

- (vii) The distance formula for finding distances using a theodolite, for a horizontal line of sight, is  
 (a)  $Ks+C$  (b)  $K+Cs$  (c)  $K/s+C$  (d)  $K+C/s$ .
- (viii) A transition curve is essentially used to  
 (a) generate more frictional forces for stability.  
 (b) allow vehicles to have increased speed while driving.  
 (c) neglect the effect of centrifugal forces.  
 (d) avoid abrupt change in radius from a straight line to a finite radius curve.
- (ix) A total station can measure  
 (a) distances electronically  
 (b) horizontal angles accurately  
 (c) vertical angles and distances  
 (d) horizontal and vertical angles and distances.
- (x) The zero graduation in a prismatic compass is marked in which position of the circle?  
 (a) North end (b) South end  
 (c) East end (d) West end.

**Group - B**

2. (a) Define surveying. State the basic differences between Plane and Geodetic Surveying.
- (b) A 20 m chain was tested before the commencement of the day's work and found to be 10cm too short. After chaining 910 m, the chain was found to be 20cm too long. At the end of day's work, after chaining a total distance of 1526 m, the chain was found to be 25cm too long. What was the true distance chained?

**4 + 8 = 12**

3. (a) Briefly describe the Radiation method of Plane Table with the help of a neat sketch.
- (b) The following bearings were observed while traversing an area with a compass:

Line	FB	BB
PQ	S36°15'E	N36°15'W
QR	S44°30'W	N45°30'E
RS	N71°45'W	S71°00'E
ST	N14°00'E	S14°30'W
TP	N61°15'E	S61°00'W

Find the local attraction at the affected stations and also the corrected bearings.

**4 + 8 = 12**

**Group - C**

4. (a) The following consecutive readings were taken with a level on continuously sloping ground at a common interval of 15 m. The readings are 0.320, 1.125, 2.265, 2.950, 3.615, 0.535, 1.460, 2.815, 3.105, 3.445, 0.605, 1.925, and 2.885. The last station has an elevation of 100.000 m. Rule out a page of level book and enter the readings. Calculate the reduced levels of the points by Rise and Fall method.
- (b) Write down the characteristics of contour lines. What is meant by topographic map?
5. (a) Write a brief note on method of repetition.
- (b) What is meant by fixed hair stadia method and movable hair stadia method in tacheometry?
- (c) To determine the elevation of station P in a tacheometric survey, the following observations were made with the staff held vertical. The instrument was fitted with an anallactic lens and its multiplying and additive constant were 100 and 0 respectively. If R.L. of B.M. is 250 m, calculate R.L. of station P. Calculate the horizontal distance between B.M. and station P.

**6 + (4 + 2) = 12**

Instrument station	H.I. (m)	Staff Station	Vertical angle	Staff readings (m)
O	2.45	B.M.	-5°00'	1.335,1.895,3.460
O	2.45	C.P.	+9°30'	0.780,1.265,2.745
P	2.40	C.P.	-6°30'	1.155,1.615,2.075

**2 + 2 + 8 = 12**

**Group - D**

6. (a) A chain line was divided into seven sections of 30m each and offsets were taken from the chain line to a hedge. The lengths of the offsets were (in m): 0, 2.65, 3.80, 3.75, 4.65, 3.60, 5.00 and 5.80. Find the area between the chain line, the first and last offsets, and the boundary by (i) trapezoidal rule and (ii) Simpson's rule.

- (b) A single-level section has a formation width of 7.5 m and side slopes 2:1. The depth of cutting at the centre at 30 m intervals are 1.8 m, 2.175 m, 2.55m, 2.925m and 3m. Find the volume of earthwork in the length of 120 m by both prismoidal formula and trapezoidal formula.

**4 + 8 = 12**

7. (a) A curve has a radius of 400 m and a deflection angle of 40°. The chainage of T1 is 1208.25 m. Compute and tabulate the angles and theodolite readings to set out the curve by Rankine's Method.

- (b) Explain the following with necessary figures:  
(i) Back tangent (ii) Deflection angle (iii) Long chord (iv) Tangent length.

**8 + 4 = 12**

**Group - E**

8. (a) Describe basic concept of Triangulation. What are the objectives of Hydrographic surveying?

- (b) Mention the various equipment used for sounding and describe them in brief.

**(2 + 2) + 8 = 12**

9. (a) Describe with a neat sketch Location of a sounding point by Tacheometry.

- (b) A sounding was located by one angle from boat and one angle from the shore. P and Q were shore signals 934 m apart. The angle measured were  $\angle SPQ = 76^{\circ}42'$  and  $\angle PSQ = 32^{\circ}56'$ . Find the coordinates of S with respect to P.

**4 + 8 = 12**

**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) Length of a Gunter's chain is  
(a) 33ft (b) 22ft (c) 66ft (d) 100ft.
- (ii) A chain was used to mark a distance of 150 metres. The designated length of the chain was 30 meters. On testing, the chain was found to be 30.01 m long. The actual length measured is  
(a) 149.95 m (b) 150.00 m  
(c) 150.05 m (d) 151.00 m.
- (iii) A 2° curve of chord length 20 m has radius of  
(a) 573 m (b) 286.5 m (c) 143 m (d) 72.5 m.
- (iv) Which of the following accessories is not used in plane table surveying?  
(a) Alidade (b) Trough compass  
(c) Prismatic compass (d) Plumbing fork.
- (v) Whole Circle Bearing of a line is 120°15'. Its Reduced Bearing is  
(a) S59°45'E (b) N30°15'E  
(c) S30°15'E (d) S120°15'E.
- (vi) Bearing of line AB is 185°34'20'' and BC is 235°46'40''. The included angle between them is  
(a) 50°12'20'' (b) 61°30'00''  
(c) 124°13'20'' (d) 129°47'40''.