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Roll No. of candidate | | | | | | | | | | |

2023

B.Tech. 4th Semester End-Term Examination

ENGINEERING SURVEYING – II

New Regulation (w.e.f. 2017-18) & New Syllabus (w.e.f. 2018-19)

Full Marks – 70 Time – Three hours

The figures in the margin indicate full marks for the questions.

Answer Question No. 1 and any *five* from rest.

1. Answer the following questions : (10 × 1 = 10)

(i) In simple curve distance between the crown of the and point of intersection

(a) Mid ordinate (b) Apex distance

(c) Tangent distance (d) Versine distance

(ii) In case of ideal transition curve

(a) Length of transition curve is directly proportional to radius of curve

(b) Super elevation is directly proportional to radius of curve

(c) Length of transition curve is inversely proportional to radius of curve

(d) Super elevation is inversely proportional to speed of vehicle

(iii) The best shape of a triangle in triangulation is

(a) Equilateral

(b) Isosceles with base angle 56°14'

(c) Isosceles with base angle 65°14'

(d) Isosceles with base angle 30°

[Turn over

(iv) In triangulation survey, the interivisibility of stations can be checked by

(a) Method of least square

(b) Heliotropes

(c) Captain G.T. McCaw's solution

(d) Three-point problem

(v) The passive sensor uses which of the following source of energy?

(a) Sun (b) Flash light

(c) Its own source (d) Moon

(vi) The principle used for measuring distances electronically is that the difference in phase between the transmitted and received waves represents

(a) Only a fraction of wave length

(b) Half-wavelength

(c) 1/4 wavelength

(d) 1/3 wave length

(vii) Residual error of a measurement is the difference of

(a) True and observed values

(b) Most probable and observed value

(c) True and most probable values

(d) Standard and probable values

(viii) Errors arising from carelessness of the observer are known as

(a) Compensating error

(b) Systematic error

(c) Mistakes

(d) Discrepancy

(ix) The rotation of an aerial camera about the line of flight is known as

(a) Tilt (b) Tip

(c) Crab (d) Drift

(x) The relief displacement on an air photograph decreases with the

(a) Decrease in flying height

(b) Increase in flying height

(c) Decrease in the distance from the principal point

(d) Both (i) and (ii)

2. (a) Two tangents intersect at chainage 59+60, the deflection angle being 50°30' Calculate the chainage of the point of curve and point of tangency. (5)

(b) A road 8 m wide is to deflect through an angle of 60° with the radius of 300m. The chainage of point of intersection point being 3600 m. A transition curve is to be used at each end of the circular curve of such a length that the rate of change of radial acceleration is 0.3 m/sec²/sec, when the speed is 60 kmph. Calculate

(i) length of transition curve (ii) Length of circular curve. (5)

(c) A parabolic vertical curve is to be set out connecting two uniform grade of +0.8% and -0.9%. The rate of change of grade is 0.05% per chain of 20 m. Calculate the length of vertical curve. (2)

3. (a) Describe briefly the corrections to be made to measurements with a tape. (2)

(b) Two triangulation station 72 km apart. The elevations of the stations A and B 372 m and 458 m respectively. The intervening ground has a uniform elevation of 328 m. Find the height of the signal required at B if the line of the sight has to pass at least 3 m above the ground at all points. (5)

(c) From a satellite station S, 5.8 m from the main triangulation station A, the following directions were observed: (5)

A	0°	0'	00"
B	132°	18'	30"
C	232°	24'	06"
D	296°	06'	11"

The lengths AB, AC and AD were compound to be 3265.6 m, 4022.2 m and 3086.4 m respectively. Determine the directions of AB, AC and AD.

4. (a) Define the following: (3)

True value, most probable value, residual error, normal equation, weight of an equation, correlates.

(b) The following are the angles measured in the field (4)

$\angle A = 43° 35' 20''$ weight 4

$\angle B = 82° 45' 20''$ weight 7

Determine A+B, A-B, A/3 and 4B as well as the weight of the results.

(c) Angles were measured on a station and the observations were recorded as follows (5)

$A = 45° 30' 10''$	weight 2
$B = 40° 20' 20''$	weight 3
$A + B = 80° 50' 10''$	weight 1

Find the most probable values of the angles A and B.

5. (a) The distance from two points on a photographic point to the principal line 68.24 mm to the left and 58.48 mm to the right. The angles between the points measured with a transit theodolite is 44°30'. Determine the focal length of lens. (4)

(b) How do you determine the scale of an aerial photograph? (2)

(c) Two objects A and B whose elevations are 500 m and 1500 m respectively above the mean sea level are photographed from a certain height with the axis of the camera vertical. The coordinates expressed in mm of the corresponding photo-image a and b are : (6)

Point	x co-ordinates	y co-ordinates
a	+ 150	+ 200
b	– 300	– 320

The focal length = 200 mm and length AB = 45000 m. Find the height of the camera station.

6. (a) What is flight planning of aerial photograph? Why overlaps are essential for aerial photograph? (3)

(b) The scale of an aerial photograph is 1 cm = 100 m. The photograph size is 20 cm × 20 cm. Determine the number of photographs required to cover an area of 10 km × 10 km, if the longitudinal lap is 60% and side lap is 30%. (4)

(c) Observations were made from instrument station A to the signal at B. The sun makes an angle of 60° with the line BA. Calculate the phase correction if (i) the observations were made on bright portion and (ii) the observations were made on the bright line. The distance AB is 9460 m. The diameter of the signal is 12 cm. (5)

7. (a) Define remote-sensing. State how it differs from photogrammetry. (3)

(b) Name the systems of remote-sensing. Give brief description of them. (6)

(c) Discuss briefly electromagnetic energy. (3)

8. (a) What are the fundamental measurements of total station? (3)

(b) Write short notes on EDM techniques of measuring distances. (4)

(c) Explain the basic calculation method of measuring horizontal angle, vertical angle and slope distance. (5)