying.**

Code : 011508

5

5. **What is the different triangulation systems used in a geodetic survey? Enumerate the principles of least squares as applied to observation of equal weight and to those for which different weights are assigned? Why least squares is generally preferred over other adjustment technique ?**
6. **The elevations of two proposed triangulation station A and B, 100 km apart, are 140 m and 416 m above mean sea level, respectively. The elevation of an intervening peak at C, 60 km from A, which is likely to obstruct the line of sight, is 150 m. Ascertain if A and B are inter visible, and if not, find the height required for the scaffold at B so that the line of sight clears C by 3 m.**
7. **Define the following astronomical terms along with diagram (i) Zenith; (ii) Poles; (iii) Celestial Horizon; (iv) Celestial equator; (v) Ecliptic plane; (vi) Observers meridian; (vii) Declination circle; (viii) Equinoctial Colure; (ix) Right Ascension; (x) Hour Angle; (xi) Azimuth; (xii) Altitude.**
8. **Describe briefly the effect of curvature and refraction in levelling. Derive an expression for curvature corrections and for combined curvature and refraction correction.**

Code : 011508

6

9. What are sounding? Write down the equipment and personnel required to locate sounding. Describe with the help of a sketch the principle of echo-sounding.

\*\*\*