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(16)

⇒ Merit of Combination method.

- \* More rapid and saves time
- \* It is not easy to spot errors (Consists of only two checks)

⇒ Rise and fall method.

- \* It is more tedious and longer and takes time
- \* It is easier to spot errors (Consists of three checks)
- \* The system is suitable for fly leveling when they are no intermediate sights

(16)

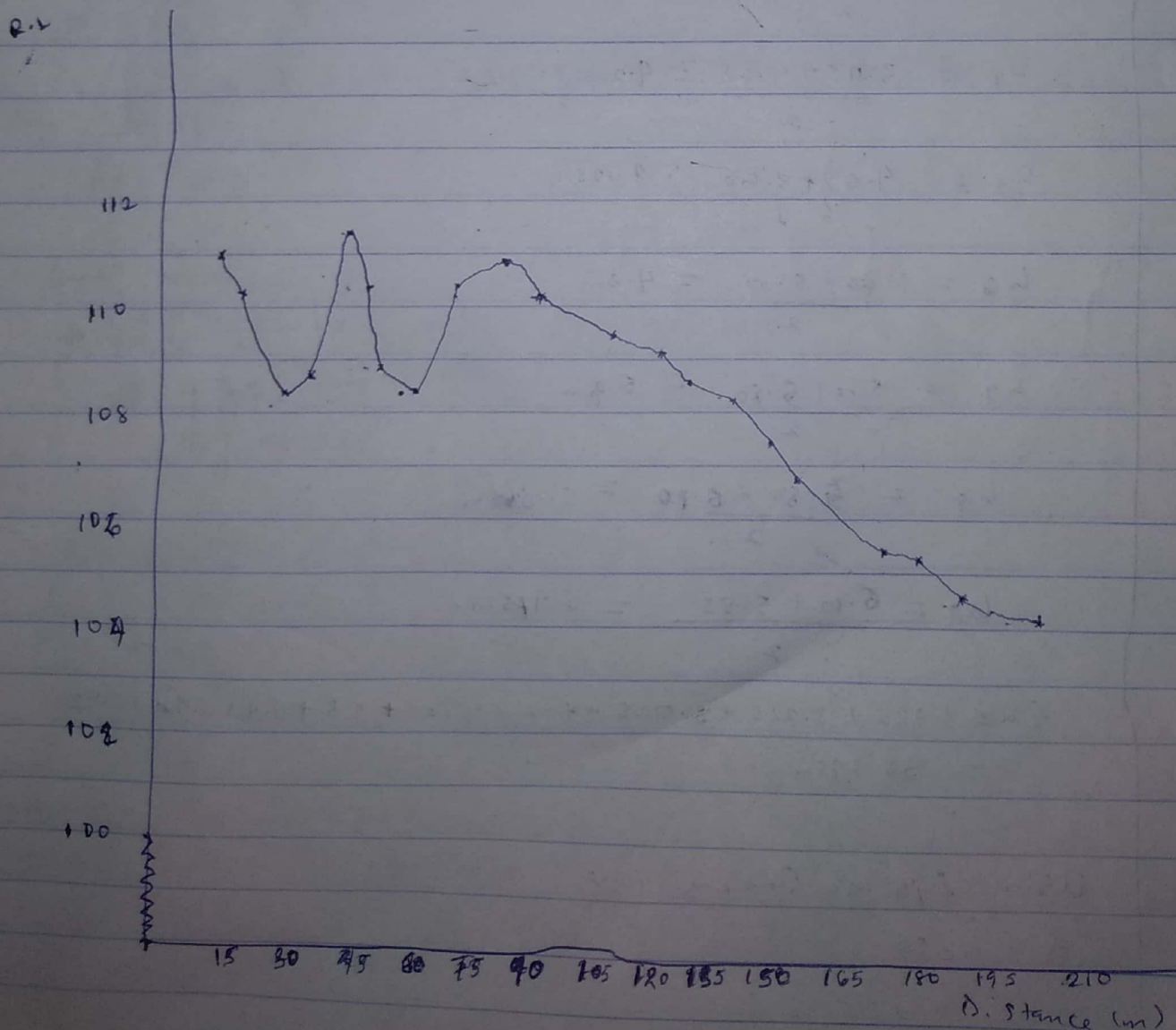
B.S	I.S	F.S	H.O.C	R.L	Distance
0.771			111.771	111	10
0.802		1.52	111.053	110.251	20
	2.311			108.742	30
3.580		1.990	112.643	109.063	40
	1.220			111.423	50
	3.675			108.968	60
2.408		4.020	111.031	108.623	70
	0.339			110.692	80
0.980		0.158	111.654	110.874	90
	1.535			110.119	100
	1.955			109.679	110
	2.430			109.224	120
	2.985			108.649	130
1.155		3.480	109.329	108.194	140
	1.960			107.369	150
	2.365			106.964	160

B.S	I.S	F.S	M.O.C	R.L	Distance
0.935		3.640	106.624	105.689	170
	1.045			105.589	150
	1.630			104.994	190
		2.545		104.029	200
$\Sigma = 10.431$		$\Sigma = 17.352$			

$$\begin{aligned} \text{Check} &= \Sigma F.S - \Sigma B.S = R.L \text{ at first point} - R.L \text{ at last point} \\ &= 17.352 - 10.431 = 111 - 104.079 \\ &= 6.921 = 6.921 \end{aligned}$$

~~GRAPH OF~~

GRAPH OF R.L AGAINST DISTANCE



Question 2

(a)

Chainage (m)	0	30	60	90	120	150	180	210	240	270
Offset length (m)	0	2.65	3.80	3.75	4.65	3.60	5.00	5.80	6.10	5.85

Solution

Using mid ordinate rule

$A = \Sigma h d$

$$h_1 = \frac{0 + 2.65}{2} = 1.325 \text{ m}$$

$$h_2 = \frac{2.65 + 3.80}{2} = 3.225 \text{ m}$$

$$h_3 = \frac{3.80 + 3.75}{2} = 3.775 \text{ m}$$

$$h_4 = \frac{3.75 + 4.65}{2} = 4.2 \text{ m}$$

$$h_5 = \frac{4.65 + 3.60}{2} = 4.125 \text{ m}$$

$$h_6 = \frac{3.60 + 5.00}{2} = 4.3 \text{ m}$$

$$h_7 = \frac{5.00 + 5.80}{2} = 5.4 \text{ m}$$

$$h_8 = \frac{5.80 + 6.10}{2} = 5.95 \text{ m}$$

$$h_9 = \frac{6.10 + 5.85}{2} = 5.975 \text{ m}$$

$$\Sigma h = 1.325 + 3.225 + 3.775 + 4.2 + 4.125 + 4.3 + 5.4 + 5.95 + 5.975 = 38.275 \text{ m}$$

Using Average Ordinate rule

$$A = \frac{ndzo}{n+1}$$

$$8 \times 30 \times 41.2$$

9

$$A = 1098.7 \text{ m}^2$$

Using Trapezoidal Rule.

$$A = d \left[ \frac{O_1 + O_n}{2} + O_2 + O_3 + \dots + O_{n-1} \right]$$

$$A = 30 \left[ \frac{0 + 5.85}{2} + 2.65 + 3.80 + 3.75 + 4.65 + 3.60 + 5 + 5.8 + 6.1 \right]$$

$$A = 30 [38.25]$$

$$= 1147.5 \text{ m}^2$$

Using Simpsons rule.

$$A = \frac{d}{3} \left[ (O_1 + O_n) + 4(O_2 + O_4 + \dots + O_{n-1}) + 2(O_3 + O_5 + O_7 + O_{n-2}) \right]$$

$$d = 30$$

$$\frac{30}{3} \left[ (0 + 6.10) + 4(2.65 + 3.75 + 3.60 + 5.80) + 2(3.80 + 4.65 + 5.85) \right]$$

$$A = 962$$

Using Trapezoidal Rule.

$$A = d \left[ \frac{O_1 + O_n}{2} + O_2 + O_3 + \dots + O_{n-1} \right]$$

$$A = 30 \left[ \frac{0 + 6.10}{2} + 5.85 \right]$$

$$= 177.25$$

$$A = 177.25 + 962$$

$$= 1139.25$$

(25)

- ⊙ Contour lines cannot merge or cross one another on a map, except in the case of an overhanging cliff.
- ⊙ A series of closed contours on a map indicates a depression if the higher values are outside.

3. A series of closed contour lines in a map represents a hill. Higher values are on the inside.
4. Contour lines cannot end anywhere but close on themselves either within or outside the limit of the map.
5. Contour lines cross a ridge or valley at right angles. If higher values are inside the bend or loop in the contour, it represents a ridge and if the higher values are outside the bend or loop, it represents a valley.