

16041(J)

5-16

B. Tech 4th Semester Examination

Surveying-II (NS)

CE-224

Time : 3 Hours

Max. Marks : 100

The candidates shall limit their answers precisely within the answer-book (40 pages) issued to them and no supplementary/continuation sheet will be issued.

**Note :** Attempt five questions in all selecting one question from each section A, B, C and D and all subparts of section E are compulsory.

SECTION - A

1. (a) A right-hand compound curve consisting of two simple circular curves of radii 350 m and 500 m, is to be laid out between two straights. The angles of intersection between the tangents and the two straights are  $25^\circ$  and  $55^\circ$ . Calculate the various elements of the compound curve. Determine the chainage of point of curvature, the point of compound curvature and the point of tangency. Chainage of point of intersection is 1245.5 m. (14)
- (b) How would you decide the length of the transition curve? Discuss the methods of determining the length of the transition curve. (6)
2. (a) Explain the method of correlates. Which are its advantages over the normal equation method? (10)
- (b) The following are three angles P, Q and R observed at station M, closing the horizon alongwith their standard errors. Determine the corrected angles. (10)  
 $P=82^\circ 17' 18'' \pm 4''$ ,  $Q = 126^\circ 28' 43'' \pm 5''$ ,  $R = 151^\circ 13' 41'' \pm 3''$

[P.T.O.]

SECTION - B

3. A base line was measured in 3 bays and the following observations were made.

Bay	Measured length (m)	Temperature ( $^\circ\text{C}$ )	Difference in levels (m)	Tension (N)
1	29.835	35	+0.092	192
2	29.847	35	+0.367	192
3	29.829	35	-0.245	192

The tape was standardized on flat at  $23^\circ\text{C}$  under a pull of 90 N.

Take  $g = 9.81 \text{ m/sec}^2$  and  $R = 6367 \text{ km}$

Determine the correct length reduced to mean sea level.

Mass of the tape  $-0.025 \text{ kg/m}$ , Cross-sectional area -  $3.48 \text{ mm}^2$

Co-efficient of linear expansion -  $9 \times 10^{-7} \text{ per } ^\circ\text{C}$

Young's modulus of elasticity  $-1.5 \times 10^5 \text{ N/mm}^2$

Mean elevation of the base line  $-249.5 \text{ m}$  (20)

4. (a) What do you mean by horizontal control? Which are different methods of establishing a horizontal control? (10)
- (b) What is a satellite station? How would you reduce the horizontal angles? (10)

SECTION - C

5. (a) Discuss the procedure of indirect levelling on a rough terrain. (8)
- (b) The following observations were taken :  
Angle of elevation from A to B =  $+3^\circ 34' 56''$ , Height of instrument at A = 1.25 m  
Height of signal at B = 4.78 m, Horizontal distance between A and B = 8347 m  
If coefficient of refraction is 0.07 and  $R \sin 1'' = 30.88 \text{ m}$ , and RL of A is 242.56 m.  
Calculate the RL of B. (12)

6. (a) What are the advantages of reciprocal observations over the single observation? (8)
- (b) Find the reduced level of a church spire R from the following observations taken from the two stations P and Q, 65 m apart.
- Angle QPR =  $61^\circ$ , Angle PQR =  $48^\circ$
- Angle of elevation from P to the top of church spire =  $28^\circ$
- Angle of elevation from Q to the top of church spire =  $26^\circ$
- Staff reading from P on the bench mark of RL 23.0 m = 2.35 m
- Staff reading from Q on the same bench mark = 0.68 m (12)

#### SECTION - D

7. (a) Write short notes on photomaps and mosaics. (12)
- (b) The parallax reading for a control point B of the elevation 684 m was 14.97 mm. Determine the elevation of another point A which has the parallax reading of 11.67 mm. Take parallax bar constant C as 78 and the flying height H as 1625 m. (8)
8. (a) Derive an equation for the scale of a vertical photograph. (10)
- (b) What is an astronomical triangle? Draw the astronomical triangle when the star is at horizon. (10)

#### SECTION - E

9. Attempt all questions:
- (a) Name at least two types of transition curve.
- (b) Name different methods of expressing the gradient.

[P.T.O.]

- (c) Discuss the use of triangulation survey.
- (d) What is the strength of the figure and how it can be determined?
- (e) Discuss advantages of indirect leveling over the direct leveling.
- (f) Define strip mosaic.
- (g) Explain the drift of the photograph.
- (h) Discuss the law of accidental errors.
- (i) How would you determine LMT of transit of a star.
- (j) Explain the spherical triangle. (2×10=20)