Total No. of printed pages = 4

CE 181305

Roll No. of candidate

5/3/22 **2021**

B.Tech. 3rd Semester End-Term Examination

Civil Engineering

ENGINEERING SURVEY – I

(New Regulation & New Syllabus)

Full Marks – 70   Time – Three hours

The figures in the margin indicate full marks

for the questions.

Answer question No. 1 and any *four* from the rest.

1. Answer the following (Multi choice Questions) : $(10 \times 1 = 10)$

    (i)   Distance between two consecutive tallies in a 20 meter metric chain is

        (a) 1 meter   (b) 2 meter

        (c) 3 meter   (d) 5 meter

    (ii) The nature of error arising due to non-horizontality of chain is

        (a) Cumulative, +   (b) Compensating, ±

        (c) Cumulative, –   (d) Cumulative, ±

    (iii) The length of a line measured with a 20 meter chain was found to be
          250 meter. The true length of the line if the chain was 10 cm too long

        (a) 251 m   (b) 251.25 m

        (c) 250.75 m   (d) 251.50 m

    (iv) 200° in Whole Circle Bearing, if is converted to Quadrantal bearing system
          becomes

        (a) S 20°W   (b) W 70°S

        (c) N 20°E   (d) E 20°N

                                                              [Turn over

(v) Which one of the following is a method adopted for locating pane table stations?

(a) Radiation   (b) Intersection

(c) Resection   (d) Leveling

(vi) A level was set up at a point A and distance to the staff station B was 1000 m. The net combined correction due to curvature and refraction is

(a) −0.0673 m   (b) −0.00673 m

(c) 0.0673 m   (d) 0.00673 m

(vii) If bearing of $AB=40°$, bearing of $BC=120°$, then $\angle ABC=$

(a) 40°   (b) 60°

(c) 80°   (d) 120°

(viii) The radius of one-degree curve is

(a) 1,760 m   (b) 1,690 m

(c) 1,790 m   (d) 1,719 m

(ix) The desirable multiplying and additive constant for a Tacheometer

(a) 100 and 0.3   (b) 50 and 0.5

(c) 100 and 0   (d) 100 and 0.5

(x) A circular curve has a 200m radius and 60° deflection angle The tangent length of the curve is

(a) 346.41 m   (b) 146.41 m

(c) 115.47 m   (d) 315.47 m

2. (a) Illustrate the method of intersection in plane table surveying with a neat diagram only. (3)

(b) The following perpendicular offsets were taken from a chain line to a hedge:

Chainage (m)	0	10	20	30	40	50	60	70	80
Off sets (m)	3.25	5.60	4.20	6.65	8.75	6.20	3.25	4.20	5.65

Calculate the area between the survey line, the hedge and the offsets by Simpson's 1/3rd rule. (5)

(c) How would you measure the length between two points A and B separated by a pond? It is not possible to go to point B (although it is visible) and the instruments you have are Chain/Tape, Ranging rods, cross staff and arrows, illustrate with relevant figure and geometry. (4)

(d) A 20-meter chain was found to be 20.10 m at the beginning and 20.30 m at the end of the work. The area of the plan drawn to a scale of 1 cm = 8m was measured with the help of a planimeter and was found to be 32.56 sq. cm. Find the true area of the field. (3)

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3. (a) The magnetic bearing of a line AB is S25°30'E. Calculate the true bearing if the declination is 7°30' West. (3)

(b) The following bearings were observed while traversing with a compass

Line	Fore Bearing	Back bearing	Line	Fore Bearing	Back bearing
AB	45°45'	226°10'	CD	29°45'	209°10'
BC	96°55°	277°5°	DE	324°48'	144°48'

Mention which stations are affected by local attraction and determine the corrected bearings. (6)

(c) A railway embankment is 10 m wide with side slopes 1.5 to 1. Assuming the ground to be level in a direction transverse to the centre line, calculate the volume contained in a length of 120 metres, the centre heights at 20 m intervals being in metres 2.3, 3.7, 3.8, 4.0, 3.8, 2.8, 2.5. (6)

4. (a) A steel tape 20 m long standardized at 55°F with a pull of 10kg was used for measuring a base line. Find the total correction per tape length, if the temperature at the time of measurement was 80° F and the pull exerted was 16 kg. Weight of 1 cubic cm of steel is 7.86 g, weight of tape is 0.8 kg and $E = 2.109 \times 10^6$ kg/cm². Co-efficient of expansion of tape per 1°F is 6.2×10^{-6}. (6)

(b) Explain the characteristics of contour with suitable neat sketch. (5)

(c) What are the different methods of contouring? Describe any one of them. (4)

5. (a) Explain the effect of curvature and refraction in Levelling. (3)

(b) The staff readings for a survey work were as follows:

1.810, 2.110, 1.225, 1.455, 0.905, 2.435, 2.810, 2.675 and 1.765. The level was shifted after 4th and 7th readings. Work out the R.L. of all the stations, if R.L. of first station is 50.000m. (6)

(c) The following details refer to reciprocal level taken with a level. (6)

Instrument at	Staff Readings on		Remarks
	A	B	
A	1.415	2.875	Distance between A & B = 1150 m
B	0.670	1.995	R.L of B = 250.000 M

Find R.L. of station A and collimation error if any.

6. (a) Explain how you would measure horizontal angle by repetition method with a theodolite. (4)

(b) Explain short notes on :

    (i) Transiting

    (ii) Swinging the telescope

    (iii) Balancing a traverse. (4)

(c) The following table gives the latitudes and departures of the sides of a closed traverse ABCD.

Side	Latitude in meters		Departure in meters	
	N	S	E	W
AB	109.40		68.20	
BC		128.40	112.90	
CD		79.60		48.20
DA	98.10			132.90

Calculate the independent co-ordinate of the stations. (7)

7. (a) Derive an expression for horizontal distance and vertical distance of height for a vertically held staff when line of sight is inclined. (6)

(b) A was held vertically at horizontal distance of 50m and 100m from the center of a theodolite fitted with stadia hairs and the staff intercepts with the telescope horizontal were 0.550m and 1.855m respectively. The instrument was then set over P of RL. 250.500m and height of instrument was 1.580m. The hair reading on the staff held vertically at station Q were 1.205, 1.940 and 2.675m, while the vertical angle was 10°30/. Find the distance PQ and the R.L. of Q. (9)

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