

**GUJARAT TECHNOLOGICAL UNIVERSITY****BE- SEMESTER-III (NEW) EXAMINATION – WINTER 2020****Subject Code:3134003****Date:10/03/2021****Subject Name:Geomatics Engineering****Time:10:30 AM TO 12:30 PM****Total Marks:56****Instructions:**

1. Attempt any FOUR questions out of EIGHT questions.
2. Make suitable assumptions wherever necessary.
3. Figures to the right indicate full marks.

**MARKS**

- Q.1** (a) Define and explain working principle of EDM. **03**
- (b) Co-ordinates of two points A and B are as follows. A third point C has been chosen in such a way that bearing of AC and CB are  $29^{\circ}30'$  and  $45^{\circ}45'$  respectively. Calculate the length of line AC and CB. **04**

Point	Northing	Easting
A	150	200
B	1500	1300

- (c) A traverse survey was done near NH48 at Gandhinagar. Observations are given in below table. Was it free from closing error? If not, find the magnitude & direction of the closing error. **07**

Line	OP	PQ	QR	RO
Length (m)	314.8	361.6	471.8	407
Bearing	$81^{\circ}24'$	$149^{\circ}49'$	$252^{\circ}52'$	$359^{\circ}59'$

- Q.2** (a) If the altitudes of a star at upper and lower culmination are  $72^{\circ}18'$  and  $21^{\circ}30'$ , respectively, both on the north side of the zenith, find the declination of the star and latitude of the place. **03**
- (b) The following are the observed values of an angle: **04**

Angle	Weight
$60^{\circ}30'40''$	2
$60^{\circ}30'38''$	3
$60^{\circ}30'39''$	3

Find: i) p.e. of single observation if unit weight, ii) p.e. of weighted arithmetic mean, iii) p.e. of single observation of weight 3.

- (c) Find the area of the closed traverse by coordinate method. Data is given in following table. **07**

Line	N	S	E	W
AB		157.2	154.8	
BC	214.5		52.5	
CD	175.4			98.3
DA		228.7		109.0

- Q.3** (a) What are the capabilities of a Total station? Enlist them. **03**

- (b) Derive the formulas for finding the Distance and Elevation of an inaccessible object by Trigonometric levelling when instrument stations are not in the same plane. **04**
- (c) Two tangents intersect at a chainage of 1322.5m, the deflection angle being  $26^\circ$ . Calculate the following for setting out a curve of radius 270. **07**  
 1) Versed sine of curve 2) Apex distance 3) Chainage of point of commencement and tangency 4) Length of curve 5) Tangent Length 6) Length of Long Chord
- Q.4** (a) A circular curve has a 300 m radius and  $67^\circ$  deflection angle. Calculate degree (D) and length of the curve. **03**
- (b) A tachometer was set up at station W and the following readings were obtained on a vertically held staff. **04**
- | Station | Staff station | Vertical angle  | Staff               | Remarks          |
|---------|---------------|-----------------|---------------------|------------------|
| W       | BM            | $-6^\circ 30'$  | 2.360, 2.915, 3.470 | RL of BM 400.00m |
|         | V             | $+11^\circ 30'$ | 2.065, 2.885, 3.705 |                  |
- Calculate the distance WV and the RL of point V.
- (c) From a satellite station S, 18m from the main triangulation station A, the following directions were observed.  $A = 0^\circ 0' 0''$ ,  $B = 140^\circ 20' 20''$ ,  $C = 230^\circ 30' 10''$ .  $D = 300^\circ 15' 30''$ . The lengths  $AB = 3205.8\text{m}$ ,  $AC = 4110.4\text{m}$ ,  $AD = 3109.5\text{m}$ . Determine the directions of AB, AC and AD. **07**
- Q.5** (a) Write short notes on the Well conditioned triangle. **03**
- (b) What do you understand by orientation of plane table? Discuss with sketch its various methods. **04**
- (c) Briefly explain with sketch the below terms of Field Astronomy. **07**  
 1) Hour angle 2) Azimuth 3) First point of Aries 4) Declination Circle.
- Q.6** (a) What is Traversing method in Plane table surveying? **03**
- (b) The distance from the principal point to an image on a photograph is 6.85 cm, and the elevation of the object above the mean sea level is 620m. What is the relief displacement of the point if the datum scale is 1/10,000 and the focal length of the camera is 20 cm? **04**
- (c) Points P and Q have elevations of 500 m and 200 m respectively. The photographic coordinates of points P and Q were measured as P (35, 25) and Q (20, 50) in millimeters. The photograph was taken with a camera having a focal length of 210 mm and from an altitude of 2500m. Find the length of line PQ. **07**
- Q.7** (a) What is Sounding? What are the instruments used for Sounding? Explain any two with sketches. **03**
- (b) Find the most probable values of the angles X and Y from the following observations at station Z: **04**  
 $X = 12^\circ 34' 24.7''$  Weight 3  
 $Y = 46^\circ 14' 37.2''$  Weight 2  
 $X + Y = 58^\circ 52' 3.5''$  Weight 4

- (c) How would you set out a 6m x 7.5m room in a 10m x 8m size plot? Explain with sketch. **07**
- Q.8** (a) What do you understand by “Remote Sensing”? Differentiate between active and passive remote sensing. **03**
- (b) Two stations A and B are 72km apart. The elevation of the station A and B are 372m and 418m, respectively. The intervening ground has a uniform elevation of 328m. The line of sight is 3m above the ground. At what distance the line of sight from A will strike the ground? What would be the height of the signal on B? **04**
- (c) Explain with sketch the method of setting out of a circular curve by Radial offsets from tangents. **07**

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