


CMR INSTITUTE OF TECHNOLOGY		USN										1		C		R									
Internal Assessment Test –1																									
Sub:Estimation & Valuation																				Code: 10CV73					
Date:20/09/2017				Duration: 90 mins				Max Marks: 50				Sem: VII				Sections:CV (A & B)									
Answer all questions. Good luck!																									
																						Mar ks		OBE	
																								CO	RBT
<p>Estimate the cost of earthwork for a portion of a road of 400m length from the following data: 1 Formation width = 10m, Side slopes: 2:1 for filling and 1.5:1 for cutting. Draw also the profile and cross section after preparing abstract of cost. Assume local rates suitably.</p>																						[20]		CO3	L2,L3
Stn		25	26	27	28	29	30	31	32	33	34	35													
Dist (m)		0	40	80	120	160	200	240	280	320	360	400													
Rlof Gl (m)		51.0	50.9	50.5	50.8	50.6	50.70	51.2	51.4	51.3	51.0	50.6													
Rlof Fl (m)		52.0	-----Downward gradient of 1 in 200----->																						
OR																									
<p>2 Estimate the quantity of earthwork from chainage 20 to 26 measured with a standard 20m chain for a portion of a road from the following data adopting average end area formula:</p>																						[20]		CO3	L2,L3
Station		20	21	22	23	24	25	26																	
RlofGl (m)		88.10	87.74	87.80	88.20	90.75	90.20	89.98																	
<p>The formation level at chain age 20 is 88.50m and the road has a rising gradient of 1 in 100. Formation width of the road is 10m; side slopes in cutting 1:1 and in banking and 2:1. Draw also the profile and cross section after preparing abstract of cost. Assume local rates suitably.</p>																									
<p>3 a. Briefly explain (i) Nominal Muster roll (ii) Security deposit</p>																						[10]		CO4	L2,L3
<p>b. Write the detailed specification of (i) plastering to brick walls in CM1:6 (ii) Centering and shuttering.</p>																						[10]		CO2	L2,L3
OR																									
<p>4 Briefly explain the different types of contracts.</p>																						[20]		CO4	L2,L3
<p>5. A road embankment 400m long is 12m wide at the formation level and has the side slope of 2:1. The ground levels at every 100meter along the center line are given as follows:</p>																						[10]		CO3	L2,L3
Distance (m)		0	100	200	300	400																			
RlofGl (m)		204.80	206.20	207.50	207.20	208.30																			
<p>The formation level at zero chainage is 207.00m and the embankment has a rising gradient of 1 in 100. The ground is level across the center line. Calculate the volume of earth work by trapezoidal formula.</p>																									
OR																									
<p>6. Write short notes on EMD and comparative statement of tenders.</p>																						[10]		CO4	L2,L3

SOLUTION

Date: 20/19/2017

Duration: 90 mins

Max Marks: 50

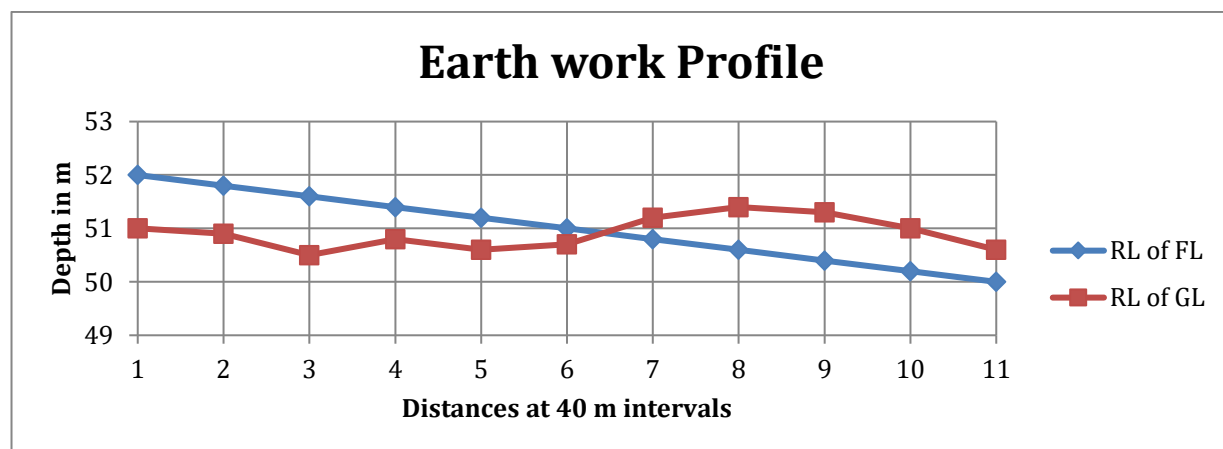
Sem: VII

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Station	25	26	27	28	29	30	31	32	33	34	35
Dist (m)	1000	1040	1080	1120	1160	1200	1240	1280	1320	1360	1400
RI of GI (m)	51.00	50.90	50.50	50.80	50.60	50.70	51.20	51.40	51.30	51.00	50.60
RL of FL (m)	52.00	51.80	51.60	51.40	51.20	51.00	50.80	50.60	50.40	50.20	50.00
Depth of Cut (m)							-0.40	-0.80	-0.90	-0.80	-0.60
Depth of fill (m)	1.00	0.90	1.10	0.60	0.60	0.30					

Sl no	Dist (m)	(y) (m)	By (m ²)	Ky ² (m ²)	By + Ky ² (m ²)	L (m)	Vol. fill(m ³)	Vol. cut(m ³)
1	0	1.00	0	0	0	0	0.00	
2	40	0.90	9.50	1.805	11.31	40	452.20	
3	80	1.10	10.00	2.000	12.00	40	480.00	
4	120	0.60	8.50	1.445	9.95	40	397.80	
5	160	0.60	6.00	0.720	6.72	40	268.80	
6	200	0.30	4.50	0.405	4.91	40	196.20	
	217.14	0.00	1.50	0.045	1.55	17.14	26.48	
7	240	-0.40	-2.00	0.060	2.06	22.86		47.1
8	280	-0.80	-6.00	0.540	6.54	40		261.6
9	320	-0.90	-8.50	1.084	9.58	40		383.4
10	360	-0.80	-8.50	1.084	9.58	40		383.4
11	400	-0.60	-7.00	0.735	7.74	40		309.4
							1821.48	1385

Sl No	Description of work	Qty	Unit	Rate per Unit Rs	Amount Rs
1.	Earth work in Filling	1821.48	Cu.m	2.00	3642.00
2.	Earth work in cutting	1385.00	Cu.m	6.00	8310.00
				Total	11952.00
				Add 3% for contingencies	358.56
				Add 2% for W/E	239.04
				Grand Total	12549.60



SOLUTION

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Sem: VII

SOLUTION: BY AVERAGE END AREA METHOD

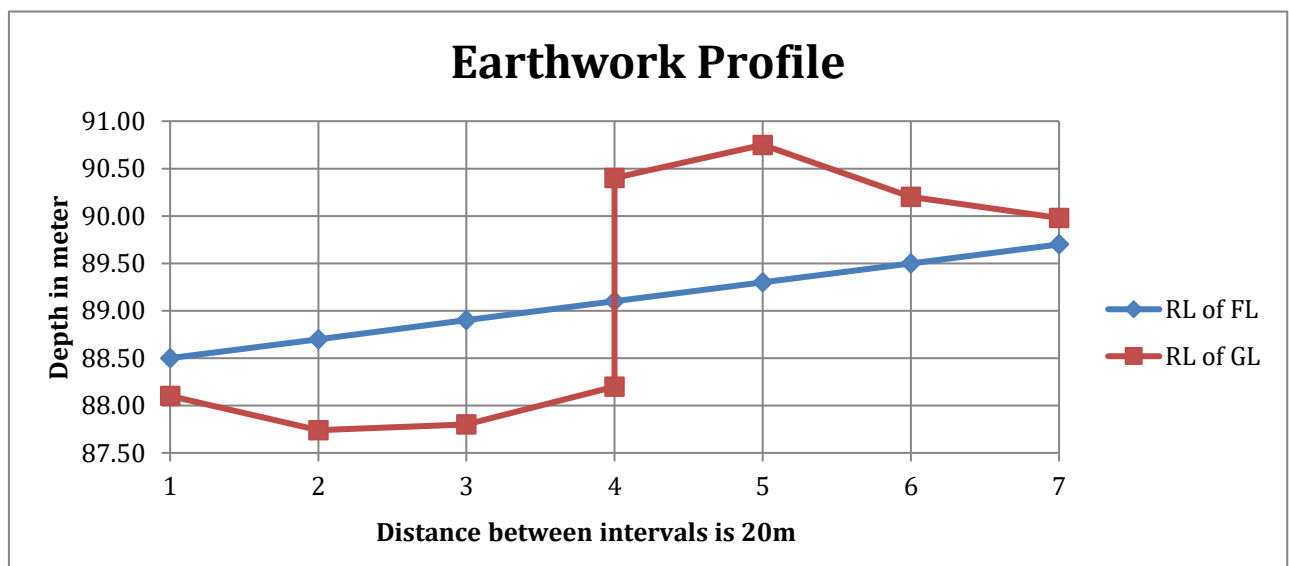
2. RL of FL = 88.50m. Rising gradient of 1 in 100.

$$\text{Incremental increase} = \left(\frac{1}{100}\right) 20 = 0.20\text{m}$$

Chainage (m)	20	21	22	23	24	25	26
RL of GL (m)	88.10	87.74	87.80	88.20	90.75	90.20	89.98
RL of FL (m)	88.50	88.70	88.90	89.10	89.30	89.50	89.70
Depth of fill (m)	0.40	0.96	1.10	0.90			
Depth of cut (m)				-1.30	-1.45	-0.70	-0.28

Sl no	Dist (m)	(y) (m)	By + Ky ² (m ²)	L (m)	Vol. fill(m ³)	Vol. cut(m ³)
1	20	0.40	4.32	0	0.00	
2	40	0.96	11.44	20	157.60	
3	60	1.10	13.42	20	248.60	
4	80	0.90	10.62	20	240.40	
5	80	-1.30	14.69	0		0.00
6	100	-1.45	16.60	20		312.90
7	120	-0.70	7.49	20		240.90
8	140	-0.28	2.88	20		103.70
					646.60	657.50

Sl No	Description of work	Qty	Unit	Rate per Unit Rs	Amount Rs
1.	Earth work in Filling	646.60	Cu.m	2.00	1293.20
2.	Earth work in cutting	657.50	Cu.m	6.00	3945.00
				Total	5238.20
				Add 3% for contingencies	157.15
				Add 2% for W/E	104.76
				Grand Total	5500.11



3 a (i)

NOMINAL ROLL:

In this part, there are columns and spaces for the names of the laborer, designation, father's name, dates of attendance, rate, total amount due for each, total amount due for whole, signature of the person taking the attendance, signature of the person taking the payment etc. and these columns are filled up. Fines if any that are inflicted on the laborer is also recorded. Muster roll is never made in duplicate and the entries are made in such a manner that it may not be possible to interpolate or alter them. The names of the laborers are grouped into classes such as masons, carpenters, masons, mazdoors etc.

(ii) SECURITY DEPOSIT (SD):

Once the tender is accepted, the contractor has to deposit 10% of the tendered amount as security to the department. This amount includes the EMD already deposited. This amount acts as a check so that the contractor fulfills all the terms and conditions of the contract and carries out all the works and completes them satisfactorily as per the specifications within the specified time.

If the contractor fails to satisfy the terms and conditions of the agreement, the complete amount of the security deposit or part of it may be forfeited by the owner. However, if the contractor completes the work satisfactorily, as per the terms and conditions of the contract, within the specified time, the security deposit will be refunded to the contractor. Instead of collecting the entire amount of security deposit in one installment before the start of the work, this amount may be collected gradually from the running account bill of the contractor.

3b(i)

Plastering of brick walls in CM1:6:

- Cement used shall be fresh Portland cement and sand used shall be medium quality, cleaned, free from organic matter and salts. All the materials used including water shall be of standard specifications.
- Mortar shall be prepared by taking the materials in the desired proportions which shall be at first mixed thoroughly till it becomes uniform in color and then shall be mixed wet by adding water slowly and gradually for at least 3 to 4 times to get a uniform paste. So much material shall be prepared at a time as can be used with the initial setting time of 30 minutes of cement.
- Surface of the wall shall be brushed, cleaned, washed and watered and wetted with water before plastering. In case of cement plaster on cement concrete, the face shall be lightly roughened, cleaned, washed and wetted with water. To ensure uniform thickness of plaster as specified, narrow strips of 100mm wide plaster shall be applied first at a distance of 1 meter center to center and the gaps between such strips shall be immediately filled with mortar and plastered.
- The plastering shall be started from the top and worked towards the ground. The whole surface shall be made flush with wooden straight edges and rubbed thoroughly with wooden floats to ensure an even surface. Rounding of corners if desired by the engineer in charge shall be carried out in one operation.
- Curing is achieved by keeping the plastered surface wet by sprinkling water after 12 hours for at least 7 days and shall be protected from rain or sun.

(ii). Centering & Shuttering:

Formwork shall include all forms required for forming the concrete which is cast-in-situ, together with all temporary construction required for their support.

Centering:

- Materials for formwork shall be of plywood or steel as approved by the engineer in charge.
- Props used for centering shall be of steel, timber posts, ballies or any other material as approved by the engineer in charge. All props shall be further provided with double wedges between the sole plates and the props so as to facilitate the tightening and easing of shuttering without causing shock to concrete.
- When the span exceeds 4.50m and the height exceeds 3.50m suitable horizontal as well as diagonal bracings shall be provided after accounting for all forces including the action of the wind which may produce lateral forces.
- While the casting of concrete is in progress, at least one carpenter shall keep a constant watch on the props and take immediate remedial measures as and when any one of them gets loosened.

Shuttering:

- Shuttering shall be of approved dressed timber of well- seasoned wooden boards to give a smooth and even surface and the joints shall not permit leakage of cement grout.
- The timber shall be free from knots, projected nails, splits or any other defects that may mar the cement surface of concrete. It shall not be so green or wet so as to shrink after erection. When metal forms are used for shuttering, all nuts and bolts shall be countersunk and well ground so as to provide a smooth surface. Openings for fan clamps and other fittings connected with services shall be provided in the shuttering as directed by the engineer in charge.
- The engineer in charge shall inspect and accept the formwork as to its strength, alignment and general fitness before placing the concrete in the forms.

- Suitable camber shall be provided in the horizontal members of the structures to counteract the effects of deflection.
- Removal of formwork must be done by avoiding shock or vibration that may cause any damage to concrete. In a slab and a beam construction, the sides of the beam shall be stripped first, then the under sides of slab and lastly the undersides of the beam. The period that shall elapse after the concrete has been laid before undertaking the work of easing and removal of centering and shuttering shall be in accordance to IS 456 -2000.
- In case of cantilever slabs and beams, the centering shall remain till the structures for bearing down have been erected and have sufficient length.

4. TYPES OF CONTRACT:

- PIECE WORK CONTRACT
- ITEM RATE OR UNIT RATE CONTRACT
- LUMPSUM CONTRACT
- COST PLUS PERCENTAGE CONTRACT
- COMBINATION OF LUMPSUM & SCHEDULE OF RATES CONTRACT
- LABOR CONTRACT

a.PIECE WORK CONTRACT:

It is an agreement by which the contractor agrees to execute the different items of work on mutually agreed rates. The agreement contains different items of works to be carried out with proper description and rates for different quantities of work. The contractor agrees to execute the specific work at stipulated rates, without reference to total quantity or time taken. Small works which do not require engineering skills for execution like earth work excavation, maintenance work, patch work and white washing etc. may be carried out through piece work contract.

b. ITEM RATE OR UNIT RATE CONTRACT:

In this contract, the contractor undertakes the execution of work at unit rates agreed at the time of tender. The payment is made to the contractor by detailed measurement of work actually executed by the contractor. This method of contract is used in most of the works in projects, maintenance of buildings, irrigation projects, and other important works.

c.LUMPSUM CONTRACT:

In this contract, the contractor agrees to execute a complete work in all respects for a specified amount within a specified time. The plans, drawings and specifications of all the items of work are to be provided to the contractor but the details of the quantities and schedule of items will not be given and the contractor will have to complete the work as per plan and specification within the contract period. On completion of work, no measurement will be taken by the department. The contractor will be paid the fixed amount as agreed by checking the whole work with plan, drawing and specification.

d.COST PLUS PERCENTAGE CONTRACT:

In this contract, the contractor is paid the actual cost of the structure plus a fixed percentage for his overhead expenses, services and profit. The contractor procures the materials, and arranges the labor at his own cost keeping the proper accounts and he is paid by the department or the owner the whole cost together the certain percentage normally 10% as his profit.

e.COMBINATION OF LUMPSUM PLUS SCHEDULE OF RATES CONTRACT:

This is similar to lumpsum contract but the schedule of rates is also provided in the contract agreement. In this type, the contractor undertakes the execution of a particular work with a fixed sum within a specified time as per plans and the detailed specifications and conditions and the schedule of rates for various items of works are also provided which regulates the extra amount to be paid or deducted for any additions and alteration. Here, no measurements of various items of works are involved in the original work is required, but measurements of extra items only shall be taken.

f.LABOR CONTRACT:

In this contract, the contractor undertakes only the labor portion of the work. All the necessary materials are supplied to the site either by the owner or the department and that the contractor arranges his own labor and gets the work done as per specifications. The contractor is paid for the labor only on the actual quantities of the work done. The work done is measured as per item rate basis.

5. Solution: **By Trapezoidal formula**

RL of FL = 207.00m at distance of 0 meter from start. Rising gradient of 1 in 100.

$$\text{Incremental increase} = \left(\frac{1}{100}\right) 100 = 1.00\text{m from start point.}$$

Distance (m)	0	100	200	300	400
RL of GL (m)	204.80	206.20	207.50	207.20	208.30
RL of FL (m)	207.00	208.00	209.00	210.00	211.00
Depth of fill (m)	2.20	1.80	1.50	2.80	2.70

Note: Volume of earthwork by **Trapezoidal formula** is given by:

$$V = d \left(\frac{A_1 + A_n}{2} + \{A_2 + A_3 + A_4 + A_5 + \dots + A_{n-1}\} \right) \text{-----Cu.m}$$

Where,

A₁, A₂, A₃, ----- A_n = cross sectional areas at successive chainage intervals

d = distance between two successive chainages

S/No	Dist(m)	Depth (d) in m	A = B(d _m) + S(dm) ² In Sq.m
1	0	2.20	36.08 (A ₁)
2	100	1.80	28.08(A ₂)
3	200	1.50	22.50(A ₃)
4	300	2.80	49.28(A _{n-1})
5	400	2.70	46.98(A _n)

$$V = 100 \left(\frac{36.08 + 46.98}{2} + \{28.08 + 22.50 + 49.29\} \right) = 100(141.40) = 14140 \text{ Cu.m}$$

6. EARNEST MONEY DEPOSIT (EMD):

When the contractor submits his tender for the work, he has to deposit a certain amount of money which is usually about 2% of the estimated cost of the project as a guarantee of the tender. This deposit is taken to ascertain the earnestness of the contractor to do the work. This amount also acts as a check on the contractor so that he does not refuse to accept the work or run away when the tender is accepted.

If the contractor does not undertake to do the work after his tender is accepted, then his EMD will not be returned to him. The EMD of all other contractors whose tenders have been refused will be returned to the respective contractors. The EMD can be accepted in the form of cash or Government securities and should be submitted to the department.

COMPARATIVE STATEMENT OF TENDERS:

After the tenders are opened, a comparative statement of the tenders is made by the office of the tender opening authority. It serves to compare the rates of the various tenders in respect of each item against the estimated rates. The excess or savings of each tender is worked out.

Comparative rates of percentage rates and lump sum tenders contain information regarding the name of the contractor, date of receipt of tenders, percentages above or below the rates entered in the tender documents. The recommendations regarding the acceptance or rejection of tender are recorded in the comparative statement.