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Internal Assessment Test 2 – April 2019

|       |   |           |              |            |       |
|-------|---|-----------|--------------|------------|-------|
| Sub:  | Quantity Survey and Contract Management | Sub Code: | 15CV81       | Branch:    | Civil |
| Date: | 15/4/2019                               | Duration: | 90 min       | Max Marks: | 50    |
|       |   | Sem/Sec:  | VIII – A & B |            |       |

**Solution**

MARKS

- 1 Reduced level of ground along the centre line of a proposed road from chainage 0m to chainage 280m are given below. The formation level at the 0m chainage is 101m and the road is in upward gradient of 1 in 400. Formation width of the road is 10m and side slopes are 2:1 in filling and 1.5:1 in cutting. Determine the road project cost for a length of 280m if the cost of filling is Rs 180/m<sup>3</sup> and cutting is Rs 120/m<sup>3</sup> adopting mid sectional area formula. Draw longitudinal and cross section of the road

[15]

|              |       |       |      |       |       |       |       |       |
|--------------|-------|-------|------|-------|-------|-------|-------|-------|
| Chainage (m) | 0     | 40    | 80   | 120   | 160   | 200   | 240   | 280   |
| RL of Ground | 100.6 | 100.2 | 99.8 | 100.2 | 100.8 | 101.9 | 102.4 | 102.5 |

Ans Given Data:

Formation level at zero chainage = 101m (with upward gradient of 1 in 400)

Formation width (B) = 10m

Side slope in cutting = 1.5

Side slope in filling = 2

Cost of filling = Rs 180/m<sup>3</sup> , Cost of cutting = Rs 120/m<sup>3</sup>

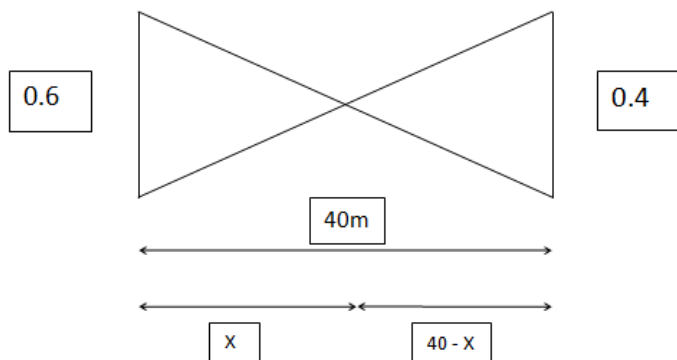
Method: Mid Sectional Area

Calculation for Formation level: given upward gradient of 1 in 400

For every 400m horizontal distance, the elevation is increased by 1m

For every 40m horizontal distance, the elevation is increased by  $1/400 \times 40 = 0.1m$

Calculation for no cutting and no banking chainage



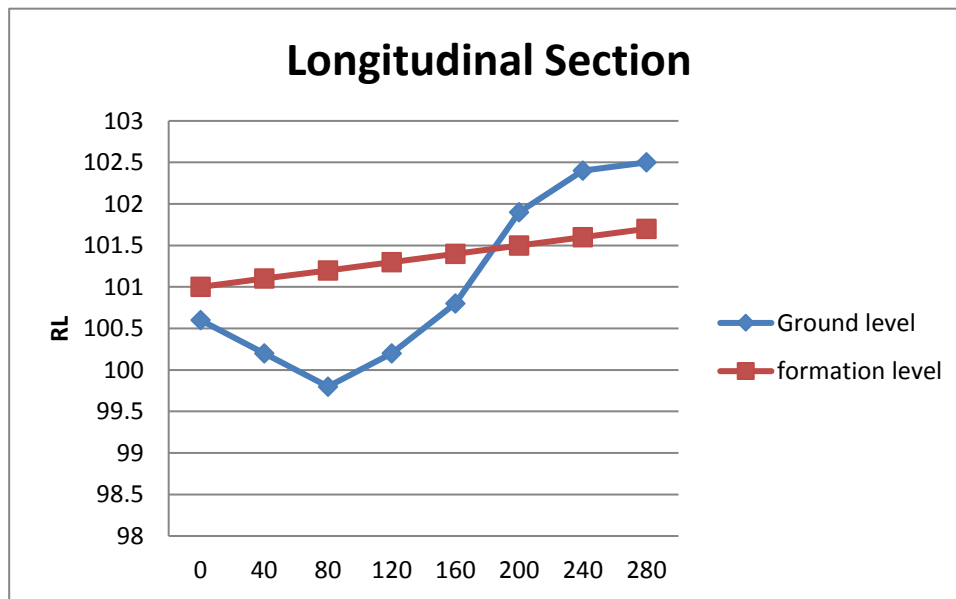
$$\frac{x}{0.6} = \frac{40-x}{0.4} \Rightarrow x = 24m$$

### Earthwork for road

| chainage                        | RL of ground | RL of formation | depth | mean depth | side slope | sectional area | length | quantity filling | quantity cutting |
|---------------------------------|--------------|-----------------|-------|------------|------------|----------------|--------|------------------|------------------|
| 0                               | 100.6        | 101             | 0.4   | ---        | ---        | ---            | ---    | ---              | ---              |
| 40                              | 100.2        | 101.1           | 0.9   | 0.65       | 2          | 7.345          | 40     | 293.8            | ---              |
| 80                              | 99.8         | 101.2           | 1.4   | 1.15       | 2          | 14.145         | 40     | 565.8            | ---              |
| 120                             | 100.2        | 101.3           | 1.1   | 1.25       | 2          | 15.625         | 40     | 625              | ---              |
| 160                             | 100.8        | 101.4           | 0.6   | 0.85       | 2          | 9.945          | 40     | 397.8            | ---              |
| changes from filling to cutting |              |                 | 0     | 0.3        | 2          | 3.18           | 24     | 76.32            | ---              |
| 200                             | 101.9        | 101.5           | -0.4  | 0.2        | 1.5        | 2.06           | 16     | ---              | 32.96            |
| 240                             | 102.4        | 101.6           | -0.8  | 0.6        | 1.5        | 6.54           | 40     | ---              | 261.6            |
| 280                             | 102.5        | 101.7           | -0.8  | 0.8        | 1.5        | 8.96           | 40     | ---              | 358.4            |
|                                 |              |                 |       |            |            |                |        | 1958.72          | 652.96           |

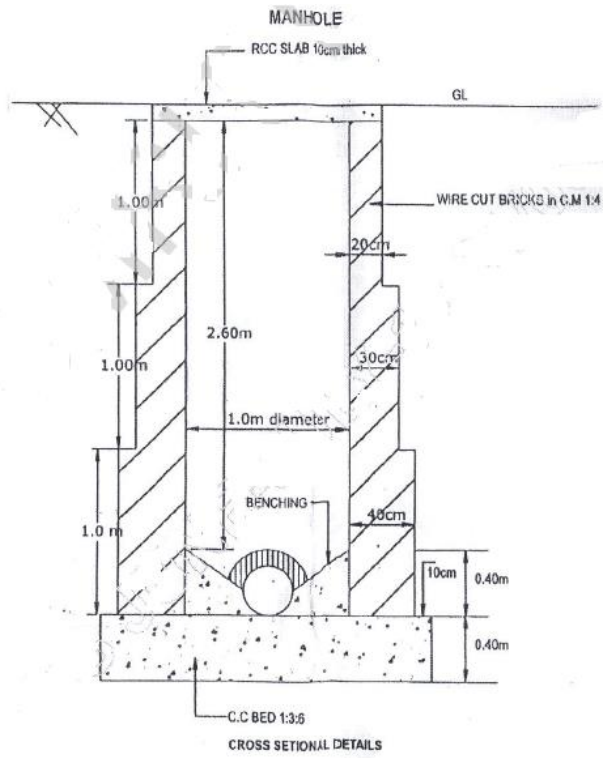
### Cost Abstract

| Item No.   | Particulars          | quantity | unit | rate | amount        |
|--|----------------------|----------|------|------|---------------|
| 1  | filling of earthwork | 1958.72  | m3   | 180  | 352569.6      |
| 2  | cutting of earthwork | 652.96   | m3   | 120  | 78355.2       |
| total  |                      |          |      |      | 430924.8      |
| additional 5% for contingencies and workcharge establishment |                      |          |      |      | 21546.24      |
| total amount   |                      |          |      |      | <b>452471</b> |



- 2 The details of a **circular manhole** are given in fig 1. Find the quantities of the following items.
- Earthwork in excavation
  - CC bed 1:3:6
  - B.B.M in CM 1:4 for walls
  - R.C.C. slab in CC 1:2:4, with 45cm manhole cover
  - Plastering in CM 1:3 for side walls

Ans



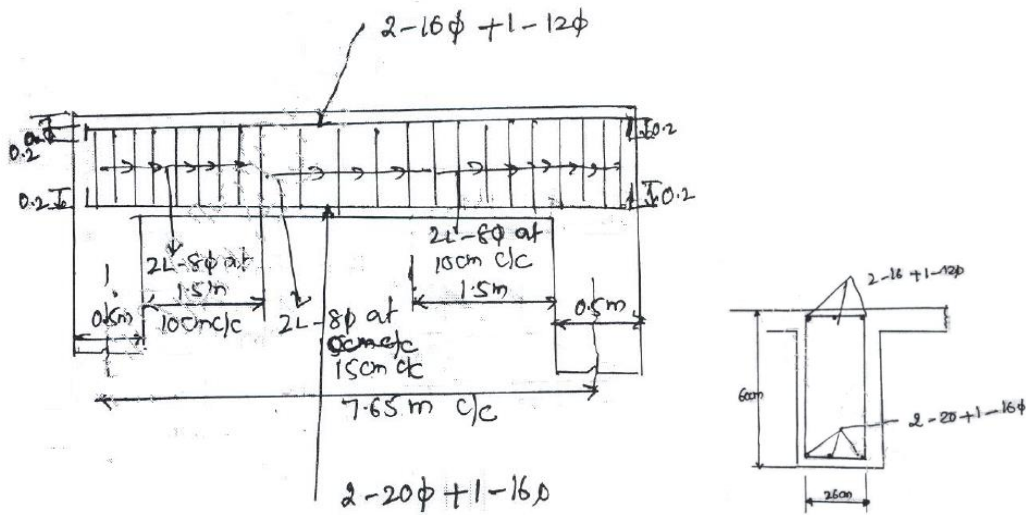
| item no. | particulars                                  | No. | L                    | B    | H   | Q             | Remarks  |
|----------|--|-----|----------------------|------|-----|---------------|--|
| 1        | Earthwork in excavation                      | 1   | $3.14 \times 1^2$    |      | 3.5 | <b>10.99</b>  | $R = (1 + .4 + .4 + .1 + .1) = 2.0$<br>$H = .4 + 1 + 1 + 1 + .1 = 3.5$ |
| 2        | CC bed 1:3:6                                 |     |                      |      |     |               |  |
|          | foundation                                   | 1   | $3.14 \times 1^2$    |      | 0.4 | 1.26          |  |
|          | benching                                     | 1   | $3.14 \times .5^2$   |      | 0.4 | 0.314         | cylinder   |
|          | deduct                                       | 1   | $3.14 \times .35^2$  |      | 0.2 | 0.0769        | for frustum of cone  |
|          |  |     |                      |      |     | <b>1.4971</b> |  |
| 3        | BBM in CM 1:4 for wall                       |     |                      |      |     |               |  |
|          | step 1                                       | 1   | $3.14 \times 1.45$   | 0.45 | 1   | 2.04          | ave. Dia. = 1.45   |
|          | Step 2                                       | 1   | $3.14 \times 1.3$    | 0.3  | 1   | 1.22          | ave. Dia. = 1.3  |
|          | step 3                                       | 1   | $3.14 \times 1.2$    | 0.2  | 1   | 0.753         | ave. Dia. = 1.2  |
|          |  |     |                      |      |     | <b>4.013</b>  |  |
| 4        | RCC slab in CC 1:2:4 with 45cm manhole cover | 1   | $3.14 \times .7^2$   |      | 0.1 | 0.154         |  |
|          | deduct man hole cover                        | 1   | $3.14 \times .225^2$ |      | 0.1 | 0.016         |  |
|          |  |     |                      |      |     | <b>0.138</b>  |  |
| 5        | Plastering in CM 1:3 for side walls          | 1   | $3.14 \times 1$      |      | 2.6 | <b>8.164</b>  | H=3-.4   |

3 Fig 2 shows the longitudinal section of **RCC beam** of size 300 mm x 600mm. Calculate the quantity of steel required and write bar bending schedule. Take the weight of rod/m as follows

[15]

8mm – 0.4kg/m,      12mm – 0.9 kg/m,      20mm – 2.0 kg/m,  
10mm – 0.6 kg/m      16mm – 1.6 kg/m      25 mm – 3.8 kg/m

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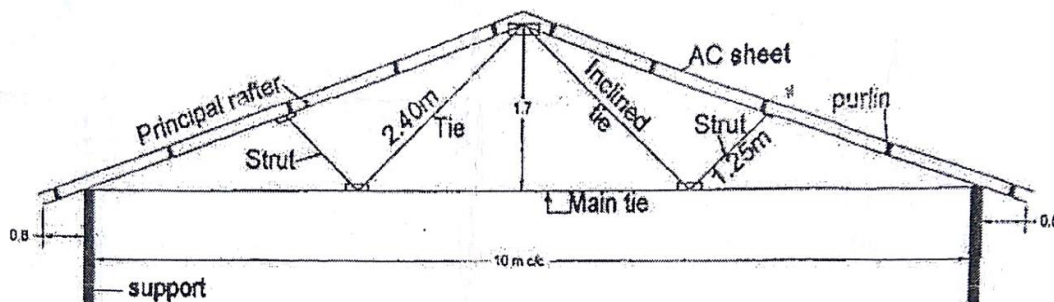


| item no. | particulars                | no. | L    | B       | H   | Q              | Remarks                       |
|----------|----------------------------|-----|------|---------|-----|----------------|-------------------------------|
| 1        | RCC work                   | 1   | 8.15 | 0.3     | 0.6 | <b>1.467</b>   |                               |
| 2        | Steel                      |     |      | density |     |                |                               |
|          | Main Bars of 20mm $\phi$   | 2   | 8.47 | 2       |     | 33.88          | L = 8.15 + .2+.2-.04-.04      |
|          | Main Bars of 16mm $\phi$   | 1   | 8.47 | 1.6     |     | 13.552         |                               |
|          | hanger bars of 16mm $\phi$ | 2   | 8.47 | 1.6     |     | 27.104         |                               |
|          | hanger bars of 12mm $\phi$ | 1   | 8.47 | 0.9     |     | 7.623          |                               |
|          | stirrups at ends           | 42  | 1.78 | 4       | 0.4 | 29.9712        | No = (1.5+.5-.04)/.1 + 1 = 21 |
|          |                            |     |      |         |     |                | L = 2(.56+.26)+18*.008        |
|          | stirrups in centre         | 28  | 1.78 | 4       | 0.4 | 19.9808        | No = (8.15-4)/.15 = 28        |
|          |                            |     |      |         |     | <b>132.111</b> | kg                            |

4 Prepare the steel quantity estimate for the **truss** member resting on 40cm wall as shown in the fig 3 [05]

Sections of the member

- i) Principal rafter ISA 75X75X8mm @ 8.9 kg/m
- ii) Inclined ties ISA 50x50x6mm @ 4.5 kg/m
- iii) Struts ISA 65x65x6mm @ 5.8 kg/m
- iv) Main Tie ISA 60x60x8 mm @ 7.0 kg/m



| item no. | particulars      | no. | L    | B | unit weight | total weight | remarks   |
|----------|------------------|-----|------|---|-------------|--------------|---|
| 1        | principal rafter | 2   | 6    |   | 8.9         | 106.8        | $L = \sqrt{6^2 + 1.7^2} = 6.23$ ; $(10 + .4 + .8 + .8) / 2 = 6$ |
| 2        | inclined tie     | 2   | 2.4  |   | 4.5         | 21.6         |   |
| 3        | strut            | 2   | 1.25 |   | 5.8         | 14.5         |   |
| 4        | main tie         | 1   | 10.4 |   | 7           | 72.8         | $L = 10 + .2 + .2 = 10.4$                                       |
|          |                  |     |      |   |             | <b>215.7</b> | kg  |