GUJARAT TECHNOLOGICAL UNIVERSITY
B.E. Sem-III (Civil Engg) Examination December 2009

Subject code: 130601   **Subject Name: Surveying**

Date: 17 / 12/ 2009   **Time: 11.00 am – 1.30 pm**

Total Marks: 70

Instructions:
1. **Attempt all questions.**
2. **Make suitable assumptions wherever necessary.**
3. **Figures to the right indicate full marks.**

Q.1 **(a)** Enlist various instruments used in plane table survey and briefly explain any three of them with sketch. **07**

(b) Describe the procedure of setting out of simple circular curve by (i) Perpendicular offset from tangent, and (ii) Rankine's method of tangential angle. **07**

Q.2 **(a)** Define following terms for the vernier transit theodolite: (i) The vertical axis, (ii) Plunging, (iii) Swinging. Also, explain with sketch temporary adjustments of vernier transit theodolite. **07**

(b) Derive the expressions to compute the area from offsets to a base line by (i) Trapezoidal rule, and by (ii) Simpson's one third rule. **07**

OR

(b) What is sounding in hydrographic survey? Enlist the equipments used for soundings. Briefly explain working of any two of them with sketch. **07**

Q.3 **(a)** Derive the expressions for computing horizontal distance and elevation in trigonometric leveling, while base of the object is inaccessible and instrument stations are in same vertical plane with the elevated object for the instrument axes at (i) same level, and (ii) different levels. **07**

(b) Compute the values of following components of simple circular curve and show them in the detailed sketch:
(i) Length of curve, (ii) Tangent length, (iii) Length of long chord, (iv) Apex distance, and (v) Mid-ordinate.
Take radius of curve = 300m and deflection angle = 40°. **07**

OR

Q.3 **(a)** What are the methods of plane tabling? Describe any two of them with sketch. **07**

(b) Prepare Gale's traverse table to adjust the closing error of the closed traverse ABCDA for the following data: **07**

Line	Length (m)	Corrected W. C. B.
AB	110	110°
BC	80	170°
CD	95	250°
DA	160	350°

Q.4 **(a)** Describe the following methods of locating soundings in hydrographic survey: **07**
    (i)   Location by range and one angle from the shore,
    (ii)   Location by intersecting ranges.

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(b) Why transition curves are introduced on horizontal curves of highways or railways? Compute the necessary components of combined curve having cubic parabolic curve as a transition curve for the following data: **07**

Deflection angle = 75°, Design speed = 70 kmph, Peg interval for (i) transition curve = 25m, and (ii) circular curve = 8m.

OR

Q.4 **(a)** Derive the expressions for computing horizontal distance and elevation in trigonometric leveling, while base of the object is inaccessible and instrument stations are not in the same vertical plane as the elevated object. **07**

(b) A flag-staff of 2m height was erected on the top of a hill (Q) and observations were made from two stations P and R, 80m apart. The horizontal angle measured at P between R and the top of flag-staff was 62° 30' and that measured at R between the top of the flag-staff and P was 66° 20'. The angle of elevation to the top of the flag-staff was measured to be 12° 8' at P and the same was measured to be 13° 2' at R. Staff readings on B.M. when the instrument was at P = 2.125m and that with the instrument at R = 2.330m. R.L. of B.M. was 240.680m. Calculate: (i) Horizontal distances PQ and RQ, and (ii) Elevation of the top of hill (Q). **07**

Q.5 **(a)** What are the fundamental lines of a transit theodolite? What are the desired relations between them? Describe the procedure of permanent adjustment of (i) Horizontal cross hair, and (ii) Horizontal axis of transit theodolite. **07**

(b) Derive the Prismoidal formula for computing the volumes. **07**

A highway embankment 200m long is 12m wide at the formation level and has the side slope 2 horizontal to 1 vertical. The ground levels at every 50m along the centre line are as under:

Distance(m)	0	50	100	150	200
R. L.(m)	104.8	106.2	107.5	107.2	108.3

The formation level at zero chainage is 107.00m and embankment has a rising gradient of 1 in 100. The ground is level across the centre line. Calculate the volume of earthwork by Prismoidal formula.

OR

Q.5 **(a)** Discuss horizontal and vertical control in setting out of works. Explain with sketch procedure of setting out foundation trenches of a building. **07**

(b) Determine the capacity of reservoir for the following observations of contour area map. A planimeter was used to measure the area of contours. The anchor point was kept outside the figure. Scale of map was 1cm = 10m and multiplying constant M = 10sq. cm for the planimeter. Use Prismoidal formula to calculate the volume. **07**

Contour (m)	Readings on planimeter		
	Final reading	Initial reading	Value of N
100	2.022	5.134	+1
102	3.168	9.025	+2
104	4.864	1.739	+2
106	5.972	8.238	+3
108	6.784	3.127	+3

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