Total number of printed pages: 03

UG/4th Semester/UCE401

2023

SURVEYING-II

Full Marks : 100

Time : Three hours

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

*Answer **any five** questions.*

1. a) Explain the principle of stadia method in tacheometry? Explain the field method to determine the constants K and C of a tacheometer. **(6)**

   b) Two straight lines T_1V and VT_2 are intersected by a third line AB. The angles VAB and VBA are measured to be 26°20′ and 34°30′, and the distance AB is equal to 358 m. Calculate the radius of the simple circular curve which will be tangential to the three lines T_1A, AB and BT_2 and the chainage of P.C. and P.T. if the chainage of V is 1245.5 m. **(6)**

   c) Define triangulation survey? Explain the three systems of triangulation. **(5)**

   d) In aerial photogrammetry define the following: **(3)**

      i) Exposure station

      ii) Tilt

      iii) Scale of the vertical photograph

2. a) A flag post of height 3 m was erected on top of a building. Find the R.L. of the top of the flag post, if the vertical angles to the top and bottom of it were 10° and 7° respectively. A staff reading of 1.234 m was taken over a bench mark of R.L. 100 m with a vertical angle of 0°0′0″. **(5)**

   b) What is a base line in a triangulation survey? What are the criteria for selection of a base line? **(5)**

   c) Two roads meet at an angle of 125°30′. Calculate the necessary data for setting out a curve of 20 chains radius to connect the two straight portions of the road by two theodolite method. **(10)**

3. a) A tacheometer was set up at station O. Determine the gradient from a point A to B from the following observations made with a fixed hair tacheometer fitted with an anallactic lens, the constant of the instrument being 100. **(10)**

Sighted to	Bearing	Reading on stadia hair		Reading on axial hair	vertical angle
A	345°	0.750	2.120	1.435	+15°
B	75°	0.625	3.050	1.835	+10°

b) Find the volume of a 6 m deep tank having rectangular shaped of top 6 m x 4 m and bottom 4 m x 2 m. **(4)**

c) The following perpendicular offsets were taken at 10 m intervals from a survey line to an irregular boundary line: 1.25, 2.60, 3.20, 2.85, 3.30, 4.80, 2.20, 1.15, 2.20. Calculate the area enclosed between the survey line, the irregular boundary line and the first and last offsets by (i) trapezoidal rule and (ii) Simpson's rule **(6)**

4. a) For a stadia method in tacheometric survey derive the distance and elevation formulae for an inclined line of sight at an angle of depression, if the staff was held normal to the line of sight. **(5)**

b) Two triangulation stations A and B are 100 km apart. The elevations of the stations A and B are 160 m and 180 m respectively. Calculate the minimum height of signal required at B so that the line of sight may not pass near the ground less than 2 m. Assume the intervening ground to have a uniform elevation of 120 m. **(5)**

c) Compute the value of C and $\frac{D-C}{D}$ for the triangulation figure shown below. The thick line indicates the base line. **(4)**

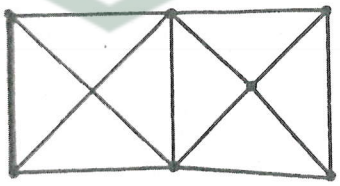

Fig. 1

d) Define: **(6)**

(i) Simple curve

(ii) Compound curve

(iii) Reverse curve

5. a) Two tangents intersect at a chainage of 70 + 50 and the deflection angle was 56°20′. Calculate the necessary data for setting out a curve of 10 chains radius to connect the two tangents by Rankine's method of tangential angles. The length of one chain is equal to 20 m (100 links). **(5)**

b) What is the actual ground area covered by a 20 cm x 20 cm size vertical aerial photograph, at an average scale of 1 cm = 200 m having 60% forward overlap and 30% side overlap? **(5)**

c) What are the different categories of photogrammetry? **(5)**

d) Explain the Raster and Vector data model. What are their advantages and disadvantages? **(5)**

6. a) What is remote sensing? Explain the two categories of remote sensing. **(5)**

b) The scale of an aerial photograph is 1 cm = 100 m. The photograph size is 20 cm x 20 cm. Determine the number of photographs required to cover an area of 10 km x 12.5 km, if the longitudinal lap is 60% and the side lap is 30%. **(5)**

c) Compute a flight mission for an aerial photogrammetry for an area 8 km wide and 16 km long. The airplane has a speed of 192 km/h. A camera with a focal length of 21 cm is to be used. The approximate scale is 1:10000, the average elevation of the ground is 366 m and the photographs are to be 23 cm x 23 cm. The forward lap is 60 % and the side lap 25%. **(10)**

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