Question Paper

Exam Date & Time: 18-Apr-2018 (09:30 AM - 12:30 PM)



MANIPAL ACADEMY OF HIGHER EDUCATION

INTERNATIONAL CENTRE FOR APPLIED SCIENCES FOURTH SEMESTER B.S (ENGG) END-SEMESTER THEORY EXAMINATIONS APRIL - 2018 DATE : 18 APRIL 2018 TIME : 9:30AM TO 12:30PM Surveying [CE 246]

Marks: 100

Duration: 180 mins.

Answer 5 out of 8 questions.

Assume any missing data suitably.

- ¹⁾ Determination of inter visibility is an application of contour $^{(10)}$ _{A)} maps. Justify the statement with the help of figures.
 - ^{B)} Two stations I_1 and I_2 , 180m apart, were selected for (10) making observations to find the elevation of a point P on a hillock. The horizontal angles measured were $LPI_1I_2 = 58^0$

30' and $LPI_2I_1 = 50^0$ 50'. The vertical angles at the staff

held at point P to 3m mark were 10^0 50' and 9^0 27' from stations I₁ and I₂, respectively. To find the RL of the instrument axis, readings were taken to a BM of RL 1085.65m. The readings from stations I₁ and I₂ were 1.65m and 2.85m, respectively. Find the RL and distance from I₁ to point P. Check the RL of P from the other instrument station

- What is surveying? What are the principles of surveying? ⁽¹⁰⁾
 Explain the divisions of surveying.
 - ^{B)} Define the following terminologies w.r.t theodolite survey. ⁽¹⁰⁾ a)Transiting, b) Swinging, c) Trunnion axis, d) face left observation, e) vertical axis
- ³⁾ The following observations were taken in reciprocal (10) levelling :

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Instrument at	Staff reading on		Remark
	А	В	
А	1.545	2.565	Distance: AB=1420m
В	0.725	1.935	RL of A= 108.36

Find True RL of B, the combined correction for curvature and refraction, the angular error in the collimation adjustment of the instrument.

B) (10)What is collimation correction? With neat sketch explain balancing of back sights & foresights in elimination of error due to curvature and refraction. (10)4) With neat sketch derive an expression for distance and elevation for inclined line of sight when the staff is held A) normal to the line of sight. (10)B) The stadia intercept read by means of a fixed hair instrument on a vertically held staff is 1.05m, the angle of elevation being $6^{\hat{A}^{\circ}}$ 36'. The instrument constants are 100 and 0.4. what would be the total number of turns registered on a movable hair instrument at the same station for a 1.75m intercept on a staff held on the same point, the vertical angle in this case being 6[°]58' and the constants 1000 and 0.5. 5) (10)The following consecutive readings were taken with a dumpy level: 1.893, 1.500, 1.865, 2.566, 2.990, 2.021, A) 2.411, 2.518, 2.960 m. The level was shifted after 4th and 6th readings. The reduced level at the first point was 100.000 m. Enter the readings in the form of level book and reduce the level by the collimation method and apply the arithmetical check. Find the gradient between the first and last stations. Plot longitudinal profile. B) Two straights AB and BC are intersected by a line D_1D_2 (10)The angles BD_1D_2 and BD_2D_1 are 40°30' and 36°24' respectively. The radius of the first arc is 600 metres and that of the second arc is 800 metres. If the chainage of intersection point B is 8248.1 metres, find the chainages of tangent points and the point of compound curvature.

- ^{A)} Central angle of a non-parallel straights Δ_1 and Δ_2 and length of common tangent are given ($\Delta_2 > \Delta_1$). Find out the common radius R and chainages at starting and end point of a reverse curve.
- ^{B)} Two straights AB and BC intersect at a chainage of 4500m. ⁽¹⁰⁾ The bearing of two straights AB and BC are 40^o and 110^o respectively. It is required to set out a 5^o simple circular curve to connect the straight. Calculate all the data necessary to set out the curve by Rankine's method of deflection angles with an interval of 40m.
- ⁷⁾ Two sets of reading were taken in tangential method. The ⁽¹⁰⁾ readings were taken from instrument station P to staff station A & B are shown below

Instrument	Staff	Vertical angles		Staff	"r" in m
station	station	Θ1	Θ2	intercept (s)	[lower hair reading above
				in m	the ground]
Р	А	5°	2º48'	2	1
	В	1º12'	-1º30'	2	0.5

The RL of line of collimation of instrument station is150.00m and Distance between A and B is 182.66m. Find the gradient between staff stations A and B.

^{B)} Derive an expression for calculating the various elements ⁽¹⁰⁾ of Reverse curve connecting two parallel straights, with a neat sketch. Given two Radii R1 and R2 and the central angles $\Delta 1$ and $\Delta 2$.

Calculate all the elements of a simple circular curve having degree of curve 9° and deflection angle is 65° .

⁸⁾ Two straights intersect at an angle of 60°. Calculate all the ⁽¹⁰⁾ data necessary to set out the Bernoulli's Lemniscate curve, which is transitional throughout, if the apex distance is 16m. Take polar deflection angle interval of 2° and tabulate the necessary data with a field check.

^{B)} Explain the principle of EDM and write a short note on ⁽¹⁰⁾ Computing distance from the phase difference method in EDM.