

**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) 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'.
- (ii) A scale of 1 cm = 2 km is represented as a representative fraction as  
 (a) 1:2000 (b) 1:20000  
 (c) 1:200000 (d) 1:2000000.
- (iii) If the BB of a survey line is S40°15'E, what will be the corresponding FB?  
 (a) S40°15'W (b) N40°15'W  
 (c) N39°45'W (d) S50°45'W.
- (iv) In WCB system, a line is said to be free from local attraction, if the difference between the FB and BB is  
 (a) 0° (b) 45° (c) 180° (d) 90°.
- (v) If the FB of a survey line is 310°30', what will be the BB?  
 (a) 40°30' (b) 50°30'  
 (c) 130°30' (d) 220°30'.
- (vi) Which of the following accessories is not used in plane table surveying?  
 (a) Alidade (b) Trough compass  
 (c) Prismatic compass (d) Plumbing fork.
- (vii) The vertical distance between two adjacent contour lines is called a  
 (a) contour gradient (b) vertical equivalent  
 (c) contour interval (d) contour equivalent.

- (viii) The position of a point can be located in GPS on receiving signals from at least  
 (a) 1 satellite (b) 2 satellites  
 (c) 3 satellites (d) 4 satellites.
- (ix) 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.
- (x) 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)  $K + C/s$ .

**Group - B**

2. (a) What is a three-point problem? Explain, with a neat sketch, the procedure of solving a three-point problem in plane table surveying.
- (b) A 30-m-long tape was standardized at 20 °C and under a pull of 100 N. The tape was used to measure a distance AB when the temperature was 45 °C and the pull was 150 N. The tape was supported at the ends only. Find the corrections per tape length if the cross-section of the tape was 4 mm<sup>2</sup>, the unit weight of the tape material is 0.0786 N/mm<sup>3</sup>, and the coefficient of thermal expansion of the tape material is  $11.5 \times 10^{-6} / ^\circ\text{C}$ . Assume that  $E = 2,000,000 \text{ kN/m}^2$ .

**8 + 4 = 12**

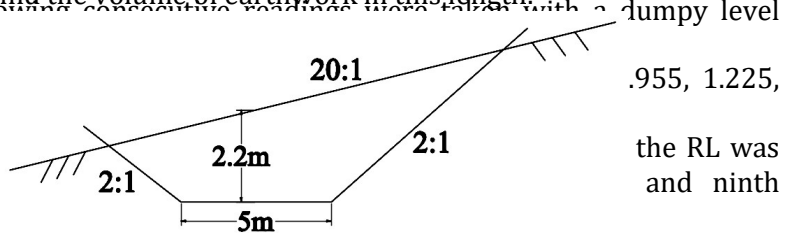
3. (a) Define the following:  
 (i) True meridian and magnetic meridian  
 (ii) Local attraction.
- (b) The following are the observed bearings of the lines of a traverse ABCDEA with a compass in a place where local attraction was suspected.

Line	Fore Bearing	Back Bearing
AB	188°45'	7°45'
BC	118°15'	298°15'
CD	346°35'	166°30'
DE	337°05'	158°10'
EA	293°30'	113°00'

Find the correct bearings of the lines.

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

- (b) The two-level sections shown in figure are constant over a length of 120 m. Find the volume of earthwork in this length.
4. (a) The following consecutive readings were taken with a dumpy level along a line of levels. The first and last readings were 3.250, 2.40 and 1.955, 1.225 respectively. The first and last reduced levels were 97.085 and 98.125 respectively. Find the RL of the first and ninth readings.



- (b) What are the characteristics of contour lines? **8 + 4 = 12**

**Group - E**

5. (a) The following observation were made using a tacheometer fitted with an anallactic lens, the multiplying constant being 100. Calculate the distance AB, and the RLs of A and B. Find also the gradient of the line AB.

Inst. Station	(i) Height of inst.	(ii) Staff station	(iii) WCB	(iv) Vertical angle	(v) Vertical Hair readings	Remarks
0	1.550	A	30°30'	4°30'	1.150, 1.750, 2.350	RL of 0 = 150.00
		B	75°30'	10°15'	1.250, 2.000, 2.750	

9. (a) What are the differences between Plane Surveying and Geodetic Surveying?

**8 + 4 = 12**

- (b) Explain briefly the following terminologies used in aerial photogrammetry:

**Group - D**

6. (a) (i) Flying height  
 (ii) Air base  
 (iii) Plumb points
- (b) What do you mean by the terms 'Long chord' and 'Centre of curvature'?

**4 + 8 = 12**

**8 + 4 = 12**

7. (a) The following offsets were taken at 10 m intervals from a survey line to an irregular boundary line: 0, 2.50, 3.80, 5.00, 4.70, 3.20, 0 m. Find 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 1/3<sup>rd</sup> rule.