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Fourth Semester B.E. Degree Examination, June/July 2023
Advanced Surveying

Time: 3 hrs.

Max. Marks: 100

Note: *Answer any FIVE full questions, choosing ONE full question from each module.*

Module-1

1   a. Explain the Repetition method of measuring horizontal angles by a transit theodolite. List the errors eliminated by this method. **(10 Marks)**

   b. To measure the elevation of a tower , observations were made from two instrument stations P & Q. Determine the elevation to the top of the tower.

Top of tower	Station Points	Horizontal Angle	Vertical Angle	Staff reading	Remarks
R	P	62° 18′	20° 12′	2.240 mts	• R.L of BM = 500 mts
	Q	72° 42′	21° 06′	3.300 mts	• Distance b/w P & Q = 80 mts

(10 Marks)

OR

2   a. Define the following with reference to a theodolite : **(04 Marks)**
      i) Horizontal Axis ii) Line of Collimation   iii) Left Face Observation   iv) Swinging.

   b. Explain the horizontal axis adjustment of a transit theodolite by the spine test. **(06 Marks)**

   c. The top of a signal spine P was sighted from two points A & B, being at very different levels and in line with 'P' the angle of elevation from A & B to P were 40° 20′ and 20° 30′ respectively. The angle of elevation from B to a target 2.5m above the foot of the staff held at A is 16° 15′. The height of instrument A and B are 1.750 mts and 1.545 mts. The horizontal distance between A and B was 100 mts. The R.L of B was 150.500 mts. Determine the RL of P and horizontal distance of the signal spire from B. **(10 Marks)**

Module-2

3   a. Derive the distance and elevation formula for a staff held vertical and line of sight being inclined in tachometry. **(06 Marks)**

   b. Explain Satellite stations and Reduction to centre. **(04 Marks)**

   c. To determine the gradient between two points A & B, the following observations were made with a tacheometer fitted with an analytical lens and having multiplying constant 100, with the staff kept vertical. **(10 Marks)**

Instrument e	Staff e	Bearing	Vertical angle	Stadia Reading
P	A	134°	+10° 32′	1.360, 1.915, 2.470
	B	224°	+ 5° 6′	1.065, 1.885, 2.705

OR

4   a. Explain First order , Second order and Third order triangulation system. **(06 Marks)**

   b. What are important factors to be considered in selection of site for a base line? **(06 Marks)**

   c. From an eccentric station S, 12.25 mts to nest of main station B, the following angles were measured $\angle BSC = 76° 25′ 32″$; $\angle CSA = 54° 32′ 20″$. The stations S and C are to opposite sides of line AB. Calculate the correct angle ABC if the length of AB and BC are 5286.50 and 4932.20 mts respectively. **(08 Marks)**

Module-3

5 a. Define the following with a neat sketch : i) Point of curvature ii) Length of long chord iii) Deflection angle iv) Vertex distance. **(04 Marks)**

   b. Explain various types of vertical curves with sketches. **(04 Marks)**

   c. The following data refer to a compound curve which bears to right :
   - Total deflection angle = 93° • Degree of 1st curve = 4° • Degree of 2nd curve = 5°
   - Point of intersection is at 45 + 21 (20m units).

   Determine in 20mts units the running distance of the tangent points and point of compound curvature , given the latter is 6 + 24 from point of intersection @ back angle of 290° 36′ from the 1st tangent. **(12 Marks)**

OR

6 a. What is Transition curve? List the functions and essential requirements of an ideal transition curve. **(04 Marks)**

   b. A road bond deflects 80° and is to be designed for a maximum speed of 100 kmph and centrifugal ratio ¼. The maximum rate of change of acceleration = 30cm/sec^3. The curve consists of a circular are combined with two spirals. Calculate the radius of circular curve , length of transition curve, total length of combined curve, chainages at beginning and end of transition curve and junctions of transition curve with circular curve? The chainage at point of intersection is 42862 mts. **(08 Marks)**

   c. Explain the method of setting out simple curve by deflection distances method. **(08 Marks)**

Module-4

7 a. Define the following : i) Vertical photograph ii) Nadir point iii) Drift iv) Exposure station v) Flight line vi) Focal length. **(06 Marks)**

   b. Explain Scale of a vertical photograph. **(04 Marks)**

   c. Two points A & B having elevations 500mts and 300mts respectively above datum appear on a vertical photograph having focal length 20cm and flying altitude of 2500 mts their corrected photographic coordinates are

Point	X(cm)	Y(cm)
a	+ 2.64	+ 1.36
B	- 1.92	+ 3.65

   Determine the length of the ground AB. **(10 Marks)**

OR

8 a. What is Relief displacement? Derive its expression. **(08 Marks)**

   b. List the reasons for overlap. **(04 Marks)**

   c. The scale of a aerial photograph is 1cm = 100m. The photography size is 30cm × 20cm. Determine the number of photographs required to cover an area 10km × 10km, if the longitudinal overlap is 60% and side lap is 30%. **(08 Marks)**

Module-5

9 a. Mention advantages of total station and describe its working principle. **(10 Marks)**

   b. Define Remote Sensing. Explain the idealized remote sensing system. **(10 Marks)**

OR

10 a. Explain GIS and mention its applications in Civil Engineering. **(10 Marks)**

    b. Define GPS. Explain the working principle of GPS. **(10 Marks)**

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