

18037(M)

B. Tech 4th Semester Examination

Engg. Surveying-II (CBS)

CE-403

Time : 3 Hours

Max. Marks : 60

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 selecting at least one from each section A, B C and D and all subparts of section E. Any missing value may suitably be assumed. All steps are mandatory for numerical parts.

SECTION - A

1. Calculate distance, gradient and bearing of line CD and RL of C and D, if RL of A=1020.60 m and B=1021.21 m from following data using a vertically held staff:

station	H.I. (m)	coordinates		Staff at	Bearing	Vertical angle	Staff reading (m)		
		N	E				lower	middle	upper
A	1.50	800	1800	C	15°14'	8°9'	1.10	1.85	2.60
B	1.53	960	2500	D	340°18'	2°3'	1.32	1.91	2.50

(12)

2. (a) Derive the formulae for distance and elevation in the tangential method of tachometry for angle of elevation and depression, both angles of depression and both elevation.

(8)

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- (b) Observations are taken on a vertical staff held at a bench mark of elevation of 108 m using a theodolite. The staff reading is 2.4 m with an angle of depression of 8° and it is 2.04 m with an angle of depression of 9°. If height of instrument is 1.62 m above ground station find elevation of theodolite station. (4)

SECTION - B

3. (a) The apex distance of a 3 degree circular curve is 82.45 m. Determine the deflection angle, tangent length and length of long chord. (6)
- (b) Derive the suitable relation to set out a simple circular curve by offsets from chord produced. Provide suitable diagram also. (6)
4. (a) A circular curve of radius 300 m on a railway line of gauge 1.5 m is to be provided with transition curve at both ends. The super elevation is restricted to 20 cm. The design should be such that the rate of change of radial acceleration is 0.3 m/s³. Calculate the length of transition curve and design speed of vehicle if no lateral pressure is to be exerted on the rails. Also calculate shift and spiral angle of the transition curve. (6)
- (b) A parabolic vertical curve is to set out to connect two grades of +0.8% and -0.9%. Rate of change of grade is 0.05% and chainage of point of intersection is 1664m. Calculate length of curve and chainage of 1st and 2nd tangent point. (6)

SECTION - C

5. (a) A pair of photographs was taken with an aerial camera from an altitude of 5000m above mean sea level. The mean principal base is equal to 90 mm. The difference in parallax between two points is 1.48 mm. Find the difference in height between the two points if elevation of the lower point is 500m above datum. What will be the difference in elevation if the parallax difference is 15.5 mm? (6)
- (b) Explain and prove principle of least square. (6)
6. (a) Write about various kind of signals used in triangulation survey. Discuss properties of a good signal. (6)
- (b) A section line AB=300m on a flat terrain measures 102.4 mm on the vertical photograph. Distance from principal point to the images of the bottom and top of a radio tower photographed on the photo was found to be 7 cm and 8 cm respectively. The average elevation of the terrain was 553 m. Determine the height of the tower if focal length of the camera=152.4 mm. (6)

SECTION - D

7. (a) Write a note on types of electromagnetic distance measurement instruments. (6)
- (b) Write a detailed note on the capabilities (functionalities) of GIS. (6)
8. (a) What is idealized remote sensing system? Discuss. (6)
- (b) Write briefly about various GPS errors. (6)

SECTION - E

9. (a) Discuss briefly the working principle of GPS.
- (b) Discuss the difference between vector and raster format for storing data in GIS.
- (c) What are various source of errors in stadia method of techeometry?
- (d) What is super elevation and its role in transition curve?
- (e) Why overlap is needed between two successive photographs? Write various points.
- (f) Write about elements of a compound curve. (2×6=12)

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