CBCS SCHEME

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18CV71

Seventh Semester B.E. Degree Examination, Feb./Mar. 2022
Quantity Surveying and Contracts Management

Time: 3 hrs. Max. Marks: 100

Note: Answer any FIVE full questions, choosing ONE full question from each module.

Module-1

1 What is an estimate? Explain briefly purpose and different types of estimates (any three). **(20 Marks)**

OR

2 The details of two room building are shown in the Fig.Q2. Estimate quantities and cost of the following items of work:
(i) Earthwork excavation foundation at Rs.380/m^3
(ii) Bed concrete 1 : 4 : 8 for foundation at Rs.2600/m^3
(iii) S.S.M. for foundation and basement at Rs.3600/m^3

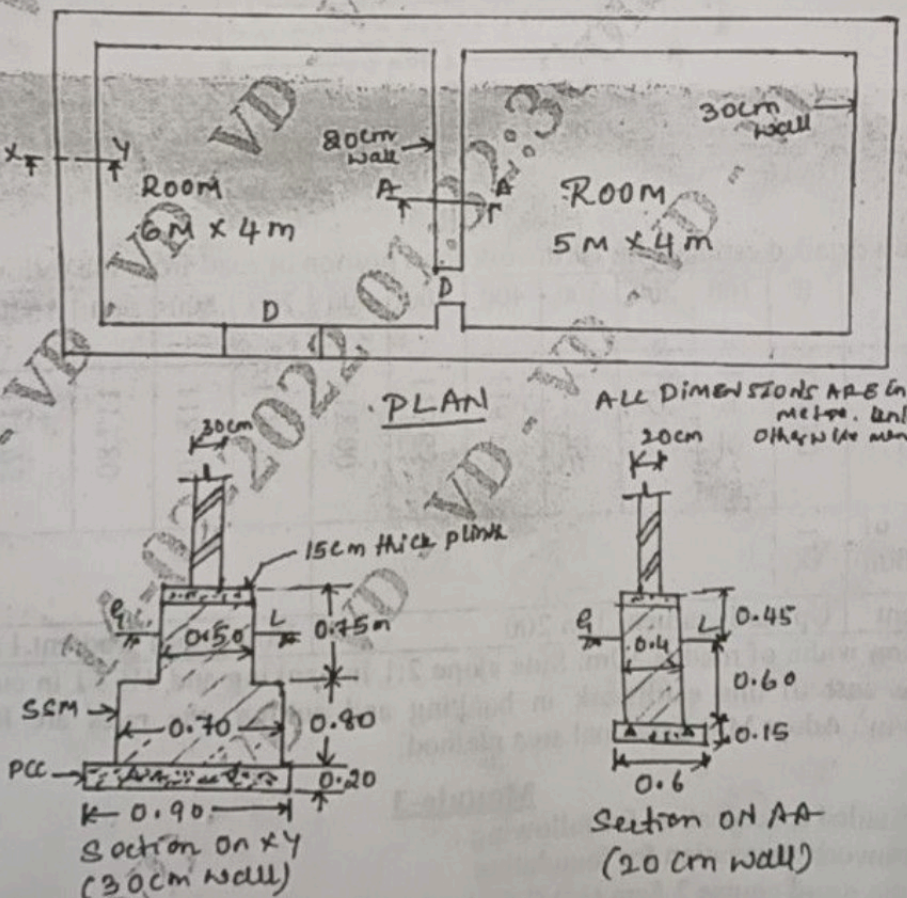
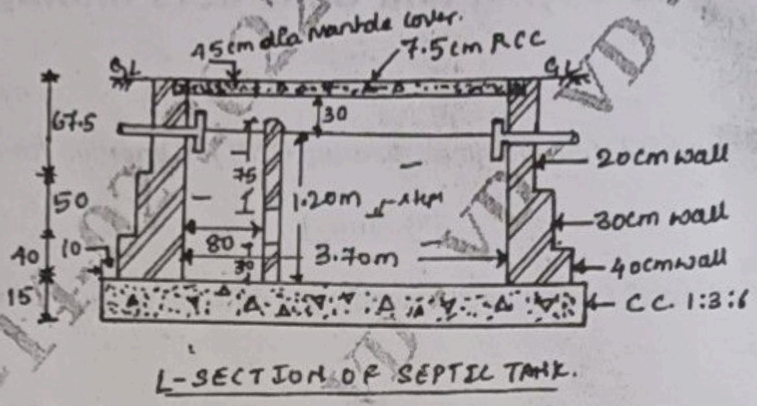


Fig.Q2 **(20 Marks)**

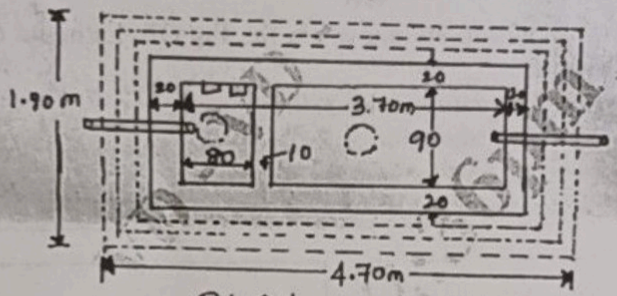
Module-2

3 The details of septic tank are shown in Fig.Q3. Estimate the quantities of following items and cost. **(20 Marks)**

(i) Earthwork excavation at Rs. 400/m^3
(ii) PCC 1 : 3 : 6 for bed at Rs. 2500/m^3
(iii) BBM in CM 1 : 4 at Rs. 2200/m^3
(iv) R.C.C. 1 : 2 : 4 roof slab cover at Rs. 3000/m^3
(v) 12mm cement plaster for sidewalls at Rs. 200/m^2



L-SECTION OF SEPTIC TANK.



PLAN

All dimensions are centimetre, except otherwise mentioned

Fig.Q3

OR

4 Prepare a detailed estimate for earthwork for a portion of road from the following data:

Dist. in m	0	100	200	300	400	500	600	700	800	900	1000	1100	1200
RL of the ground	114.50	114.75	115.25	115.20	116.10	116.85	118.00	118.25	118.10	117.80	117.75	117.90	119.50
RL of formation	115												
Gradient	Upward gradient 1 in 200							Downward gradient 1 in 400					

Formation width of road is 10m. Side slope 2:1 in banking and 1½ : 1 in cutting. Calculate also the cost of this earthwork in banking and cutting; the rates are Rs. 275/m^3 and Rs. 350/m^3. Adopt Mid-Sectional area method. **(20 Marks)**

Module-3

5 Write detailed specification for following :

(i) Earthwork excavation for foundation
(ii) Damp proof course 2.5cm (1") C.C. 1 : 1½ : 3
(iii) Burnt brick masonry for superstructure in CM 1:6
(iv) R.C.C. 1 : 2 : 4 for roof slab. **(20 Marks)**

OR

6 Analyse rates from first principle for following :
(i) Cement concrete 1 : 5 : 10 in foundation.
(ii) I[st] class brick work in super structure with CM 1:6
(iii) Coursed Rubber stone masonry in CM 1:6 for super structure.
(iv) 12 mm thick internal plastering in CM 1:6 for brick walls. (20 Marks)

Module-4

7 What is tender? Explain the departmental procedure of tendering civil works. (20 Marks)

OR

8 What are the different types of contracts? Explain any four types of contracts. (20 Marks)

Module-5

9 Write a short notes on :
a. Mobilization and equipment advance
b. Secured advance
c. Liquidated damages and bonus
d. Dispute resolution mechanism
e. Performance security. (20 Marks)

OR

10 What is valuation? Explain briefly methods of valuation of buildings. (20 Marks)

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Module-1

It is the process of calculating quantities & cost of various items required in connection withe the work.

Purpose of Estimation.

- To ascertain necessary amount of money required by owner to complete proposed work.
- To ascertain quantities of materials required by owner to in order to programme their timely procurement. like cement steel etc.
- To calculate number of different categories of workers that are to be empoyed to complete work within scheduled time.
- To justify investment from benifit cost ratio.
- To investigate tenders & prepare bills of Payment.

Types of Estimate.

1) Detailed Estimate.

This includes detailed particulars for the quantities, rates, & cost of all items involved for satisfactory completion of Project.

It is accomparied by Report, specification, Detailed Drawing, Design.

2) Preliminary or approximate Estimate.

It is rough Estimate to find out an approximate cost in a short time & thus enables the authority concerned to consider financial aspect of scheme, for according sanction to same.

3) Quantity Estimate / Quantity survey.

This is a complete estimate or list of quantities for all items of work required to complete the concerned project. Quantity of Each Individual item of work is worked out from respective dimension on drawing of structure.

4) Revised Estimate

5) Supplementary Estimate.

2) No of Junctions = 2

Total c/c Line Length 30cm wall=

$$\left(\frac{0.3}{2}+\frac{0.3}{2}+0.2+6+5\right)\times 2+2\left(4+0.3\right)=31.6m$$

$$= 31.6m$$

Total c/c Line Length 20cm wall=

$$4+\frac{0.3}{2}+\frac{0.3}{2}=4.3m$$

£

Module -2

Sl No	Particulars	No	L	B	D	Quantity
1.	Earthwork excavation	1	4.7	1.9	1.725	15.41 m^3
2.	PCC in cm 1:3:6	1	4.7	1.9	0.15	1.34
3.	BBM 1:4					
	LW					
	1 step	2	4.5	0.4	0.4	1.44
	2 step	2	4.3	0.3	0.5	1.29
	3 step	2	4.1	0.2	0.675	1.11
	SW					
	1 step	2	0.9	0.40	0.40	0.29
	2 step	2	0.9	0.30	0.50	0.27
	3 step	2	0.9	0.20	0.675	0.24
						4.64 m^3
4.	RCC Partition 1:2:4					
	Roof slab cover	1	3.9	1.10	0.075	0.322
5.	Plastering 12mm					
	LW	2	3.7		1.5	11.1
	SW	2	0.9		1.5	2.7
	Partition wall both side	2	0.9		1.35	2.43
						16.32 m^2

No	Particulars	Quantity	Unit	Rate	Amount (Rs)
1)	Earthwork	15.41	m^3	4000	61640
2)	PCC	1.34	m^3	2500	3350
3)	BBM	4.64	m^3	2200	10208
4)	RCC work	0.322	m^3	3000	966
5)	Plastering	16.32	m^2	200	3264
					79428/-
	3% contingencies				= 2382.84
	2% work Establishment				= 1588.56
					1,19,142/-

No	Particulars	No.	L	B	D	Quantity	Rem
1	Earthwork Excavation foundation						
	a) 30cm wall	1	31.6	0.9	1.30	36.97	
	b) 20 cm wall	1	43	0.6	0.75	1.53	
						38.50 m³	
2	PCC Bed concrete						
	30 cm	1	31.6	0.9	0.20	5.69	
	20 cm	1	3.6	0.6	0.15	0.32	
						6.01 m³	
3.	SSM CM 1:6						
	30cm wall 1st	1	31.6	0.70	0.8	17.70	
	2nd	1	31.6	0.50	0.60	9.48	
	20cm wall with 1st course of 30cm wall,	1	3.6	0.40	0.30	0.43	
	2nd with 30cm	1	3.8	0.40	0.60	0.91	
						28.52 m³	

No	Particulars	Quantity	Rate	unit	Amount
1	Earthwork	38.50	380/-	m³	14630
2.	PCC	6.01	2600/-	m³	15626
3	SSM	28.52	3600/-	m³	102672
					132928.00
			3% contingency		= 3987.84
			2% work charge		= 2658.56
					139574.4

Every 100m → $\frac{1}{200} \times 100 = 0.5$m rise.

Downward gradient after 800m, Every 400m → 1m drop

∴ 100m → $\frac{1}{400} \times 100 = 0.25$m drop

No	Dist.	depth	Mean d_m	Bd_m	Sd_m^2	$Bd_m + Sd_m^2$	L	Quantity Banking	Quantity cutting
1	0	0.5							
2	100	0.25	0.38	3.8	0.29	4.09	100	409	
3	200	0.25	0.25	2.5	0.13	2.63	100	263	
4	300	0.8	0.53	5.3	0.56	5.86	100	586	
5	400	0.4	0.6	6	0.72	6.72	100	672	
6	429	0	0.2	2	0.08	2.08	298	619.32	
7	500	1	0.5	5	0.38	5.38	71		381.98
8	600	0.35	0.68	6.8	0.69	7.49	100		749
9	700	0.25	0.3	0.14	3.14	3.04	100		314
10	800	0.35	0.3	0.14	3.14	3.04	100		314
11	900	0.3	0.33	0.16	3.46	3.46	100		346
12	1000	0.5	0.4	0.24	4.24	4.24	100		424
13	1100	0.9	0.7	0.74	7.74	7.74	100		774
14	1200	2.75	1.83	5	23.3	23.3	100		2336
						Total		1990.32	5638.98

No	Particulars	Quantity	Unit	Rate	Amount
1	Earthwork Banking	1990.32	m^3	275	547338
2	" cutting	5638.98	m^3	350	1973643
					2520981
			3%	contingencies =	75629.43
			2%	work charge =	50419.62
					3277,79.49

5] a) Earthcoork Excavation for Foundation.

→ Excavation for foundation Trenches shall be aarric out in all sorts of soils as per plan approved at site.

→ Sides of foundation Trenches shall be Truely vertical & levelled.

→ Excavated material shall be stacked away from sides of trenches by atleast 1m.

→ water accumulated should be pumped out.

b] Damp proof course 2.5cm CC 1:1.5:3

→ DPC may be 2-2.5cm thick with standard water proofing Compound

→ Material - All materials shall be as per std specification. course Aggregate shall be Hard, well burnt. Fine aggregate shall be Sunkii/ Lime/sand, with No clay Particules.

→ Propotioning → As mentioned above 1:1.5:3

→ Mixing → shall be done on masonry platform/ Tray by measing boxes.

→ Laying of materials

c] Coursed Rubber stone masonry CM 1:6.

→ materials - stone type specified such as granite, trap Lime stone, Sand stone, quartz-zite etc shall be obtained from quarries, approved by Engineer.

→ Stones should be small enough to be Lifted & placed by hand L ≯ 3 times ht/Breadth of thickness of wall

→ Mortar - as per specified in proportion & Laying should

be on weddted surface before use. Height of each course shall not be less than 15cm nor more than 30cm.

Measurement → shall be taken in cubic meters.

Module-4

7] The tender is an offer in writing to execute some specified work or to supply the materials at certain rates within a fixed time under certain conditions of agreement Between contractor & department or owner or any party.

Procedure.

Before Inviting Tender, tender documents have to be Prepared & issued to intrested tenders.

These Documents Include.

→ Detailed specification of work & material
→ Complete set of drawing
→ General condition of contract
→ schedule of quantities of vesious items of work.
→ Location of water point & supply point for power & rates
→ Name of authority that is accepting or rejecting tender
→ conditions of penalty for slow progress & non-fulfulment of condition of contact.

After tender documents have been Prepared & approved by authority, A notice inviting tenders has to be published on notice board of

all unit offices of Department.

All particulars should be written in tender like
1) Name of authority
2) Name of work & its location
3) Estimated cost of Work
4) Period of contract & type of contract etc.

Tender Notice should be prepared with all Particulars. Executive Engineer receives tender. He has rights to accept or reject any tender.

Sale of Tender Document

It is responsibility of Executive. Engineer to see that tender document are made available to contractors

Receiving - authority authorizes an officer to receive.

Opening of Tender → Sealed Tender received are to be opened in presence of contractors.

Preparation of comparative statement & scrutiny

& Acceptance of Tenders & Execution of contract Agreement.

8] Types of Contract

1) Piece Work contract
2) Item rate or unit price contract
3) Lump sum contract
4) cost plus Percentage contract
5) Combination of Lump sum & schedule of rates contract.
6) Labour contract.

The payment is made to the contractor by detail measurement of the work actually executed by contractor.

Merits

* Since work is distributed as an item wise there will be no disputes between the owner & contractor.

Demerits

* The final cost cannot be determined before completion of work.

4) cost plus percentage contract

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

1) Piece Work Contract.

It is an agreement by which worker agrees to execute the different item of work to be carried out with proper description & rates for unit quantity of work.

Merits

→ Best suited for small work & work which will not require Engineering skill.
→ Work may be completed very quickly.
→ It would be cheaper when works are small.

Demerits

→ The item is not considered so the workers can take their own time to complete job so that rate of progress of work will reduce.

2) Lump Sum contract

In this contract the contract agrees to execute a complete work in all respects for a sepcified amount within a specified time. The contractor will be paid fixed amount as agreed by checking whole work in comparing with plan, drawing & specification.

3) Item rate or Unit Price contract

In this contract, the contractor under takes the execution of work at the unit rates agreed at time of Tender.

Module-5

a] Mobilization & Equipment advances

Mobilization advance payments are Payment of funds to a supplier or contractor before in anticipational of and for the purpose of Performance under contract. since these Payments are not measured by contract Performance they differ from Partial Payment which are Based on actual performance of faster in furtherance of contract.

The Basic Purpose is to extend financial assistance within the terms of contract to mobilize man material resource for timely & smooth take off Project.

b] Secured advance Payment

This represents an advance Payment made on security of materials brought to the site of work when the contract is for completed item of work. The advance amount not exceeding 70%. of the value of materials brought to the site. The Payment will be made only after clarifying the following.

→ quantities of materials actually being brought at site.
→ contractor has not received any advances for site materials.

3) Liquidated Damages & Bonus

It is an amount of compensation Payable by a contractor to the owner or the govt due to delayed construction having no relationship with real Damage. If contractor fails to complete work within time prescribed in tender than contractor shall Pay to the owner or govt the sum stated in the tender or Liquidated damages for such default & not as penalty for everyday for excess Period taken B/w Dates specified.

4) Dispute Resolution Mechanism

* A Dispute resolution in construction contracts is vital Because it prevents potential legal action.
* Construction disputes takes place Because one Party may breach the contract in some manner or a simple miscommunication Between Parties could arise, conflict may also occur due to following reason
  - → contract delays.
  - → Failure to enforce the agreement.
  - → Incomplete or unsubstantiated claims.

Performance Security.

It includes Performance Bonds, provided by a Bank or insurance company, retention funds & Performance guarantee by a surety.

In the Building & construction industry a performance Bond is used to provide security in various situation commonly. These Performance Bonds are used to provide security in repair of a contractor's performance during contract Period. Thus a Performance Bond are protects client from resist of a contractor failing to fulfull its contractual obbligations to client.

Two Types

On Demand - Bound or amount payable under Performance Bond is payable to client upon the client requesting such Payment.

Conditional - This Basic Purpose of mobilization advance Payment is to extend financial assistance within the terms of contract to the contractor to mobilize the man material resource for timely & smooth take off Point or Procurement of Equipment material or other service contract.

6.

1) 1 : 5 : 10

$\frac{15.4}{16} = 0.97$ cum (28 Bags)

$0.97 \times 5 = 4.85$ cum – Sand

$0.97 \times 10 = 0.970$ cum. – Coarse Aggregate

No.	Particulars	Quantity	Rate	Amount
1.	Materials			
	Stone Ballast	0.970 m^3	7000/m^3	6720
	Sand	4.85 cum	1300/m^3	6240
	Cement	28 Bags	330/Bag	11880
2.	Labour			
	Head Mason	1/4 No	400/Day	100.00
	Mason	2 No	390/Day	780.00
	Mazdoor	20 No	290/Day	5800.00
3	Contigencies, T & P		Lumpsum	300.00
			Total	31820.00
		1% water charge		318.20
			Total	32138.20
		10% Profit –		3213.82
		Grand Total =		35352.02/-

Rate Per cum = $\frac{35352.02}{10} = 3535.2/-$

2). Firstclass Brickwork in superstructure 1:6.

Brick & Mortar –

No of Bricks = $\frac{10}{0.1 \times 0.1 \times 0.2} = 5000$ No.

Volume without Mortar = $10 - (5000 \times 0.009 \times 0.009 \times 0.19)$

$= 2.30 m^3$

15% Extra (Frog) = $2.3 + \frac{15}{100} \times 2.3 = 2.64 m^3$

For Dry mix add 1/3rd extra = $3.50 m^3$

Cement = $\frac{3.5}{1+6} = 0.5 m^3 = 15$ Bags.

Sand = $3.0 m^3$,

No	Particulars	Quantity	Rate	Amount
1.	Bricks	5000 No	6.00/No	30000
	sand	3cum	1300/m3	3900
	Cement	15 Bags	330/Bag	4950
	Scaffolding	L.S	/lumpsum	220
2.	Labour			
	Head Mason	½ No	400/day	200.00
	Mason	9 No	390/day	3510.00
	Mazdoor	20 No	290/day	5800.00
		Contigencies T&P		200
		Total		48780
		water 1%		487
		Total		49267.80
		Profit 10%		4926.78
		Grand Total		54194.58.

Rate per cum = $\frac{54194.58}{10}$ = Rs. 5419.58

3. Coursed Rubble stone masonry in Cement mortar 1:6 for superstructure

→ material - stone - 12.5 m^3

Volume of mortar - 4 m^3

Cement = $\frac{4}{1+6}$ = 0.57 m^3 = 17 Bags.

Sand = 0.57 × 6 = 3.4 m^3.

Sl No	Particulars	Quantity	Rate	Amount
1.	stone & wastage	12.5 m^3	550/m^3	6875.00
	sand	3.4 m^3	1300/m^3	4420.00
	Cement	17 Bags	330/Bag	56.10.00
	Scaffolding		Lumpsum	200.00

No	Particulars	Quantity	Rate	Amount
	Labour			
	Head Mason	1/2 No	400 /Day	200.00
	Mason	15 No	390 /Day	5850.00
	Mazdoor	24 No	290/Day	6960.00
3	T & P		Lumpsum	150.00
				30065.00
		water	1% charge	300.65
			Total	30365.65
		10%	Profit —	3036.56
			Grand Total	33402.21

$$\text{Rate}/m^3 = \frac{33402.21}{10} = 3340.22/-$$

4.) Plastering 12mm thick CM 1:6.

Volume of wet mortar $= 0.012 \times 100 = 1.2 m^3$

Add 20% Extra $= 1.2 + \frac{20}{100} \times 1.2 = 1.44 m^3$

For Dry mix $\frac{1}{3}^{rd}$ extra :-

$= 1.44 + \frac{1}{3} \times 1.44 = 1.92 m^3$

Cement $= \frac{1.92}{1+6} = 0.274 m^3 = \frac{0.274}{0.0347} = 7.89 = 8$ Bag

Sand $= 0.274 \times 6 = 1.645 m^3$

No	Particulars	Quantity	Rate	Amount
1.	Material			
	Cement	8 Bag	330 /Bag	2640
	Sand	1.645	1300 /m^3	2138.5
	Scaffolding	LS	LS	100.00

Sl. No.	Particulars	Quantity	Rate	Amount
2.	Labour			
	Head Mason	$\frac{1}{2}$ No	400/Day	200.00
	Mason	14 No	390/Day	5460.00
	Mazdoor (2 No. Bhasti)	18 No	290/Day	5220.00
3.	Contigencies (T&P)	Lumpsum		125
			Total	15883.5
			water 1% of Total	158.83
			Total =	16042.33
			Profit 10% =	1604.233
			Grand Total	17646.563

Rate per Sqm = $\frac{17646.563}{100}$ = 176.46

≈ ~~₹~~ 177 - 180 Rs

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