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**17/ENG03/024**

**Civil Engineering**

**CVE 310(ENGINEERING SURVEYING) ASSIGNMENT**

**QUESTION 1**

1a)

Methods of levelling

1. Height of collimation method
2. Rise and fall method

Advantages of Height of Collimation Method

1. It isn't time consuming as the calculation involved is small Calculation
2. The accuracy of the method can be checked which makes little space for errors
3. This system is suitable for longitudinal leveling where number of intermediate sights

Disadvantages of Height of Collimation Method

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

Advantages Of Rise and Fall Method

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

Disadvantages Of Rise and Fall Method

1. It is time consuming
2. Having a visual representation for this method is necessary

1b)

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| B.S | I.S | F.S | H OF C | R.L | Remarks | DISTANCE |
| 0.771 |  |  | 134.771 | 134 |  | 0 |
| 0.802 |  | 1.52 | 134.053 | 133.251 | C.P | 10 |
|  | 2.311 |  |  | 131.742 |  | 20 |
| 3.580 |  | 1.990 | 135.643 | 132.063 | C.P | 30 |
|  | 1.220 |  |  | 134.423 |  | 40 |
|  | 3.675 |  |  | 131.968 |  | 50 |
| 2.408 |  | 4.020 | 134.031 | 131.623 | C.P | 60 |
|  | 0.339 |  |  | 133.692 |  | 70 |
| 0.780 |  | 0.157 | 134.654 | 133.874 | C.P | 80 |
|  | 1.535 |  |  | 133.119 |  | 90 |
|  | 1.955 |  |  | 132.699 |  | 100 |
|  | 2.430 |  |  | 132.224 |  | 110 |
|  | 2.985 |  |  | 131.669 |  | 120 |
| 1.155 |  | 3.480 | 132.329 | 131.174 | C.P | 130 |
|  | 1.960 |  |  | 130.369 |  | 140 |
|  | 2.365 |  |  | 129.964 |  | 150 |
| 0.935 |  | 3.640 | 129.624 | 128.689 | C.P | 160 |
|  | 1.045 |  |  | 128.579 |  | 170 |
|  | 1.630 |  |  | 127.994 |  | 180 |
|  |  | 2.545 |  | 127.079 |  | 190 |
| $Σ$=10.431 |  | $Σ$=17.352 |  |  |  |  |

Calculations:

HC=RL+BS

HC(1)=124+0.711=134.771

RL=HC-FS

RL(1)=134.771-1.52=133.251

HC(2)=133.251+0.802=134.053

RL(2)=134.053-2.311=131.742

RL(3)=134.053-1.990=132.063

HC(3)=132.063+3.580=135.643

RL(4)=135.643-1.220=134.423

RL(5)=135.643-3.675=131.968

RL(6)=135.643-4.020=131.623

HC(4)=131.623+2.408=134.031

RL(7)= 134.031-0.339=133.692

RL(8)= 134.031-0.157=133.874

HC(5)=133.874+0.780=134.654

RL(9)= 134.654-1.535=133.119

RL(10)= 134.654-1.955=132.699

RL(11)= 134.654-2.430=132.224

RL(12)= 134.654-2.985=131.669

RL(13)= 134.654-3.480=131.174

HC(6)=131.174+1.155=132.329

RL(14)= 132.329-1.960=130.369

RL(15)= 132.329-2.365=129.964

RL(16)= 132.329-3.640=128.689

HC(7)=128.689+0.935=129.624

RL(17)= 129.624-1.045=128.579

RL(18)= 129.624-1.630=127.994

RL(19)= 129.624-2.545=127.079

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

 =6.921=6.921



**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 $ΣA=962+183.75$

$A=1145.75m^{2}$

Question 2b

**Characteristics of contours**

1. Depression between summits(saddle): Depression between summits is called a saddle. It is represented by 4 sets of contours



1. Contour lines cannot end anywhere but close on themselves either within or outside the limit of the map



1. Contour lines cross a ridge or valley at right angles. If the higher values are inside the bend or loop on the contour, it represents a ridge and if the higher values are outside a bend it represents a valley



1. Contours never run into 1 another unless in the case of a vertical cliff. In this case several contours coincide and the horizontal equivalent becomes zero.



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

