320413 (20)

BE (4th Semester)

Examination, April-May, 2021

Branch : Civil

SURVEYING - II

Time Allowed : Three Hours

Maximum Marks : 80

Minimum Pass Marks : 28

Note : Part (A) of all questions is compulsory (2 marks each). Answer any TWO questions (2 × 7 = 14 marks each) out of three from Part (B).

Unit-I

Part (A)

Q. 1. (a) (1) Distance of visible horizon for a point having an elevation of 637.5 m is : 1

(i) 6.735 km

(ii) 67.35 km

(iii) 10 km

(iv) 100 km

(2) Phase correction is done on : 1

(i) Pole signals

(ii) Beacons

(iii) Cylindrical signals

Part (B)

(b) What is meant by a satellite station and reduction to centre ? Derive expression for

reducing the angles measured at the satellite stations to centre (Any One Case). 7

(c) The altitudes of two proposed stations A and B, 80 km apart are respectively 225 m and 550 m. The intervening obstructions situated at C, 40 km from A has an elevation of 285 m. Ascertain if A and B are intervisible, and if necessary, find by how much B should be raised so that the line of sight must nowhere be less than 3 m above the surface of the ground. 7

(d) A steel tape is 30 m long at a temperature of 20°C when lying horizontally on the ground.

Its sectional area is 0.082 sq.cm, its mass 2 kg and coefficient of expansion 65×10^{-7} per 1°C. The tape is stretched over three equal spans. Calculate actual length between the end graduations under the following conditions : temperature 40°C, pull 180 N. Take E = 2.07 × 107 N/cm^2. 7

Unit-II

Part (A)

Q. 2. (a) (1) Systematic errors are always : 1

(i) Cumulative

(ii) Compensating

(iii) Are always positive

(iv) Always negative

(ii) Theory of probability is applied to : 1

(i) Systematic errors

(ii) Accidental errors

(iii) True errors

Part (B)

(b) The following angles were measured at a station O so as to close the horizon : 7

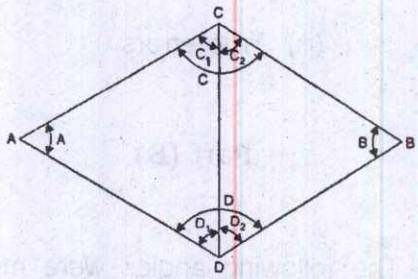
$\angle AOB = 83°42'28".75$ weight 3

$\angle BOC = 102°15'43".26$ weight 2

∠COD = 94°38'27".22 weight 4

∠DOA = 79°23'23".77 weight 2. Adjust the angles.

(c) The following are the measured values of equal weight for two connected triangles ACD and BCD (Figure).



TWO CONNECTED TRIANGLES

A 68°12'24"

B 52°28'46"

C 128°16'30"

D 110°02'25"

C_1 62°18'40"

C_2 65°57'51"

D_1 49°28'59"

D_2 16°33'28"

Adjust the values of the angles. 7

(d) The following round of angles was observed from central station to the surrounding stations of a triangulation survey : 7

A = 93°43'22" weight 3

B = 74°32'39" weight 2

C = 101°13'44" weight 2

D = 90°29'50" weight 3

In addition, one angle $\left(\overline{A+B}\right)$ was measured separately as combined angle with a mean value of 168°16'06" (wt. 2). Determine the most probable values of the angles A, B, C and D.

Unit-III

Part (A)

Q. 3. (a) (i) When the line of sight is inclined and the staff is held vertically, the horizontal distance is given by : 1

- $\frac{f}{i} \times S\cos^2\theta + (f+d)\cos\theta$
- $\frac{f}{i} \times S\sin^2\theta + (f+d)\sin\theta$
- $\frac{f}{i} \times S\cot^2\theta + (f+d)\cot\theta$

(ii) As the distance between the tacheometer and staff increases, the staff intercept by stadia hair 1

- Increases
- Decreases
- Remain constant

(Part – B)

(b) What are the constants of a tacheometer and how are they determined ? 7

(c) A tacheometer was set up at station 'A' and the following readings were obtained on a vertically held staff.

Station	Staff station	Vertical Angle	Hair readings	Remarks
A	B.M.	–2°18'	3.225, 3.550, 3.875	R.L. of B.M. =425.515 m
	B	+8°36'	1.650, 2.515, 3.380	

Calculate the horizontal distance from A to B and the R.L. of B if the constants of the instruments are 100 and 0.4. **7**

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

Inst. Station	Height of axis	Staff station	Vertical angle	Hair readings	Remarks
P	1.45	BM	–6°12'	0.98, 1.54, 2.100	RL of BM = 384.25 m
P	1.45	Q	+7°5'	0.83, 1.36, 1.89	
Q	1.57	R	+12°21'	1.89, 2.48, 3.07	

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

Unit-IV

Part (A)

Q. 4. (a) Write the expression for length of line

between two stations of different elevations as from an aerial photograph ? 2

Part (B)

(b) Prove that ratio of Tilt Displacement of a point not on the principal line to that of a point on a principal line = Secant of angle at isocentre from principal line to the point. 7

(c) Derive an expression for scale of a tilted photograph. 7

(d) Explain the calculation of amount of relief displacement ? 7

Unit-V

Part (A)

Q. 5. (a) Give some examples of the applications of 'hydrographic surveying' ? **2**

Part (B)

(b) What is meant by sounding ? Explain the method of observation of sounding from a sounding boat, case – Ranging and one angle from the boat ? **7**

(c) Explain the various equipments used for taking soundings ? **7**

(d) An observer taking soundings from a boat wished to locate his position P. He measures an angle to two A and B, AP at right angles to AB. If the measured angle APB is 29° and distance AB is 550 m, calculate the boat position from A ? 7