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320453(20)

**B. E. (Fourth Semester) Examination,
April-May 2016**

(New Scheme)

(Civil Engg. Branch)

SURVEYING-II

Time Allowed : Three hours

Maximum Marks : 80

Minimum Pass Marks : 28

Note : Attempt all questions. Part (a) of each question is compulsory. Attempt any two parts out of (b), (c) and (d). Part(a) carries 2 marks each & parts (b), (c) & (d) carry 7 marks each.

Unit-I

1. (a) Define classification of triangulation systems and their permissible error of closures? 2

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- (b) The elevations of two proposed triangulation stations A and B, 160 km apart, are 100 m and 326 m above mean sea level respectively. The elevation of an intervening peak at C, 80 km from A, which is likely to obstruct the line of sight, is 150 m. Ascertain if A and B are inter-visible, and if not, find the height required for the scaffold at B so that the line of sight clears C by 3 m. 7

- (c) Explain the reduction of phase error when the signal is partly illuminated. 7

- (d) A line 3.2 km long is measured with a steel tape 150 m long which is standardized under no pull at 30°C. In section, the tape is 1/6 cm wide and 1/20 cm thick. If half the line is measured at a temperature of 40°C, the other half at 50°C, and the tape is stretched to a pull of 220 N, find the correction to the total length for sag, pull and temperature. The coefficient of expansion is $11 \times 10^{-6} / ^\circ\text{C}$, the weight of the tape material is 77.5 kN/m³ and the elastic modulus E is 2.1×10^8 kN/m². 7

Unit-II

2. (a) Explain "figure adjustment and station adjustment". 2

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(b) The following angles were measured at a station : 7

Angle	Weight
A = 40°36'25"	2
B = 30°12'40"	2
C = 65°30'15"	1
A + B = 70°49'10"	2
B + C = 95°42'52"	1

Find the most probable values of A, B and C.

(c) The following angles were measured at a station O so as to close on the horizon :

$$\angle AOB = 83^\circ 42' 28.75'' , \text{ wt} = 3;$$

$$\angle BOC = 102^\circ 15' 43.26'' , \text{ wt} = 2;$$

$$\angle COD = 94^\circ 38' 27.22'' , \text{ wt} = 4; \text{ and}$$

$$\angle DOA = 79^\circ 23' 23.77'' , \text{ wt} = 2.$$

Adjust the angles by the method of correlates. 7

(d) The angles A, B and C of a triangle ABC have been observed several times with the following results :

$\angle A$	$\angle B$	$\angle C$
58°51'30"	70°47'24"	50°21'12"

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58°51'28"	70°47'22"	50°21'13"
58°51'26"	70°47'25"	50°21'13"
58°51'32"	70°47'23"	50°21'10"
58°51'27"	70°47'26"	
58°51'31"		

Assign weights to the angles by Gauss rule and determine their least squares estimate. 7

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3. (a) What is a subtense theodolite? 2

(b) To find the RL of station B, two observations are taken by a theodolite from station A- one to a BM and the other to the station B. The records are as follows : 7

Inst. station	Staff station	Target	Vertical angle	Staff reading	Remark
A	BM	Lower	-10°0'	0.655	RL of BM
		Upper	-7°0'	2.655	= 510.500 m
B	B	Lower	-5°0'	1.250	
		Upper	+4°0'	3.200	

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Find the RL of B, and the distance between the BM and station B.

- (c) The same distance was measured by a tacheometer and a subtense theodolite. Records of the tacheometer reading are as follows :

Staff intercept = 1.255 m,

Angle of elevation = $5^{\circ}0'$

$$\frac{f}{i} = 100; (f + d) = 0.2$$

Subtense theodolite readings :

Staff intercept = 2 m.

Angle of elevation = $5^{\circ}30'$ (l.o.s. inclined)

Constants = 1000 and 0.3

Find the total number of turns in micrometer. 7

- (d) The following observations were taken using a tacheometer fitted with an anallatic lens, the staff being held vertically :

Inst. station	Height of axis	Staff of station	Vertical angle	Hair reading	Remark
P	1.45	BM	$-6^{\circ}12'$	0.98, 1.54, 2.100	RL of BM = 384.25 m
P	1.45	Q	$+7^{\circ}5'$	0.83, 1.36, 1.89	
Q	1.57	R	$+12^{\circ}21'$	1.89, 2.48, 3.07	

Determine the distances PQ and QR and the RLs of P, Q and R. 7

Unit-IV

4. (a) Define Crab and Drift with neat sketches. 2
- (b) Derive expression to find scale of a photograph. 7
- (c) Explain the phenomenon of relief displacement on a vertical photograph. 7
- (d) Define : 7
- (i) Vertical photograph

(ii) Tilt

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(iii) Exposure station

Unit-V

5. (a) Define the purpose of Hydrographic Surveying? 2
- (b) What is 'Hydrographic Surveying'? Give some examples of its applications? On what principles this type of surveying is based? 7
- (c) Give the different graphical solutions to the locating points at soundings from the angular observations from boat. 7
- (d) A, B and C are three visible stations in a hydrographical survey. The computed sides of the triangle ABC are : AB 1130 m; BC 1372 m; and CA 1889 m. Outside this triangle (and nearer to AC), a station P is established and its position is to be found by three point resection on A, B and C, the angles APB and BPC being respectively $42^{\circ}35'$ and $54^{\circ}20'$. Determine the distances PA and PC. 7