

**GUJARAT TECHNOLOGICAL UNIVERSITY****BE- SEMESTER-III (NEW) EXAMINATION – WINTER 2024****Subject Code:3134003****Date:26-11-2024****Subject Name:Geomatics Engineering****Time:10:30 AM TO 01:00 PM****Total Marks:70****Instructions:**

1. Attempt all questions.
2. Make suitable assumptions wherever necessary.
3. Figures to the right indicate full marks.
4. Simple and non-programmable scientific calculators are allowed.

**MARKS**

- Q.1** (a) Briefly describe with sketch any one method of Plane table survey. **03**
- (b) Describe with sketches instruments and accessories used in Plane table survey. **04**
- (c) Due to some problems, the length and bearing of one side was not taken for a closed traverse ABCDA. From the available data, compute the length and bearing of the line DA. **07**

| Line | Length (m) | Bearing     |
|------|------------|-------------|
| AB   | 140.8      | N 20° 16' E |
| BC   | 280.1      | N 75° 27' E |
| CD   | 187.3      | S 27° 15' E |
| DA   | ?          | ?           |

- Q.2** (a) Define: Plunging, Right swing, Tacheometer. **03**
- (b) Explain the principle of Stadia method. Derive the relation  $D = KS+C$  in tacheometry survey. **04**
- (c) Following observations are obtained in tacheometry survey. **07**

| From | To | Vertical Angle | Hair Readings |       |       |
|------|----|----------------|---------------|-------|-------|
| A    | B  | + 5° 20'       | 1.050         | 1.650 | 2.250 |
| A    | C  | - 4° 10'       | 2.180         | 2.980 | 3.780 |

Take  $K=100$ ,  $C=0$ , H.I. = 1.45 m and R.L. of A = 516.9 m. Staff held vertically. Compute: (i) Lengths AB, AC & (ii) R. L. of B and C.

**OR**

- (c) Prepare Gale's Traverse Table to adjust the closing error for the following data. **07**

| Line | Length (m) | WCB  |
|------|------------|------|
| AB   | 110        | 20°  |
| BC   | 130        | 160° |
| CA   | 70         | 258° |

- Q.3** (a) Briefly explain: Triangulation, Well-conditioned Triangle, Satellite station. **03**
- (b) Derive the expressions for Trigonometric levelling for the case when base of the object is inaccessible and instrument stations are in the same vertical plane and instrument axes at same elevation, for the elevated object. **04**

- (c) Find the reduced level of a church spire C from the following observations taken from two stations A and B 60 m apart. Angle  $BAC = 65^0$ , Angle  $ABC = 45^0$ , Angle of elevation from A to the top of spire =  $24^0$ , Staff reading from A on B.M. = 2.65 m, R.L. of B.M. = 215.20 m. Also, determine distances AC and BC. **07**
- OR**
- Q.3** (a) Define for the simple circular curve: Degree of curve, Long chord, Tangent length. **03**
- (b) Briefly describe the setting out of simple circular curve by Rankine's method. **04**
- (c) Show the various components of simple circular curve on a detailed sketch. Also, compute following values if radius is 300 m and deflection angle is  $30^0$ , (i) Length of curve, (ii) Length of Long chord, (iii) Mid Ordinate, (iv) Tangent length, (v) Apex distance. **07**
- Q.4** (a) Define: Systematic error, Most Probable error, Sounding. **03**
- (b) Discuss with sketch sounding by 'Fathometer'. **04**
- (c) Two triangulation stations A and B are 47 km apart and have elevations of 180 m and 203 m respectively. Find the minimum height of signal required at B so that the line of sight may not pass nearer the ground than 3 m. The intervening ground may be assumed to have a uniform elevation of 152 m. **07**
- OR**
- Q.4** (a) Define in Aerial photogrammetry: Principal point, Tilted photograph, Relief Displacement. **03**
- (b) Explain with sketch various parts of Aerial Camera and their working. **04**
- (c) From an eccentric station S, 35 m to the west of the main station B, the following angles were measured: Angle  $BSC = 82^0 22' 30''$ , Angle  $CSA = 53^0 30' 26''$ . The stations S and C are to the opposite sides of the line AB. Calculate the correct angle ABC if the lengths AB and BC are 5316.3 m and 4630.9 m respectively. **07**
- Q.5** (a) Define following terms and show them in a sketch of celestial sphere: Zenith, Azimuth, Hour angle. **03**
- (b) What do you understand by 'Remote Sensing'? What are the applications of remote sensing? **04**
- (c) The scale of an aerial photograph is 1cm=180m. The photograph size is 22cm x 22cm. Determine the number of photographs required to cover an area 16 km x 14 km, if the longitudinal lap is 65% and the side lap is 35%. **07**
- OR**
- Q.5** (a) Define: GIS, GPS, EDM. **03**
- (b) Briefly describe working principle and applications of Total Station. **04**
- (c) Explain with sketches working principle, segments and applications of GPS. **07**

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