

- (iv) The projection of a traverse line on a line parallel to the meridian is known as of the _____ line.
- (v) The latitude and departure of a traverse line are both positive when WCB of the line lies in the _____ quadrant.
- (vi) When the angular and linear measurements are equally precise in traversing, the balancing of the traverse is done by _____.
- (vii) The method of surveying used for determining the relative height of points on the surface of the earth is called _____.
- (viii) A staff reading taken on a BM or a point of known elevation is called _____.
- (ix) The vertical distance between any two consecutive contours is called _____.
- (x) An alidade used with the plane table is used for _____ objects.
2. (a) Draw a neat sketch to indicate the following: level surface, horizontal surface, vertical line, level line and horizontal line. (5)
- (b) Explain the different problems in leveling. (5)
- (c) The following readings are reciprocal leveling observation across a river between two points A and B. Find the true difference in elevation between the two points: (5)

Instrument at	Staff reading at A	Staff reading at B
A	1.440	2.615
B	1.775	2.950

3. (a) What do you understand by the terms transiting and swinging of telescope? What is deflection angle? (2 + 2 = 4)
- (b) A theodolite was set up at station A and the staff reading on a BM of elevation 250.555 was 2.525 m. The staff was then placed at a station P and the vertical angle reading at the 4 m mark of the staff was $10^{\circ}30'$. Find the RL of station P, if the distance between the instrument and station P was 170 m. (6)
- (c) Explain the Bowditch's rule and Transit rule of balancing a traverse. (2.5 + 2.5 = 5)
4. (a) Why horizontal equivalent cannot be constant in a contour map? Explain the direct methods of contouring. Explain the advantages and disadvantages of these methods. (2 + 2 + 4 = 8)
- (b) Explain the terms: Contour line, contour interval, horizontal equivalent, contour map, leveling, profile leveling, reciprocal leveling. (1 × 7 = 7)
5. (a) Explain the basic principle of tacheometry. What are its uses? (3 + 2 = 5)
- (b) A tacheometer was set up at station P and observations were made to a staff held normal to the line of sight over point Q. The vertical angle measured was $6^{\circ}36'$. The three hair readings were 1.905, 2.480 and 3.055. The reading from P, with the line of sight horizontal to a BM of RL 852.55 was 1.855. If the instrument constants are 100 and 0.5, find the RL of Q. (6)
- (c) Explain the tangential method of tacheometric measurement. (4)

6. (a) Explain the orientation of plane table by method of backsighting. (3)
- (b) Discuss the advantages and disadvantages of plane table surveying. (5)
- (c) Explain the procedure to get the difference in elevation between the instrument station and the object if the base of the object is inaccessible and instrument station in same vertical plane. (7)
7. (a) Discuss the temporary adjustments of a level. (5)
- (b) The following figures were extracted from a level field book, some of the entities being illegible. Insert the missing figures, check your results and re-book all the figures. (10)

Station	B.S.	I.S.	F.S.	Rise	Fall	RL	Remarks
1	2.285					232.46	BM 1
2	1.650		X	0.020			
3		2.105			X		
4	X		1.960	X			
5	2.050		1.925		0.300		
6		X		X		232.255	BM 2
7	1.690		X	0.340			
8	2.865		2.100		X		
9			X	X		233.425	BM 3