Seat No.: _____   Enrolment No._____

GUJARAT TECHNOLOGICAL UNIVERSITY
BE - SEMESTER–IV(NEW) EXAMINATION – WINTER 2022

Subject Code:3140601   **Date:13-12-2022**
Subject Name:Surveying
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.**

Q.1	**(a)**	Explain principle of plane tabling. Explain orientation of a plane table by magnetic needle method.	**03**
	(b)	Explain basic principle of EDM and working principle of GPS.	**04**
	(c)	Which are the methods of theodolite traversing? Explain any one of them with figure.	**07**
Q.2	**(a)**	Explain principle of tacheometry.	**03**
	(b)	Explain the principle and uses of triangulation.	**04**
	(c)	A theodolite traverse survey was conducted and the data obtained is given below.	**07**

Line	AB	BC	CD	DA
Length	158.40	179.30	233.90	204.50
Bearing	78°42'	152°30'	251°20'	356°12'

Find the magnitude and direction of the closing error if any.

OR

	(c)	Derive the expressions for determining horizontal distance and elevation in trigonometric leveling while base of the object is inaccessible and the instrument axes of both stations are at the same level in same vertical plane.	**07**
Q.3	**(a)**	An instrument was setup at D and the angle of elevation of the top of an electric pole PN was 31°20'. The horizontal distance between D and P, the foot of the pole was 378.80m. Determine the RL of top of the pole N, if the staff reading held on a BM (RL 180.00) was 3.145m. with telescope in horizontal plane.	**03**
	(b)	Define the terms: Transiting, Line of collimation, Changing face and Swinging the telescope.	**04**
	(c)	Two stations D and P, 82 km apart, have elevations 17 m and 270m above mean sea level respectively. Calculate the minimum height of the signal at P.	**07**

OR

Q.3	**(a)**	In plane table survey at one plane table station it was found that the table was not accurately centered over the ground station. If the displacement was 40 cm in a direction at right angles to the ray. Calculate the displacement of the point from its true position on the plane table sheet if the scale of plotting is, (1) 1cm=50cm (2) 1:500 and (3) 1cm=50m.	**03**
	(b)	Enlist various methods of plane tabling and explain traversing method with figure.	**04**
	(c)	Explain electromagnetic spectrum also describe uses of total station in the field of civil engineering.	**07**
Q.4	**(a)**	What is transition curve? State the requirements of a transition curve.	**03**

(b) How will you allocate weights to the field observations? **04**

(c) Area enclosed between the dam and upstream contours at a reservoir site are as follows: **07**

Contour level (m)	54	56	58	60	62
Enclosed area (sq.m)	715	6515	52700	79000	374000

If the bottom level is 54 m and the F.R.L is 62 m, determine the capacity of the reservoir by trapezoidal and prismoidal formula. Also compute prismoidal correction.

OR

Q.4 (a) Explain elements of a reverse curve with figure. **03**

(b) Derive an equation for calculating area by Mid-ordinate rule and Average-ordinate rule. **04**

(c) A compound curve, consisting of two simple circular curves of radii 350 m and 450 m, is to be laid out between two straights, The angles of intersection between the tangents and the two straights are 30° and 60°. Calculate the various elements of the compound curve. **07**

Q.5 (a) Differentiate between direct observations and indirect observations. **03**

(b) Define point of curvature, length of the curve, sub-chord and right-hand curve. **04**

(c) In tacheometric survey, derive the expression for horizontal and vertical distances in the fixed hair method when the staff is held vertically and the measured angle is that of elevation. How will you find RL of staff station? **07**

OR

Q.5 (a) Two straight intersect at chainage 3075.40m and the angle of intersection is 130°. If the radius of the simple curve to be introduced is 650m, find the tangent distances, chainage of the point of commencement and length of the long chord. **03**

(b) Define true error, most probable error, residual error and normal equation. **04**

(c) A tacheometer was setup on station A and the following readings were obtained on a staff vertically held. **07**

Inst. Station	Staff Station	Vertical Angle	Hair Readings (m)		
A	BM	-6°40'	1.200	1.900	2.600
	B	+8°20'	0.800	1.600	2.400

Calculate the horizontal distance AB and RL of B. The constants of instrument are 100 and 0.15. RL of BM is 850.50m.

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