

**SURVEYING
(CIVL 2101)**

Time Allotted : 3 hrs

Full Marks : 70

Figures out of the right margin indicate full marks.

Candidates are required to answer Group A and any 5 (five) from Group B to E, taking at least one from each group.

Candidates are required to give answer in their own words as far as practicable.

**Group - A
(Multiple Choice Type Questions)**

1. Choose the correct alternative for the following: **10 × 1 = 10**
- (i) In the Trapezoidal Formula, the line joining the top of the ordinates is assumed to be
 (a) elliptical (b) straight
 (c) circular (d) parabolic.
- (ii) In Simpson's formula, the number of ordinates cannot be taken as
 (a) 8 (b) 9 (c) 10 (d) 12.
- (iii) For a 2^o curve on 20-m chord having a deflection angle of 36^o, the tangent length is
 (a) 118 m (b) 177 m
 (c) 248.2 m (d) 363.27 m.
- (iv) Triangulation is based on the principle, that knowing
 (a) three sides, the angles can be calculated precisely
 (b) three angles, the sides can be calculated precisely
 (c) two sides and one angle, the remaining side and angles can be determined precisely
 (d) one side and three angles, the remaining sides can be calculated precisely.
- (v) The global positioning system operated by the US department of defence uses
 (a) 6 satellites (b) 12 satellites
 (c) 18 satellites (d) 24 satellites.
- (vi) If the QB of a survey line is S43°30'E, what will be the WCB?
 (a) 45°30' (b) 55°30'
 (c) 133°30' (d) 136°30'.

- (vii) In chain surveying, perpendiculars to the chain line are set out by
 (a) a theodolite (b) a prismatic compass
 (c) a clinometer (d) an optical square.
- (viii) If the BB of a survey line is 215°30', what will be the FB?
 (a) 35°30' (b) 245°30'
 (c) 55°30' (d) 120°30'.
- (ix) The operation of revolving the telescope in a horizontal plane about its vertical axis is called
 (a) swinging (b) transiting
 (c) face right (d) face left.
- (x) If the FB of a survey line is N45°30'E, what will be the BB?
 (a) S45°30'W (b) N39°30'W
 (c) N39°30'E (d) S50°30'W.

Group - B

2. (a) The self-weight of a tape is 30 N. the length of the tape is 100 m. The tape is suspended between its two ends with a pulling force of 200 N. Determine the correct horizontal distance between the two ends of the tape.
- (b) The distance between two survey stations was 1200 m when measured with a 20 m chain. The same distance when measured with a 30 m chain, was found to be 1195 m. If the 20 m chain was 0.05 m too long, what was the error in the 30 m chain?
- (c) Write down the names of different accessories needed for chain surveying.

3 + 6 + 3 = 12

3. (a) The true bearing of a survey line is S40°30' W. What will be the magnetic bearing if the declination is 10°15' E?
- (b) Differentiate between isogonic survey lines and isoclinic survey lines.
- (c) The following bearings were taken in running a closed compass traverse while surveying:

Line	Fore Bearing	Back Bearing
AB	48°25'	230°00'
BC	177°45'	356°00'
CD	104°15'	284°55'
DE	165°15'	345°15'
EA	259°30'	79°00'

State the stations which are affected by local attraction and by how much.

Determine the correct bearings. Calculate the true bearings, if the declination was $1^{\circ}30'$ W.

$$2 + 2 + (3 + 3 + 2) = 12$$

Group - C

4. (a) Derive the formula for curvature correction and refraction correction in levelling work.
- (b) In order to find the difference in elevation between two points A and B, a level was set up on the line AB, 50 m from A and 1300 m from B. A and B being on the same side of the instrument. The readings obtained on staff held at A and B were 0.435 m and 3.950 m, respectively. Find the true difference in elevation between A and B.
- $$(4 + 4) + 4 = 12$$
5. (a) A levelling staff is held vertical at distances of 100 m and 300 m from the axis of a tacheometer and the staff intercept for horizontal sights are 0.99 m and 3.00 m, respectively. Find the constants of the instrument.
- (b) The aforementioned instrument is set up at a station A and the staff is held vertical at a point B. With the telescope inclined at an angle of depression of 10° to the horizontal, the readings on the staff are 2.670, 1.835, 1.000 m. Calculate the R.L. of B and its horizontal distance from A. The H.I. is 1.42 m and R.L. is 450.5 m.
- (c) Write down different parts of a transit theodolite.
- $$4 + 5 + 3 = 12$$

Group - D

6. (a) The following offsets were taken at 15 m intervals from a survey line to an irregular boundary line: 3.50, 4.30, 6.75, 5.25, 7.50, 8.80, 7.90, 6.40, 4.40, and 3.25 m. Calculate the area enclosed between the survey line, the irregular boundary line, and the first and last offsets, by:
- (i) The Trapezoidal rule
- (ii) Simpson's rule.
- (b) A curve is designated as a 4° curve (20-m arc). The deflection angle is 40° . Calculate the offsets from the long chord at 10-m intervals.
- $$(3 + 3) + 6 = 12$$
7. (a) Two tangents intersect at chainage 1250 m. The deflection angle is 30° . Calculate all data necessary for setting out a curve of radius

250 m by Rankine's deflection angle method. The peg intervals may be taken as 20 m. Prepare a setting out table.

- (b) What do the terms, 'back tangent' and 'forward tangent' mean?
- $$10 + 2 = 12$$

Group - E

8. (a) Explain working principle of EDM instrument by phase difference method.
- (b) Define the term sounding.
- (c) What is GPS?
- $$6 + 2 + 4 = 12$$
9. (a) Describe the procedure for locating of sounding positions by 'Two Angles From Boat Method' with neat sketch.
- (b) Explain briefly the following terminologies used in aerial photogrammetry:
- (i) Isocentre
- (ii) Plumb points
- (iii) Homologous points
- (iv) Vertical photograph.
- $$4 + (4 \times 2) = 12$$