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Internal Assesment Test –1

Sub:Advanced Surveying — Code: 17CV46

Date:07/03/2019	Duration: 90 mins	Max Marks: 50	Sem: IV	Sections:CV (A & B)

Answer ***any five*** questions. Good luck!

		Marks	OBE	
			CO	RBT
1	Explain the Rankines method of deflection angles for setting out a simple circular curve.	10	1,4	L1,L2
2	Two tangents intersect at a chainage of 59+60, the deflection angle being 50°30'. It is required to connect the two tangents by a curve of radius 15 chains. Taking the peg interval as 100 links, calculate the necessary data for setting out the curve by offset from chords produced method. Take length of the chain as 20m (100 links).	10	1,4	L1,L2
3	Draw a neat sketch of compound curve giving the various elements. Also explain the method of setting out the compound curve.	10	1,4	L1
4.	Explain with neat sketches, the various triangulation systems.	10	1,4	L1

Selected

P.T.O

		Marks	OBE	
			CO	RBT
5	Calculate the ordinates at 10 m distance for a circular curve having long chord of 80 m and a versed sine of 4 m.	10	1,4	L1,L2
6.	A compound curve consists of two simple circular curves of radii 350m and 500m and is to be laid out between two straights T_1I and IT_2. PQ is the common tangent at the point of compound curvature D. The angles IPQ and IQP are 55°00' and 25°00' respectively. Sketch and calculate the distances of the tangent points T_1I and IT_2.	10	1,4	L1,L2
7.	Explain Satellite station and reduction to centre.	10	1,4	L1

C.I. C.C.I. H.O.D.

Scheme & Solution — 1st Internal Assessment Test
07/03/2019 Advanced Surveying — 17CV46.

1. • Set up the theodolite at point of the curve T_1. With both plates clamped to Zero - Zero, direct the theodolite to bisect the P.I. ie. V.
• Release the Vernier plate and set the angle Δ_1 on the Vernier. The line of Sight will now be on the chord T_1A.
• With Zero end of the tape pointed at T_1 and arrow held at $T_1A = C$, Swing the tape around T_1 till the arrow is bisected by the Cross hairs. Thus, the point A is fixed.
• Set the deflection angle Δ_2 on the Vernier so that the line of Sight is along the line T_1B.
• With the Zero end of the tape pinned at A and arrow held at $AB = C$, Swing the tape around A till the arrow is bisected by the Cross hairs thus fixing the point B.
• Repeat Steps till the end point is reached. 1 × 6 = 6 marks

Figure (4) M = 4 marks

(10) Marks

2. Tangent length $(T) = R \tan\left(\frac{\Delta}{2}\right) = 15 \tan\left(25^\circ 15'\right) = 7.07$ chains

$= 7.07 * 20 = 141.48$ m.

length of Curve $(L) = \frac{\pi R \Delta}{180^\circ} = \frac{\pi * 15 * 50^\circ 30'}{180^\circ} = 13.22$ chains

$= 13.22 * 20 = 264.44$ m.

Chainage @ P.I. = 59 + 60 = 1192.00 m.

Deduct tangent length (T) = 7 + 07 = 141.48 m

∴ Chainage at P.C. = 52 + 52.6 = 1050.52 m.

Add length of Curve (l) = 13 + 22.1 = 264.42 m

Chainage at T_2 = 65 + 74.1 = 1314.94 m.

03 Marks

C_1 = 1060 − 1050.52 m = 9.48 m, C_1' = 1314.94 − 1300 = 14.94 m

Number of full chords = $\frac{1300-1060}{20}$ = 12 No's.

$\delta_1 = 1718.9 * \frac{C_1}{R} = 1718.9 * \frac{9.48}{300} = 54.32' = 0^\circ\ 54'\ 19''$

$\delta_2 = \delta_3 = \delta_4 = \dots\dots \delta_{10} = \delta_{11} = \delta_{12} = \delta_{13} = 1718.9 * \frac{20}{300} = 1^\circ 54' 36''$

$\delta_{14} = 1718.9 * \frac{14.94}{300} = 1^\circ 25' 36''$ 03 Marks

Preparation of detailed Table = 04 marks 10 Ma

3. Sketch — 03 marks, Detailed procedure = 07 marks 10m

4. Sketches — 03 marks, Detailed procedure = 07 marks 10 Mar

5. $O_o = \boxed{R - \sqrt{R^2 - \left(L/2\right)^2}} \Rightarrow 4 = R - \sqrt{R^2 - (40)^2}$

$(R-4) = \sqrt{R^2 - (40)^2}$ or $(R-4)^2 = R^2 - 40^2$

$\Rightarrow R^2 - 8R + 16 = R^2 - 1600$

or $1616 = 8R \Rightarrow \boxed{R = 202 m}$

$R - O_o = 202 - 4 = 198 m.$ — 04 Marks

$$O_x = \sqrt{R^2 - x^2} - (R - O_o)$$

$$O_{10} = \sqrt{(202)^2 - 10^2} - 198 = 3.75\,m.$$

$$O_{20} = \sqrt{(202)^2 - (20)^2} - 198 = 3.01\,m$$

$$O_{30} = \sqrt{(202)^2 - (30)^2} - 198 = 1.76\,m$$

$$O_{40} = \sqrt{(202)^2 - (40)^2} - 198 = 0\,m$$ ... 06 Marks

10 Mark

6. $$t_s = R_s \tan\left(\frac{\Delta_1}{2}\right) = 350 \tan\left(\frac{55^0}{2}\right) = 182.20m$$

$$t_L = R_L \tan\left(\frac{\Delta_2}{2}\right) = 500 \tan\left(\frac{25^0}{2}\right) = 110.85m$$

$$T_s = t_s + (t_s + t_L)\frac{\sin\Delta_2}{\sin\Delta} = 307.96m$$

$$T_L = t_L + (t_s + t_L)\frac{\sin\Delta_1}{\sin\Delta} = 354.61m.$$ 04 mark

Chainage at P.I. ie. I = 1800.00 m

Deduct length T_s = 307.96m

Chainage at T_1 = 1492.04 m

Add length l_s = 335.98m

Chainage at p.c.c. = 1828.02m

add length l_L = 218.17m

Chainage at T_2 = 2046.19m. 04 mark

$l_S = \frac{\pi R_S \Delta_1}{180^\circ} = 335.98m$, $l_L = \frac{\pi R_L \Delta_2}{180^\circ} = 218.17m$

02 mark 10M

7. Sketch – (3) mark, Explaination – (07) marks 10Ma

End of Scheme.