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B. Tech
PECI 5303

Fifth Semester Examination – 2013
SURVEYING - II
BRANCH : CIVIL
QUESTION CODE : C- 432
Full Marks – 70
Time : 3 Hours

Answer Question No. **1** which is compulsory and any **five** from the rest.
The figures in the right-hand margin indicate marks.

1. Answer the following questions :   2 ×10

    (a) Differentiate between fixed-hair-method and movable-hair-method in tacheometry.

    (b) What are the constants of a tacheometer ?

    (c) What do you mean by tangential tacheometry ?

    (d) Sketch a circular curve showing all its elements.

    (e) What is a transition curve ? Sketch it.

    (f) What do you mean by 'base line' and 'base net' in triangulation ?

    (g) What do you mean by 'reduction to center' in triangulation ?

    (h) What do you mean by most probable value ?

    (i) How do you select stations in total station survey ?

    (j) What do you mean by 'parallax' ?

2. Derive an expression for the horizontal distance of a vertical staff from a tacheometer if the line of sight of the telescope is horizontal.

    The following are the observations in a tacheometric survey :

Instrument Station	Staff Station	Hair Readings (m)			Vertical Angle
		Bottom	Center	Top	
O	BM	1.75	1.95	2.15	−5° 30'
O	P	1.50	1.65	1.80	+9° 30'

The RL (reduced level) of the bench mark (BM) was 500 m. The tacheometer was fitted with an anallatic lens with constant 100. Find the RL of station P.   10

P.T.O.

3. (a) Stadia readings were taken with a theodolite on a vertical staff with the telescope inclined at an angle of 3°30'. The staff readings were 2.990, 2.055, 1.120. The reduced level of the staff station is 100.00 m, and the height of the instrument is 1.40 m. What is the reduced level of the ground at the instrument ? 5

   (b) Determine the gradient from a point P to a point Q from the following observations. The constant of the instrument (tacheometer) was 100 and the staff was held vertically. 5

Instrument Station at	Staff Point	Bearing	Hair Readings (m)			Vertical Angle
			Bottom	Center	Top	
A	P	140°	1.35	1.92	2.49	+10°45'
A	Q	230°	1.08	1.90	2.72	+5°30'

4. (a) Two tangents to a railway curve, PX and XQ, meet at an angle of 140°. Find the radius of the curve which will pass through a point M, 24 m from the intersection point X, the angle PXM being 100°. 5

   (b) A reverse curve having two branches of common radius is to connect two parallel straights 9 m apart. If the distance between the tangent points is 72 m, find the necessary radius. 5

5. (a) A railway curve of 1250 m radius is to be set out to connect two tangents. The design speed is 100 kmph. Find the suitable length of transition, and the necessary shift of the circular curve. 5

   (b) Determine the most probable value of an angle X from the following observations of equal weight : X = 30° 30' 30", 2X = 61° 00' 55" and 183° 02' 40". 5

6. The elevations of two proposed triangulation stations A and B, 100 km apart, are 140 m and 416 m above mean sea level, respectively. The elevation of an intervening peak at C, 60 km from A, which is likely to obstruct the line of sight, is 150 m. Ascertain if A and B are intervisible, and if not, find the height required for the scaffold at B so that the line of sight clears C by 3 m. 10

7. (a) Explain the 'batter board method' of setting out a large public building. 5

   (b) Explain the operations involved in setting out water supply and sewer lines true to alignment and grade. 5

8. Explain the following in brief : 5×2

   (a) errors in tacheometer

   (b) vertical curves

   (c) strength of figures in triangulation

   (d) method of least square

   (e) scaffolds and signals

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