Important Instructions to examiners:

1) The answers should be examined by keywords and not as word-to-word as given in the model answer scheme.

2) The model answer and the answer written by candidate may vary but the examiner may try to assess the understanding level of the candidate.

3) The language error such as grammatical, spelling errors should not be given more importance. (Not applicable for subject English and communication skill).

4) While assessing figures, examiner may give credit for principal components indicated in the figure. The figure drawn by candidate and model answer may vary. The examiner may give credit for any equivalent figure drawn.

5) Credits may be given step wise for numerical problems. In the some cases, the assumed constant values may vary and there may be some difference in the candidate's answer and model answer.

6) In case of some questions credit may be given by judgment on part of examiner of relevant answer based on candidates understanding.

7) For programming language papers, credit may be given to any other program based on equivalent concept.

Q. No.	Sub Q. No.	Question and Model Answers	Marks
1.	**a)**	**Attempt any THREE of the following:**	**12**
	(i)	**Enlist the different methods of approximate estimate.** Ans : **Methods of Approximate Estimate are** – 1) Plinth area rate method 2) Cubical Content method or Cubic rate method 3) Service unit method or Unit rate method 4) Typical bay method 5) Approximate quantities with bill method 6) Cost comparison method 7) Cost from materials and labours	**01 each (for any four)**
1.	**a) (ii)**	**Define estimating and costing? State any four purpose.** Ans: **Estimating –**The process of working out the probable cost of a work is called estimating. **OR**The process of calculating the quantities and costs of the various items in connection with work required for satisfactory completion of work is called estimating. **Costing –**The process of calculating actual cost of work before its execution is called costing.	**01** **01**

Purposes –

1) To know the approximate cost of work.
2) To ascertain the quantities of materials required for timely procurement.
3) To calculate the no. of different categories of workers needed for work.
4) To assess the requirements of tools, plants and equipment required.
5) To fix up completion period from the volume of work involved.
6) To draw up construction schedule and programme.
7) To arrange funds required according to programme.
8) To justify investment from benefit cost ratio.
9) To get administrative approval and technical sanction.
10) To invite tenders and prepare bills.

1/2 each (for any four)

1. a) (iii) Draw the standard format of face sheet and abstract sheet

Ans:

Face Sheet

Name of Work - ----------

Sr.No.	Particulars	Amount
1)	Estimated cost	
2)	Water supply and Sanitary charges @ ---- %	
3)	Electrification charges @ ---- %	
4)	Contingencies @ ---- %	
5)	Work charged establishment @ ---- %	
	Total Amount (In words)	

02

Abstract Sheet

Item No.	Description or Particulars of Item	Quantity	Unit	Rate	Per (Unit)	Total Amount

02

1. a) (iv) The plinth area of proposed building is 400 sqm. The known cost of construction for similar structure is Rs. 19,35,000 having plinth are 225 sq.m. Calculate approximate cost of proposed building.

Ans:

Given data -

Building	Area (Sq.M)	Cost (Rs.)
Existing Building	225	1935000
Proposed Building	400	?

By Plinth Area Rate method

1) Plinth area Rate = Cost of existing building/ Plinth area of existing building **02**
   = 1935000/ 225
   = Rs. 8600 per Sq.M
2) Cost of Proposed building = Plinth area Rate x Plinth area of proposed building **01**
   = 8600 x 400
   = 3440000 **01**
   Cost of Proposed buiding = Rs. 34,40,000/-

1. b) Attempt any ONE of the following: 06

1. b) (i) State the mode of measurements for following items of works.
1) Honey combed brickwork, 2) Dado, 3) Brick work (10 mm) in partition wall, 4) Collapsible gate (steel), 5) Railing, 6) D.P.C.

Ans:

Sr.No.	Item of Work	Mode of measurement
1)	Honey combed brickwork	Sq.M.
2)	Dado	Sq.M.
3)	Brick work (10mm) in partition wall	Sq.M.
4)	Collapsible gate (steel)	Sq.M.
5)	Railing	Rmt
6)	D.P.C.	Sq.M.

01 For each

1. b) (ii) Explain the following terms
Provisional sum, 2) Prime cost, 3) Day work

Ans:

1) **Provisional Sum**- Provisional sum is an amount provided in the estimate for some specialized work to be done by specialist firm. Whose details are not known at the time of preparing estimate. The work like installation of A.C, Liftetc. are comes under provisional sum whose full information and details may not be known at the time of preparing estimate. The amount paid to the contractor will not necessarily be the exact amount of provisional sum. **02**
2) **Prime Cost** – Prime Cost is the net cost or purchase cost of articles at shop and refers to the supply of articles only and not to the carrying out of work. It is not always possible at the time of preparing estimate to specify the exact requirement of articles such as water supply fittings, sanitary fittings,door &window etc. The same has to be decided while actual fitting of articles, for the execution of such item a reasonable amount is kept in estimate as Prime Cost. The price paid to the contractor for prime cost article will be the actual cost paid by him, he is not allowed to take some profit on that material. **02**
3) **Day work**–The procedure of costing or valuing an item of work on the basis of actual labors and materials required, is called day work. This method is used in certain items where it is difficult to take measurement for e.g Architectural elevation of building, preparation of statue and under water construction etc. Contractor have to maintain the record of daily consummation of material and labour engaged. **02**

2. Attempt any TWO of the following: 16

2. a) Calculate the quantity of earth work required for the earthen dam by trapezoidal formula using following data.
Top width of embankment = 3m
R.L. of top = 105 m
Side slope of both side 2H : 1V

Chainage (m)	200	230	260	290	320	350
R.L. of ground (m)	100	98	97.5	95.2	96	97

Ans:

Given data-

1) Top width of embankment = B =3m
2) R.L. of top = 105 m
3) Side slope of both side 2H : 1V i.e. S = 2
4) Chainage interval or length of section = L = 30m

Using Trapezoidal Method

1) Embankment height required = d = R.L. of Top – R.L. of ground — **01**
2) Area of cross section = $Bd + Sd^2$ — **01**
3) The calculations at respective chainages are tabulated as below-

Chainage (m)	200	230	260	290	320	350
R.L. of ground (m)	100	98	97.5	95.2	96	97
R.L. of Top (m)	105	105	105	105	105	105
Embankment Ht.(d)m	5	7	7.5	9.8	9	8
Area of cross section	65	119	135	221.48	189	152

01

02

4) Quantity of earthwork
   Q = L/2 {first area + last area + 2 x (sum of all remaining areas)} — **01**
   = 30/2 {65 + 152 + 2 x (119+135+221.48+189)} — **01**
   Q = 23189.40 Cu.M — **01**

2. b) Describe the procedure for preparing detailed estimate by using center line method.

Ans:

Centre line method is used for calculating quantities of rectangular,circular and polygonal buildings. This method is simple and quick. Calculations in thismethod are less and easy. — **02**

Procedure for preparing detailed estimate by using center line method-

1) Prepare centre line plan at foundation from given drawing and write centre line lengths of each wall.
2) Find the total length of centre lines having the same type of footing.
3) Calculate the number of junctions of cross walls (or **T**s).
4) Calculate net centre line length of an item = Total centre line length - n x (1/2 width of item)

Where n= number of junctions of cross walls with main walls or no. of **T**s.

5) For buildings having different type of walls, each set of walls should be taken separately.
6) Total Quantity of item = No. x Net centre line length x breadth x depth or height of item.

01* each (for six steps)

(*Note-Student may draw figure to explain the procedure, give credit accordingly)

2. c) (i) The cost of construction of college building is 3 crores for the capacity of 600 students and area of construction about 2500 m^2. Prepare approximate estimate of a new proposed college building for 3500 students with the area 14000 m^2. Use service unit method.

Ans:

Given Data-

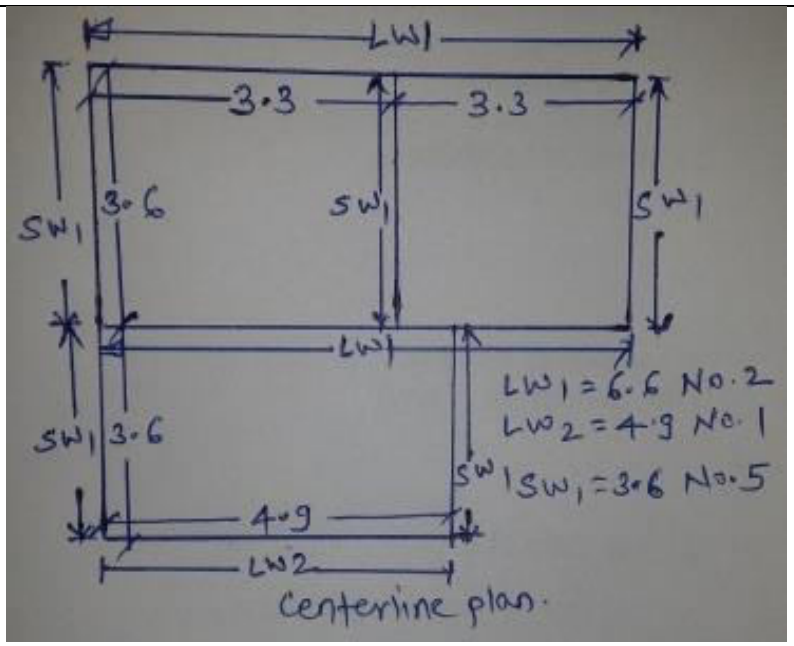
Building	**Students**	**Area (Sq.M.)**	**Cost (Crores)**
Existing College	600	2500	3
Proposed College	3500	14000	?

By Service Unit method - For college building, service unit is student.

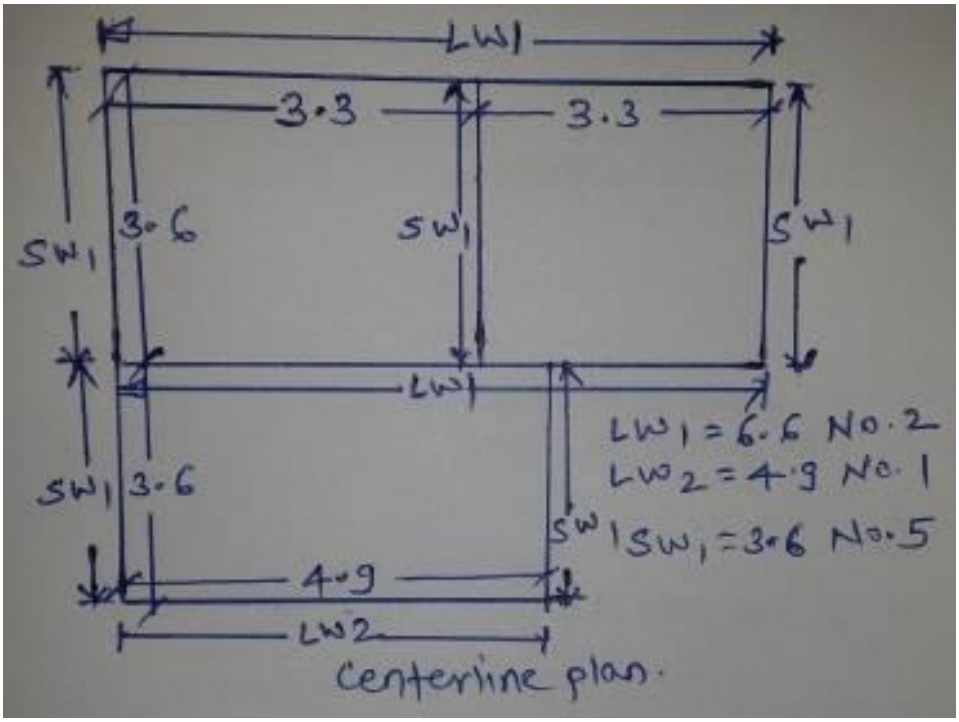
1) Service Unit Rate = Cost of existing building/ Students capacity in existing building — **01**
   = 30000000/ 600
   = Rs. 50000 per student — **01**

		2) Cost of Proposed building = Service Unit Rate x Students capacity in proposed building = 50000 x 3500 = 175000000 **Cost of Proposed College buiding = Rs. 17.5 Crores**	**01** **01**
	(ii)	**Define** **1) Contingencies, 2) Work charge establishment** Ans: **1) Contingencies**–The miscellaneous incidental expenses which can not approximately be classified under any distinct sub head are called as contingencies. **OR** The additional amount provided in estimate to meet unforeseen expenses, which can not approximately be classified under any distinct sub head is called as contingencies. Normally it is 3 to 5% of estimated cost. **2) Work Charged Establishment**–Work charged establishment is the establishment, which is charged to works directly.**OR** The additional amount provided in estimate for payment or salaries of temporary staff like supervisors, chowkidars, munshies, etc. is called as contingencies. Normally it is 1.5 to 2% of estimated cost.	**02** **02**
3		**Attempt any FOUR of following**	**16**
	a)	**State the rules of deduction for plastering as per IS1200** Ans: Plastering usually 12mm thick is calculated in sq.m. Deduction in plastering are made in the following manner a) No deduction is made for ends of beams, posts, rafters etc. b) No deduction is made for opening up to 0.5 sq.m. And no addition is made for jambs, soffits and sill of these opening. c) For opening more than 0.5 sq.m. and up to 3 sq.m. Deduction is made for one face only. No addition for jambs, soffits and sills. d) For opening above 3 sq.m. Deduction is made for both faces of openings, and the jambs, soffits and sill shall be added	**1 M Each**
	b)	**Define task work and state factors affecting task work.**	
		Ans: The capacity of doing work by skilled labour in the form of work per day is known as the task work. **Factors affecting task work** a) Output of skilled labour depends on the nature, size, height, location, climatic condition, technique adopted etc. of the work. b) Efficient site organization & management increases the labour output. **c)** Higher wages, incentives, less working hours & other amenities such as labour camp, drinking water, toilets, improves the labour output.	**2 M** **2M**

	C)	**Define Rate analysis and state its purpose**	
		Ans: Determination of rate per unit of a particular item of work, from the cost of quantities of materials, the cost of labours, charges of tools and plants and other miscellaneous petty expenses required for completion of work is known as rate analysis **Purpose of rate analysis** a) To work out the quantity of material required with their cost b) To work out number of labours required with their rates per day c) To find actual cost of item of work d) To determine rate of extra item **e)** To check the reliability in tender quoted by the contractor	**2 M** **½ X4 (any four)**
	d)	**Give the market rates of** a) Reinforcing steel b) Coarse aggregate c) Cement bags **d)** Sand (local)	
		Ans: a) Reinforcing steel = Rs 40/ kg or Rs 40000/MT b) Coarse aggregate = 700/ m3 or Rs 2000/brass c) Cement bags = Rs 280/bags d) Sand (local) = Natural Rs 2100/m3 or Rs 6000/brass i. = Artificial Rs 1500/m3 or Rs 4500/brass (Note :-The rates of material varies with place to place so give marks accordingly there may be some variation in rates.)	**1 M for each**
	e)	**State any four advantages of using software/program for estimating and costing**	
		Ans:- Following are the advantages of using software 1) Accurate quantity computation is possible. 2)These software helps is saving time of valuable human resource 2) It is possible to avoid manual mistakes by using these software 3) It is useful for better project management 4) Using software product will provide an efficient way to process your estimates, track your company's projects, put more quotes out into the marketplace and helps in winning more bids	**1 M each (any four)**
4		**Work out the quantity of following item of work and enter them in standard measurement sheet**	**16**
		Ans:- **Assume thickness of P.C.C below foundation =15 Cm**	

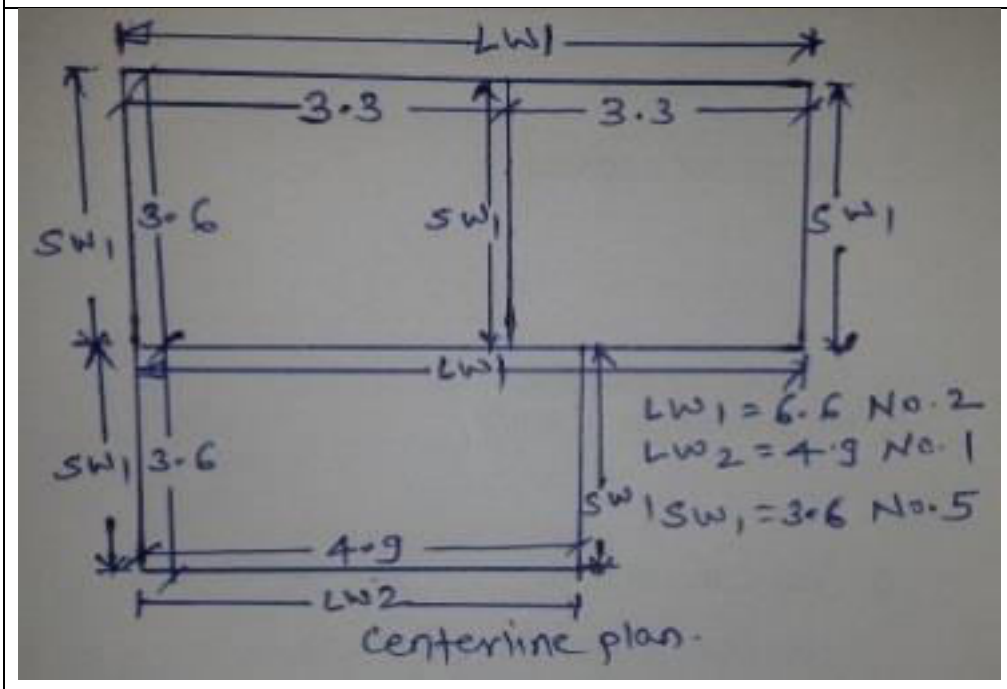
Item no.	Description of item	No	Length(m)	Breadth(m)	Depth (m)	Qty	Total Qty	
	1. Excavation in foundation							
								**1M**
	Center line plan Long wall Lw1=6.6 no.2 Lw2=4.9 no1 Short wall Sw1 =3.6 no. 5 LW1=6.6+0.9=7.5 LW2=4.9+0.9=5.8 SW1=3.6-0.9=2.5 **OR** Center Line Method Total center line= (2X6.6 +1X4.9 +3.6X5)=36.1 TL=36.1- 4/2(0.9)=34.3	 2 1 5 1	 7.5 5.8 2.7 34.3	 0.9 0.9 0.9 0.9	 1.65 1.65 1.65 1.65	 22.28 8.61 20.05 46.30	 50.94 Cum 50.94 Cum	**1M** **1M** **1M**
	2. Internal Plaster (1:4)							
	Kitchen	2	3.0		3.1	18.66		**1 M**
		2	3.3		3.1	20.46		
	Bed	2	3.0		3.1	18.66		**1M**
		2	3.3		3.1	20.46		**1M**
	Living	2	4.6		3.1	28.52		
		2	3.3		3.1	20.46		
						Total	**127.1 Sqm**	**1M**

3. UCR masonry in foundation and plinth



1M

	Center line plan Long wall Lw1=6.6 no.2 Lw2=4.9 no1 Short wall Sw1 =3.6 no. 5							**1M**
	(Step 1)							
	LW1=6.6+0.6=7.2	2	7.2	0.6	0.7	6.05		
	LW2=4.9+0.6=5.5	1	5.5	0.6	0.7	2.31		**1M**
	SW1=3.6-0.6=3.0	5	3.0	0.6	0.7	6.30		
	(Step 2 and plinth)							
	LW1=6.6+0.5=7.1	2	7.1	0.5	0.8	5.68		
	LW2=4.9+0.5=5.4	1	5.4	0.5	0.8	2.16		
	SW1=3.6-0.5=3.1	5	3.1	0.5	0.8	6.2	**28.71 Cum**	**1M**
	OR							
	Center Line Method Total center line= (2X6.6 +1X4.9 +3.6X5)=36.1							
	(Step 1)							
	TL=36.1- 4/2(0.6)=34.9	1	34.9	0.6	0.7	14.66		
	(Step 2 and plinth)							
	TL=36.1- 4/2(0.5)=35.1	1	35.1	0.5	0.8	14.04		
							28.71	

	4. Flooring							
	Kitchen	1	3.0	3.3		9.9		**1M**
	Bed	1	3.0	3.3		9.9		**1M**
	Living	1	4.6	3.3		15.15		
	Deduction below door	3	1.0	0.3		0.9		**1M**
						Total	**34.05 Sqm**	**1M**
	5. 2.5cm thk DPC							
								**1M**
	Long wall Lw1=6.6 no.2 Lw2=4.9 no1 Short wall Sw1 =3.6 no. 5							**1M**
	LW1=6.6+0.5=7.1	2	7.1	0.5		7.1		**1M**
	LW2=4.9+0.5=5.4	1	5.4	0.5		2.7		**1M**
	SW1=3.6-0.5=3.1	5	3.1	0.5		7.75	**17.55 Sqm**	**1M**
	OR							

			Center Line Method Total center line= (2X6.6 +1X4.9 +3.6X5)=36.1 TL=36.1- 4/2(0.5)=35.1	1	35.1	0.5		17.55	**17.55 Sqm**	
		Students can assume any thickness of P.C.C, so marks shall be awarded accordingly. Student may calculate the quantity of Earthwork,, U.C.R. Masonry &DPC either by Long wall-Short wall method or by Centerline method. Final answer will be same by both the methods.								
4	**b)**	**Attempt any one of following**								**6**
	i)	**Work out the quantity of steel for circular column with following data** **1.Diameter 600 mm & height 4500mm** **2.Main steel 8 bars,12mm diam (Tor)** **3.Links 6 mm diameter ms@125c/c**								
		Ans: Assume cover 40mm Length of main bar= 4500 mm **L**ength of link= πD+24d =π x 520 + 24x 6 = 1777.6=1778 =1.778m No of Links =(total length –cover)+ 1 Spacing = (4500-40)+ 1 125 = 36.48 = 37 no **Link 600mm diam**								**2M**

Sr no	Description	Shape of bar	No	Length (M)	Total length (m)	Diam of bar mm	Wt Kg/m	Total wt in kg
1	Main Bar		8	4.500	36	12	0.89	32.04
2	Links		37	1.778	65.78	6	0.22	14.48
							total	**46.52 Kg**

2M

2M

	ii)	**Define rate analysis and state the factors affecting rate analysis**.	
		Ans: Determination of rate per unit of a particular item of work, from the cost of quantities of materials, the cost of labours, charges of tools and plants and other miscellaneous petty expenses required for completion of work is known as rate analysis **Factors affecting Rate Analysis:-** **1. Major Factors :-** **a) Materials: -** The material can be calculated by knowing the specification of theitems. The price of various materials depends upon market conditions. The cost of material is taken as delivered at site inclusive of transport, local taxes, and other charges. For tools and plants and miscellaneous petty item which cannot be accounted in details lump sum provision is made. It is also necessary to include a certain percentage of waste of all materials to cover breakage, losses, cutting wasteetc. **b) Labour: -** The labour force will be necessary to arrange the materials in proper way so that the items can be completed. The amount of labour force required to carry out a unit of a particular item is decided from past experience or in case of complicateditems it is decided by carrying out a sample of that item. The labour force required depends upon the efficiency of labourer hence this force will vary from place to place and also there prices. By knowing the amount of labour force and wages of laborer the cost of labour can becalculated **2. Minor Factors:** - **<u>Minor factors:-</u>** **a) Special equipment's: -** different types of tools and plants are necessary for execution of work. A good estimator will decide whether purchasing is more economical or hiring the tools and plants isadvisable. **b) Place of work:-** if the site is in remote areas, transportation charges increases similarly labour charges also varies i.e. if site conditions are difficult, cost will bemore. **c) Magnitude of work:** - greater the magnitude of work lesser will be thecost. **d) Conditions of Contract**:- if the condition of contract is very stiff the rates are high **e) Profit of the contractor: -** Normally 10% of actual cost of work is consideredas contractorprofit. **f) Specification: -** it shows the proportion of material, the method of constructionand execution of work. If superior quality material issued rate will behigher. **g) Miscellaneous:** - time of completion, climatic condition, also affects the rate ofitem.	**2M** **2M** **2M**

5		**Attempt any TWO of the following:**	**16**
	a)	**Prepare rate analysis for brickwork in superstructure in cm 1:6 for Cu.m.**	

Assume volume of brick masonry = 10 cu.m.

Dry volume of mortar considering frog filling and wastage etc. = 35 % of volume ofbrick masonry. **1M**

Dry volume of mortar = (35 / 100) x 10 cu. m. = 3.5 cu. m.

A) Material Calculation

1) Volume of Cement

$$\text{Volume of cement} = \frac{\text{Dry vlume of Mortar}}{\text{Sum of Proportion}} \text{x Conent of cement in Proportion}$$

$$= \frac{3.5}{(1+6)} \times 1$$

$$= 0.5 \text{ m}^3$$

$$\text{No. of Cement bags} = \frac{\text{Volume of Cemet}}{\text{Volume of one bag of cemet}}$$

$$= \frac{0.5}{0.035}$$

$$= 14.29$$

$$= \text{Say } 14.50 \text{ Bags}$$ =15 Bags **1M**

2) Quantity of sand

$$\text{Quantity of Sand} = \frac{\text{Dry Volume}}{\text{Sum of Proportion}} \text{ X Content of sand in proportion}$$

$$= \frac{3.5}{(1+6)} \text{ X } 6$$

$$= 3.00 \text{ m}^3$$ **1M**

3) Number of Bricks

Size of bricks = 19 cm X 9 cm X 9 Cm

Size of bricks with mortar joint = 20cm X 10 cm X 10 cm

Volume of brick = 0.2 m x 0.1 m x 0.1 m = 0.002 cu. m.

$$\text{No. of Briks} = \frac{\text{Volume of masonry}}{\text{Volume of one brick}}$$

$$= \frac{10}{0.002}$$

$$= 5000 \text{ Nos.}$$

Adding 5 % of wastage = ((5/100) x Nos. of brick) + Nos. of brick **1M**

= ((5 / 100) x 5000) + 5000 = 5250 Nos.

S.N.	Particulars	Quantity	Rate	Unit of Rate	Amount
(A)	Cost of Material				

Cost of Material and Labour

S.N.	Particulars	Quantity	Rate	Unit of Rate	Amount
(A)	Cost of Material				
1	Cement	15	280.00	bag	4200.00
2	Sand / Fine Aggregates	3.00	1500.00	m^3	4500.00
3	Bricks	5250	6.00	No.	31500.00
	Total Cost of Material				**40200.00**
(B)	Cost of Labour				
1	Head Mason	0.5	800.00	day	400.00
2	Mason	8	600.00	day	4800.00
3	Male Mazdoor	8	350.00	day	2800.00
4	Female Mazdoor	10	350.00	day	3500.00
5	Bhisti	2	300.00	day	600.00
	Total Cost of Labour				**12100.00**
(C)	Scaffolding	--------Lump-sum----------			500.00
	Total A+B+C				**52800.00**
(D)	Water Charges	@ 1.5 % of Total			792.00
(E)	Contractor's Profit	@ 10 % of Total			5280.00
	Grand Total				**58872.00**

$$\text{Rate per } m^3 = \frac{\text{total cost}}{\text{Volume of Brickwork}}$$

$$\text{Rate per } m^3 = \frac{58872}{10} = 5887.2$$

Rate per cu. m. = Rs.5890/m^3

4M for Table and values.

(Note : Examiner should keep in mind that rates of materials and labours differs from place to place and time to time, proportionate marks should be given for following the correct procedure of preparing rate analysis)

	b)	**Prepare rate analysis for 60 m^3 cement concrete of proportion (1:2:4)**	
		Ans:. Assume Quantity (Wet Volume) of P.C.C. = 10 m3 A) Material Calculation Dry Volume = 52% more of wet volume $\text{Dry Volume} = 10 + \frac{52}{100} \times 10$ $= 15.20\ m^3$	**1M**
		i) Quantity of Cement $\text{Quantity of Cement} = \frac{\text{Dry Volume}}{\text{Sum of Sum Proportion}} \times \text{Content of Cement in proportion}$ $\frac{15.20}{(1+2+4)} \times 1$ $= 2.171\ m^3$ $\text{No. of Cement bags} = \frac{\text{Volume of Cemet}}{\text{Volume of one bag of cemet}}$ $= \frac{2.171}{0.035}$ $= 62.02$ $=$ Say 62.50 Bags = Say 63	**1 M**
		ii) Quantity of Sand / Fine Aggregate $\text{Quantity of C.A} = \frac{\text{Dry Volume}}{\text{Sum of Proportion}} \times \text{Content of sand in Proportion}$ $\frac{15.20}{(1+2+4)} \times 2$ $= 4.34\ m^3$	**1M**

iii) Quantity of Course Aggregate

$$\text{Quantity of C.A} = \frac{\text{Dry Volume}}{\text{Sum of Proportion}} \times \text{Content of C.A. in proportion}$$

$$= \frac{15.20}{(1+2+4)} \times 4$$

$$= 8.68\ m^3$$

1M

Cost of Material and Labour

S.N.	Particulars	Quantity	Rate	Per	Amount
(A)	Cost of Material				
1	Cement	62	280.00	bag	17360.00
2	Sand / Fine Aggregates	4.34	1500.00	m^3	6510.00
3	Course Aggregates	8.68	700.00	m^3	6076.00
	Total Cost of Material				**29946.00**
(B)	Cost of Labour				
1	Head Mason	1/2	800.00	day	400.00
2	Mason	2	600.00	day	1200.00
3	Male Mazdoor	10	350.00	day	3500.00
4	Female Mazdoor	10	350.00	day	3500.00
5	Bhisti (including curing)	5	300.00	day	1500.00
	Centering & Shuttering	----------Lump-sum----------			2000.00
	Total Cost of Labour				**12100.00**
(C)	Tools and Plants	----------Lump-sum----------			1500.00
	Total A+B+C				**43546.00**
(D)	Water Charges	@ 1.5 % of Total			653.19
(E)	Contractor's Profit	@ 10 % of Total			4354.60
	Grand Total				**48553.79**

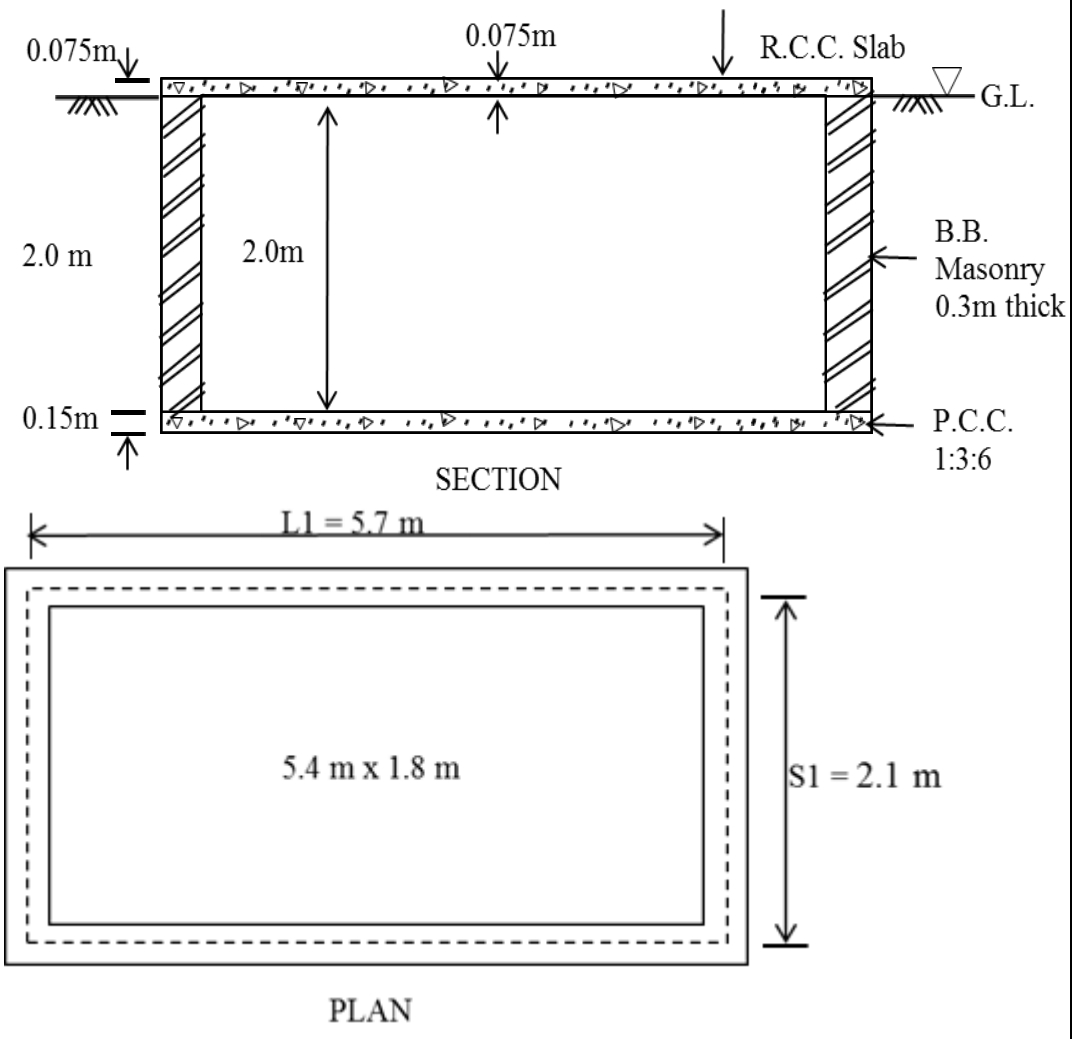
4M for Table and values.

$$\text{Rate per } m^3 = \frac{\text{total cost}}{\text{Volume of P.C.C.}}$$

$$\text{Rate per } m^3 = \frac{47349.59}{10} = 48553.79$$

Rate of P.C.C. 1:2:4 = Rs. 4860/m^3

(Note : Examiner should keep in mind that rates of materials and labours differs from place to place and time to time, proportionate marks should be given for following the correct procedure of preparing rate analysis)

	C)	**Workout quantity of following items for septic tank of size 1.80 m X 5.40 m and height 2.0 m.** **i. Earthwork in Excavation** **ii. P.C.C. (1:3:6)** **iii.BB masonry in cm (1:6)** **iv Slab on septic tank 75 mm thick.**	
		Ans:  Assume wall spanning in horizontal direction as long wall & wall spanning in vertical direction as short wall in plan Length of long wall; L1 = (0.3/2) + 5.4 + (0.3/2) L1 = 5.70 m……2 nos. Length of short wall; S1 = (0.3/2) + 1.8 + (0.3/2) S1 = 2.10 m……2 nos.	**1M**

Measurement Sheet

No.	Description of item of work	No.	Length L (m)	Breadth B (m)	Depth D (m)	Quantity	Total Quantity	
1	**Earthwork in excavation** L = 0.3 + 5.4 + 0.3 L = 6.0 m B = 0.3 + 1.8 + 0.3 B = 2.40 m D = (0.15 + 2.0) D = 2.15 m	1	6.00	2.40	2.15	30.96	**30.96 m^3**	**2M**
NOTE: - The examiner should give full marks if Student calculates the quantity of earthwork by assuming dimension of wall thickness, height & offset of P.C.C.as those dimensions are not given in the question paper.								
2	**P.C.C. (1:3:6)** L = 0.3 + 5.4 + 0.3 L = 6.0 m B = 0.3 + 1.8 + 0.3 B = 2.40 m D (Thickness) = 0.15 m	1	6.00	2.40	0.15	2.16	**2.16 m^3**	**1.5M**
NOTE: - The examiner should give full marks if Student calculates the quantity of P.C.C. by assuming dimension of thickness & offset of P.C.C. as those dimensions are not given in the question paper.								
3	**B.B. masonry in C.M. (1:6)**							
	For long wall, length of item; L = L1 + 0.30 L = 5.70 + 0.30 = 6.0 m	2	6	0.3	2	7.2		
	For short wall, length of item; L = S1 - 0.30 L = 2.10 - 0.30 = 1.80 m	2	1.8	0.3	2	2.16		**2M**
Total Quantity of B.B. masonry in C.M. (1:6)							**9.36 m^3**	
NOTE: - The examiner should give full marks if Student calculates the quantity of brickwork either by Long wall-Short wall (out to out – in to in) method or by Centerline method and by considering the different wall thickness.)								
4	R.C.C. slab L = 0.3 + 5.4 + 0.3 L = 6.0 m B = 0.3 + 1.8 + 0.3 B = 2.40 m D (Thickness) = 0.15 m	1	6.00	2.40	0.075	1.08	**1.08 m^3**	**1.5M**

6		**Attempt any FOUR of the following:**	**16 M**
	a)	**Explain in brief D.S.R**	
		Ans: 1. A list of rates of various items is prepared to facilitate preparation of estimate by government bodies like Public Works Department. 2. As the rates vary from place to place, Maharashtra Government publishes list of rates as per districts. These rates are in the form of printed booklet and called as District Schedule of Rates (DSR). 3. This booklet is revised every year because of changes in cost of labor, material every year. 4. It includes Completed rates, per unit cost of item of work and Labor rates. 5. Labor rates include charges to be paid to head mason, mazdoor, coolie etc. depending on the category of labor. 6. It also includes initial lead and lift and separate charges are applicable for more lead and lift. Similarly the rates are applicable to ground floor only and they are increased for each upper floor.	**1each (Any four)**
	b)	**Work out quantity of UCR foundation of community well (Refer Figure No. 2)**	
		Ans: **Measurement Sheet** S.N. | Particular of Item | No. | Length | Breadth | Depth | Quntity | Total Qty. 1 | UCR For Step - I Exter. Dia.= 5+0.6+0.6 = 6.2 m Inter. Dia. = 5.0 m Height = 3.0 m A = (π/4) x (6.2^2-5^2) | 1 | 10.5504 | 3 | 31.65 2 | For Step - II Exter. Dia. = 5+0.5+0.5 = 6.0 m Inter. Dia. = 5.0 m Height = 3.0 m A = (π/4) x (6^2-5^2) | 1 | 8.635 | 3 | 25.91 3 | For Step - III Exter. Dia. = 5+0.3+0.3 = 5.6 m Inter. Dia. = 5.0 m Height = 3.0 m A = (π/4) x (5.6^2-5^2) | 1 | 4.9926 | 3 | 14.98 **Total Quantity of UCR Foundation in m3** | **72.534** ***NOTE: - The examiner shall give appropriate marks if Student calculates the quantity by assuming heights of UCR steps, as those dimensions are not given in the question paper***	**1 M for each step** **1 M for its total)**
	c)	**Work out quantity of flooring of community well (Refer Figure No. 2)**	
		Measurement Sheet S.N. | Particular of Item | No. | Length | Breadth | Depth | Quntity | Total Qty. 1 | Flooring Exter. Dia.=5+0.3+0.3+1+1=7.6 Inter. Dia. = 5+0.3+0.3=5.6m A = (π/4) x (7.6^2-5.6^2) | 1 | 20.724 | -- | 20.724 **Total Quantity of Flooring in m^2** | **20.724**	**4M**

	d)	**Work out quantity of Excavation of community well (Refer Figure No. 2)**	
		Ans: **Measurement Sheet** (see table below) ***NOTE: - The examiner shall give appropriate marks if Student calculates the quantity by assuming height, as those dimensions are not given in the question paper.***	**3.5 M (1/2 M for each)** **And 1/2 M for its total**
	e)	**Work out quantity of R.C.C.ring beam of community well (Refer Figure No. 2**	
		Ans: **Measurement Sheet** (see table below)	**4M**

Measurement Sheet

S.N.	Particular of Item	No.	Length	Breadth / Area	Depth	Quntity	Total Qty.
1	Excavation from Ground Level to 1.5 m depth Dia.= 5+0.6+0.6 = 6.2 m	1		$(\pi/4) \times (6.2^2)$	1.5	45.263	
2	Excavation from 1.5m Level to 3.0 depth	1		$(\pi/4) \times (6.2^2)$	1.5	45.263	
3	Excavation from 3.0m Level to 4.5m depth	1		$(\pi/4) \times (6.2^2)$	1.5	45.263	
4	Excavation from 4.5m Level to 6.0m depth	1		$(\pi/4) \times (6.2^2)$	1.5	45.263	
5	Excavation from 6.0m Level to 7.5m depth	1		$(\pi/4) \times (6.2^2)$	1.5	45.263	
6	Excavation from 7.5m Level to 9.0 depth	1		$(\pi/4) \times (6.2^2)$	1.5	45.263	
7	Excavation from 9.0m Level to 9.25 depth	1		$(\pi/4) \times (6.2^2)$	0.25	7.5439	
	Total Quantity of Excavation in m^3						**279.122**

Measurement Sheet

S.N.	Particular of Item	No.	Length	Breadth	Depth	Quntity	Total Qty.
1	R.C.C. ring beam Exter. Dia.= 5+0.6+0.6 = 6.2 m Inter. Dia. = 5.0 m Depth of ring beam = 0.25 m						
	$A = (\pi/4) \times (6.2^2-5^2)$	1	10.550		0.25	2.638	
	Total Quantity of R.C.C. ring beam in m^3						**2.638**