B.E.Sixth Semester (Civil Engineering) (C.B.S.)

Surveying - II

P. Pages : 3 **NKT/KS/17/7376**

Time : Three Hours * 0 4 8 2 * Max. Marks : 80

Notes :
1. All questions carry marks as indicated.
2. Solve Question 1 OR Questions No. 2.
3. Solve Question 3 OR Questions No. 4.
4. Solve Question 5 OR Questions No. 6.
5. Solve Question 7 OR Questions No. 8.
6. Solve Question 9 OR Questions No. 10.
7. Solve Question 11 OR Questions No. 12.
8. Due credit will be given to neatness and adequate dimensions.
9. Assume suitable data whenever necessary.
10. Illustrate your answers whenever necessary with the help of neat sketches.
11. Use of non programmable calculator is permitted.

1. a) Derive the equation D=KS+C as used in fixed hair method of tacheometry. **6**

b) A tacheometer was set up at a station 'A' and the reading on the vertically held staff at 'B' were 2.255, 2.605 and 2.955 the line of staff being at an inclination of +8°24', another observation on the vertically held staff at C gave the reading 1.640, 1.920 and 2.200 the inclination of line of sight being +1°06'. Calculate horizontal distance between A and B and elevation of 'B' if the RL of 'C' is 418.685. The constant of instrument were 100 and 0.3. **7**

OR

2. a) Derive the distances and elevation formulae for line of sight inclined but staff normal to it, when the line of collimation is inclined upward. **5**

b) To determine the distance between the two points 'C' and 'D'. The following observations were taken upon a vertically held staff from two transverse station A and B. The Tacheometer was fitted with an analectic lens, the constant of the instrument being 100. **8**

Traverse Station	H.I. (m)	Co-ordinates (x, y)	Staff station	Bearing	Vertical Angle	Staff Reading
A	1.58	218.3, 164.7	C	330°20'	+12°12'	1.255, 1.860 2.465
B	1.50	518.2, 207.6	D	20°36'	+10°36'	1.300, 1.885, 2.470

Calculate :
i) The distance CD
ii) The reduced levels of C and D, given that those of A and B are 432.550 and 436.865m respectively.
iii) Gradient from C to D.

3. a) Describe the method of setting out a simple curve by offset from the chords produced. **5**

b) Two straights AB and BC intersect at an inaccessible point. A straight line MN intersect them making angle AMN = 115° and an angle CNM = 128°. The lengths of MN is 135.50M. The radius of the curve between the straights is 387.60 m and chainage of M is 1596.90 m. Compute the necessary data to set out the curve with 30 m chord length, with the help of theodolite. **8**

OR

4. a) A parabolic valley curve is to be set out connecting two uniform grade - 0.60% and +0.45% The chainage and reduced level of point of intersection are 10545.325 m and 192.235 m respectively. The rate of change of grade is 0.05% per chain of 20 m. Calculate the reduced levels of the various station pegs and tabulate in a table. **7**

b) Two straights AB and CD intersect of V. BD is the common tangent of length 200 m. It is proposed to introduced a reverse curve between them the angles ABD and CDB are 150°30' and 43°12' respectively. **6**
Calculate :
i) The common radius
ii) The chainages of PC, PRC and PT if that of B is 9245.80 m

5. a) Derive an ideal transition formulae. **5**

b) A road bend which deflects 80° is to be designed for a maximum speed of 100 km per hour, a maximum centrifugal ratio of $\frac{1}{4}$ and maximum rate to the change of acceleration of 30 cm/sec^3, the curve consisting of a circular arc combined with two cubic spiral. **9**
Calculate :
i) the radius of circular arc
ii) the requisite length of transition curve
iii) the total length of composite curve and
iv) the chainage of the beginning and the end of the transition curve, and of the junctions of the transition curves with the circular arc if the chainage of the P.I. is 42862 m.

OR

6. a) Prove that the shift = $\frac{L^2}{24R}$ where, L is the length of curve and R is the radius of circular curve. **5**

b) Two straights AB and BC intersect at chainage 1000 m, the deflection angle being 40°. It is proposed to insert a circular curve of radius 300 m with a transition curve of length 90m at each end. Calculate all the dates necessary for setting out the curve by the deflection angle method, taking peg interval of 20 m. Prepare the setting out table, taking the least count of theodolite 20". **9**

7. a) The altitude of two proposed stations A and B 130 km apart are respectively 220 m and 1240 m. The altitude of the two points C and D on a profile between them are respectively 305 m and 630 m. The distance AC = 60 km and AD = 100 km. Determine A and B are intervisible and if necessary find the minimum height of scaffolding at B assuming A as the ground station such that the new line of sight clear the peak by 3 m. **7**

b) What is meant by satellite station and reduction to centre ? Derive expression for reducing the angles measured at the stations to centre. **7**

OR

8. a) State and explain laws of weights. **6**

b) Determine the most probable values of the angles A, B and C from the following observed values. **8**

A = 42°36'28" weight 2
B = 28°12'42" weight 2
C = 65°25'16" weight 1
A + B = 70°49'14" weight 2
B + C = 93°37'55" weight 1

9. a) Derive the equation for relief displacement in a vertical photography with figure. **6**

b) An area 50 km x 36 km is to be photographed with a lens having 30 cm focal length for the purpose of constructing a mosaic. The photograph size is 20 x 20 cm. The average scale is to be 1:12000 effective at an elevation of 500 m above datum. Overlap is to be atleast 60% and the side lap is to be at 30%. An intervalometer will be used to control the interval between exposures. The ground speed of the aircraft will be maintained at 200 km/hour. The flight lines are to be laid out in the long distance direction on existing map having a scale 1:60000. The two flight lines are to coincide with the short distance of the area Determine : **7**

i) flying height
ii) theoretical ground spacing of flight lines
iii) number of flight lines required
iv) Spacing flight lines on flight map
v) exposure interval
vi) total number of photographs required.

OR

10. a) Derive parallel equation in determining the coordinates of points in aerial photogrammetry. **5**

b) Two points A and B have elevations of 400 m and 275 m respectively above datum appear on the vertical photograph having focal length of 20 cm and flying altitude 2000 m above datum. Their corrected photographic co-ordinates are as follows - **8**

Point	x (mm)	y (mm)
a	+4.89	+3.32
b	-2.94	-5.16

Determine the length of ground line AB.

11. a) Write a note on Napier rules of circular parts. **6**

b) Explain in brief about GPS and its applications. **7**

OR

12. a) Explain the various co-ordinates system used in astronomy. **6**

b) What are the various applications of remote sensing. **7**

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