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**MATRIC NUMBER : 17/ENG03/059**

**ASSIGNMENT TITLE : 1. Levelling, 2. Areas & volume, 3. Contours**

**COURSE TITLE : Engineering Surveying II**

**COURSE CODE : CVE 310**

**1a) Methods of levelling**

**Height of collimation system**

**Advantages**

* It is rapid as it involves few Calculation
* There are two checks on the accuracy of RL calculation
* This system is suitable for longitudinal leveling where number of intermediate sights
* Visualization is not necessary regarding the nature of the ground

**Disadvantages**

* There is no check on the RL of the intermediate sight
* Errors in the intermediate RLs cannot be detected.

**Rise and fall system**

**Advantages**

* There is a check on the RL of the intermediate points
* Errors in the intermediate RLs can be detected as all the points are correlated
* There are three checks on the accuracy of RL calculation
* This system is suitable where there are no intermediate sights

**Disadvantages**

* It is laborious involving several calculations.
* Visualization is necessary regarding the nature of the ground

1B.) $H\_{of}$C = RL + B.S

 RL = $H\_{of}$C $–$ F.S (I.S)

 RL = 110 + matric No. (59)

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| B.S | I.S | F.S | H OF C | R.L | DISTANCE |
| 0.771 |  |  |  | 169 | 10 |
| 0.802 |  | 1.52 | 168.993 | 168.191 | 20 |
|  | 2.311 |  |  | 166.682 | 30 |
| 3.580 |  | 1.990 | 170.583 | 167.003 | 40 |
|  | 1.220 |  |  | 169.363 | 50 |
|  | 3.675 |  |  | 166.908 | 60 |
| 2.408 |  | 4.020 | 168.971 | 166.563 | 70 |
|  | 0.339 |  |  | 168.632 | 80 |
| 0.780 |  | 0.157 | 169.594 | 168.814 | 90 |
|  | 1.535 |  |  | 168.059 | 100 |
|  | 1.955 |  |  | 167.639 | 110 |
|  | 2.430 |  |  | 167.164 | 120 |
|  | 2.985 |  |  | 166.609 | 130 |
| 1.155 |  | 3.480 | 167.269 | 166.114 | 140 |
|  | 1.960 |  |  | 165.309 | 150 |
|  | 2.365 |  |  | 164.904 | 160 |
| 0.935 |  | 3.640 | 164.564 | 163.629 | 170 |
|  | 1.045 |  |  | 163.519 | 180 |
|  | 1.630 |  |  | 162.934 | 190 |
|  |  | 2.545 |  | 162.019 | 200 |
| $Σ$=10.431 |  | $Σ$=17.352 |  |  |  |

Check =$ ΣF.S-ΣB.S $= R.L at first point - R.L at last point

 = 6.921 = 6.921

Solution

$RL\_{1}$ = 110 + 59 = 169m

$H\_{of}$C (1) = 169 + 0.711 = 169.711

$RL\_{2}$ = 169.11 – 1.52 = 168.191m

$H\_{of}$C (2) = 168.191 + 0.802 = 168.993

$RL\_{3}$ = 168.993 – 2.311 = 166.682m

$RL\_{4}$ = 168.993 – 1.990 = 167.003m

$H\_{of}$C (3) = 167.003 + 3.580 = 170.583

$RL\_{5}$ = 170.583 – 1.220 = 169.363m

$RL\_{6}$ = 170.583 – 3.675 = 166.908m

$RL\_{7}$ = 170.583 – 4.020 = 166.563m

$H\_{of}$C (4) = 166.563 + 2.408 = 168.971m

$RL\_{8}$ = 168.971 – 0.339 = 168.632m

$RL\_{9}$ = 168.971 – 0.157 = 168.814m

$H\_{of}$C (5) = 168.814 + 0.780 = 169.594

$RL\_{10}$ = 169.594 – 1.535 = 168.059m

$RL\_{11}$ = 169.594 – 1.955 = 167.639m

$RL\_{12}$ = 169.594 – 2.430 = 167.164m

$RL\_{13}$ = 169.594 – 2.985 = 166.609m

$RL\_{14}$ = 169.594 – 3.480 = 166.114m

$H\_{of}$C (6) = 166.114 + 1.155 = 167.269

$RL\_{15}$ = 167.269 – 1.960 = 165.309m

$RL\_{16}$ = 167.269 – 2.365 = 164.904m

$RL\_{17}$ = 167.269 – 3.640 = 163.629m

$H\_{of}$C (7) = 163.629 + 0.935 = 164.564

$RL\_{18}$ = 164.564 – 1.045 = 163.519m

$RL\_{19}$ = 164.564 – 1.630 = 162.934m

$RL\_{20}$ = 164.564 – 2.545 = 162.019m

QUESTION 2

|  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| 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 |

Using Mid-ordinate rule:

A=$Σ$hd

h1= $\frac{0+2.65}{2}$=1.325m

h2= $\frac{2.65+3.80}{2}$=3.225m

h3= $\frac{3.80+3.75}{2}$=3.775m

h4= $\frac{3.75+4.65}{2}$=4.2m

h5= $\frac{4.65+3.60}{2}$=4.125m

h6= $\frac{3.60+5.00}{2}$=4.3m

h7= $\frac{5.00+5.80}{2}$=5.4m

h8= $\frac{5.80+6.00}{2}$=5.9m

h9= $\frac{6.00+5.85}{2}$=5.925m

$$Σh=1.325+3.225+3.775+4.2+4.125+4.3+5.4+5.9+5.925$$

$Σh=$38.175m

d=30m

A=$Σhd$

= $38.175×30$

A= $1145.25m^{2}$

Using average ordinate rule

A=$\frac{ndΣO}{n+1}$

n=9

d=30

$$ΣO=0+2.65+3.80+3.75+4.65+3.60+5.00+5.80+6.10+5.85$$

$ΣO=$41.2m

A=$\frac{9×30×41.2}{9+1}$

A=$112.4m^{2}$

Using trapezoidal rule

A=$d(\frac{0\_{1}+0\_{n }}{2}+0\_{2}+0\_{3}+0\_{4}............0\_{n-1})$

$d=30$

A=$30(\frac{0+5.85}{2}+2.65+3.80+3.75+4.65+3.60+5.00+5.80+6.10)$

A=$30(38.275)$

A=$1148.25m^{2}$

Using Simpson's rule

$A=\frac{d }{3 }\left[\left(0\_{1}+0\_{n}\right)+4\left(0\_{2}+0\_{4}+.........0\_{n-1}\right)+2\left(0\_{3}+0\_{5}........0\_{n-1}\right)\right]$

$d=30$

Note: Last offset was removed because number of offsets were even

$A=\frac{30}{3 }\left[\left(0+6.10\right)+4\left(2.65+3.75+3.60+5,80\right)+2\left(3.80+4.65+5.00\right)\right]$

$A=962m^{2}$

Calculating for last offset using trapezoidal rule

A=$d(\frac{0\_{1}+0\_{n }}{2}+0\_{2}+0\_{3}+0\_{4}............0\_{n-1})$

$A=30\left[\frac{6.40+5.85}{2}\right]$

$A=183.75m^{2}$

Therefore $ΣA=962+183.75$

$A=1145.75m^{2}$

2B.)

 CHARACTERISTICS OF CONTOURS

1. Contour lines crosses a ridge or valley at right angle. If the higher values are inside the bend or loop in the contour. It represents a ridge and if the higher values are outside the bend it represents the value.

1. Contour lines cannot merge or cross one another on a map except in the case of an overhanging cliff.



1. A series of closed contour on a map indicates a depression if the higher values are outside.
2. Contour line cannot end anywhere but close on themselves either within or outside the limit of the map.
3. A series of close contour lines, represent a hill if the higher valves are inside.

