

# UNIT - II

## DETAILED ESTIMATES

DATE                  

THEORIES :- 0 MARKS

[14 MARKS]

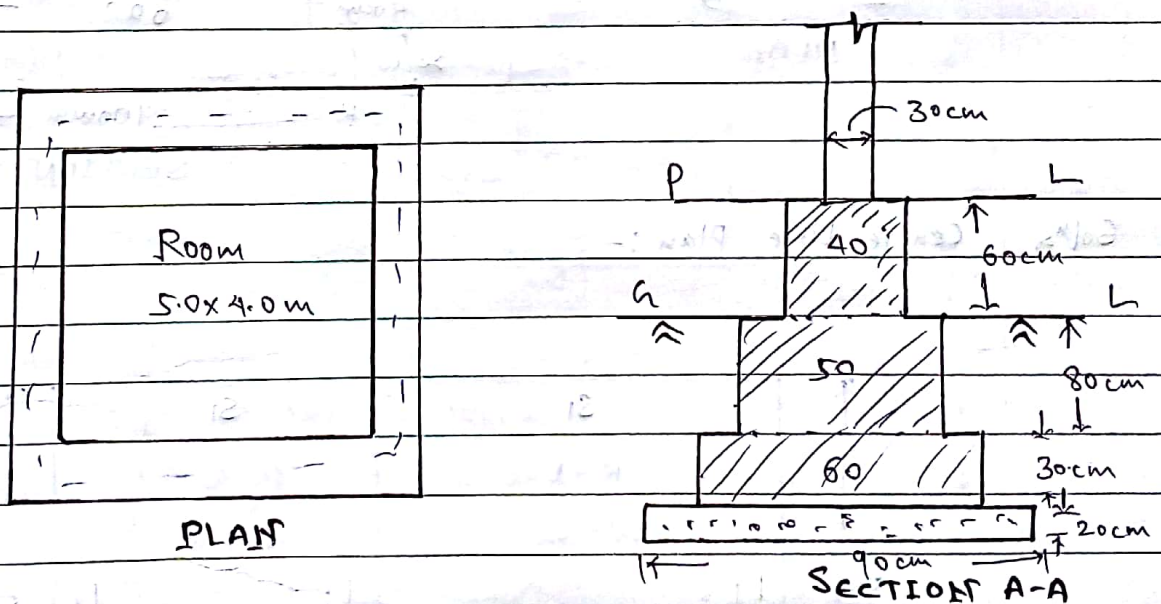
NUMERICALS:- 14 MARKS

NUMERICALS  $\Rightarrow$  14 MARKS

TYPE-I- [8 MARKS] [Compulsary]

[Based on Detailed Estimate using Centre-Line Method] & [Long and Short wall method]

- Q1. Figure Shows the plan of a single room building with section of foundation wall. Estimate the quantities of ci) Earth work in excavation in foundation  
 ii) lime concrete bed in foundation (iii) UCR masonry in foundation and plinth by using long wall and short wall method.



Soln  $\Rightarrow$

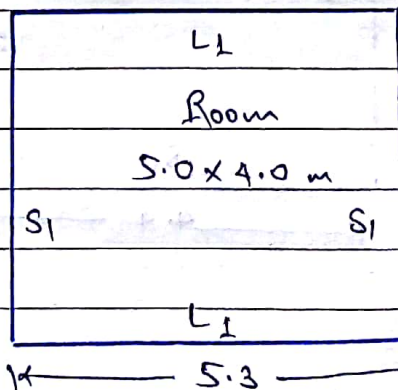
Centre line- Plan :-

$$L_1 = \frac{5.0 + 0.30}{2} + \frac{0.30}{2}$$

$$L_1 = 5.3 \text{ m}$$

$$S_1 = \frac{4.0 + 0.30}{2} + \frac{0.30}{2}$$

classmate  $S_1 = 4.3 \text{ m}$



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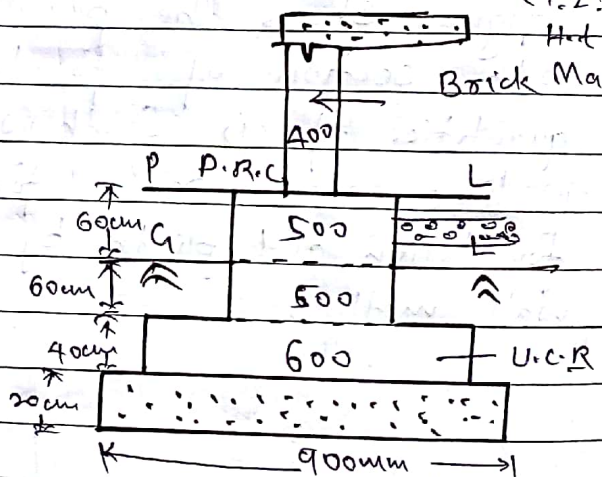
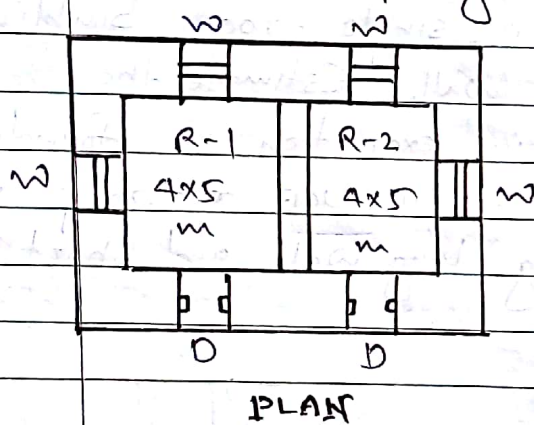
No.	Description and details of work	Nos.	Dimensions			Quantity	Remarks
			Length	Breadth	Height/Depth		
01.	Earthwork in excavation in foundation						
	LW <sub>1</sub> ⇒						
	$L = 5.3 + 0.90 = 6.2$	2	6.2	0.9	1.3	$14.508\text{m}^3$	
	SW <sub>1</sub> ⇒						
	$L = 4.3 - 0.90 = 3.4$	2	3.4	0.9	1.3	$7.956\text{m}^3$	$22.464\text{m}^3$
02.	Lime Concrete bed in foundation						
	LW <sub>1</sub> ⇒						
	$L = 5.3 + 0.90 = 6.2$	2	6.2	0.9	0.20	$2.232\text{m}^3$	
	SW <sub>1</sub> ⇒						
	$L = 4.3 + 0.9 = 5.2$	2	5.2	0.9	0.20	$1.0368\text{m}^3$	$3.456\text{m}^3$
03.	UCR Masonry in foundation and plinth						
	Step-I						
	LW <sub>1</sub> ⇒						
	$L = 5.3 + 0.6 = 5.9$	2	5.9	0.6	0.30	$2.124\text{m}^3$	
	SW <sub>1</sub> ⇒						
	$L = 4.3 - 0.6 = 3.7$	2	3.7	0.6	0.30	$1.332\text{m}^3$	
	Step-II						
	LW <sub>1</sub> ⇒						
	$L = 5.3 + 0.50 = 5.8$	2	5.8	0.50	0.80	$4.64\text{m}^3$	
	SW <sub>1</sub> ⇒						
	$L = 4.3 - 0.50 = 3.8$	2	3.8	0.50	0.80	$3.04\text{m}^3$	
	UCR Masonry in plinth						
	LW <sub>1</sub> ⇒						
	$L = 5.3 + 0.40 = 5.70$	2	5.70	0.40	0.60	$2.736\text{m}^3$	
	SW <sub>1</sub> ⇒						
	$L = 4.3 - 0.40 = 3.90$	2	3.90	0.40	0.60	$1.872\text{m}^3$	$15.744\text{m}^3$



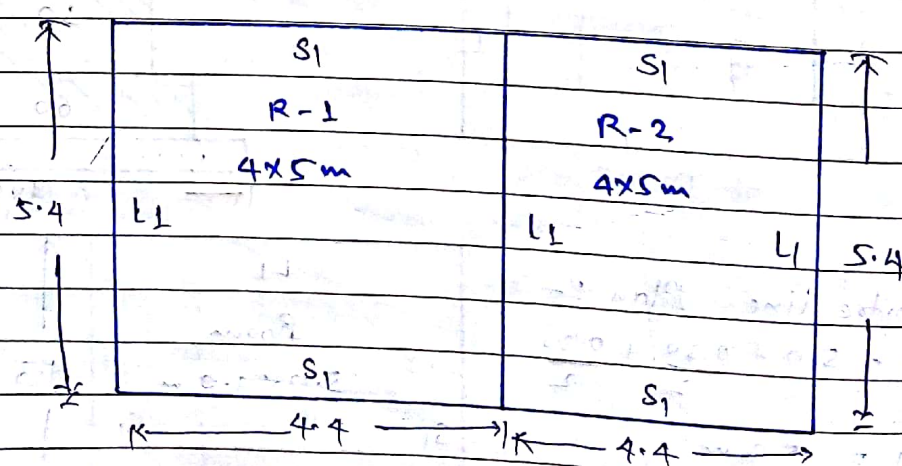
02. Fig. shows the plan and cross section of wall of a building with two rooms. Prepare an estimate with the quantities of the following items.

1. Earth work in excavation in foundation
2. P.C.C. bed in foundation (1:2:4)
3. U.C.R Masonry for foundation and plinth
4. 2.5cm cement concrete D.P.C
5. Brick work in superstructure in C.M (1:6).
6. Plinth filling materials.

12cm thick RCC slab  
(1:2:4)  
Hd 3m  
Brick Masonry



60<sup>th</sup> Centre Line Plan :-





# MEASUREMENT BOOK

Ques No. 02

NOVELTY GENERAL STORE

No.	Description and details of work	Nos.	Dimensions			Quantity	Remarks
			Length	Breadth	Height/Depth		
01.	Earth work in excavation in foundation						
	Lw <sub>1</sub> ⇒						
	$L = 5.4 + 0.9 = 6.3$	3	6.3	0.9	1.20	20.412m <sup>3</sup>	
	Sw <sub>1</sub> ⇒						
	$L = 4.4 - 0.9 = 3.5$	4	3.5	0.9	1.20	15.12m <sup>3</sup>	35.532m <sup>3</sup>
02.	P.C.C bed in foundation (1:2:4)						
	Lw <sub>1</sub> ⇒						
	$L = 5.4 + 0.9 = 6.3$	3	6.3	0.9	0.20	3.402m <sup>3</sup>	
	Sw <sub>1</sub> ⇒						
	$L = 4.4 - 0.9 = 3.5$	4	3.5	0.9	0.20	2.52m <sup>3</sup>	5.922m <sup>3</sup>
03.	U.C.R Masonry for foundation and plinth						
	Step-I						
	Lw <sub>1</sub> ⇒						
	$L = 5.4 + 0.6 = 6.0$	3	6.0	0.6	0.40	4.32m <sup>3</sup>	
	Sw <sub>1</sub> ⇒						
	$L = 4.4 - 0.6 = 3.8$	4	3.8	0.6	0.40	2.648m <sup>3</sup>	
	Step-II						
	Lw <sub>1</sub> ⇒						
	$L = 5.4 + 0.5 = 5.9$	3	5.9	0.5	0.60	5.31m <sup>3</sup>	
	Sw <sub>1</sub> ⇒						
	$L = 4.4 - 0.5 = 3.9$	4	3.9	0.5	0.60	4.68m <sup>3</sup>	
	Step-III (Plinth)						
	Lw <sub>1</sub> ⇒						
	$L = 5.4 + 0.5 = 5.9$	3	5.9	0.5	0.60	5.31m <sup>3</sup>	
	Sw <sub>1</sub> ⇒						
	$L = 4.4 - 0.5 = 3.9$	4	3.9	0.5	0.60	4.68m <sup>3</sup>	27.948
04.	2.5cm Cement Conc.						
	D.P.C						

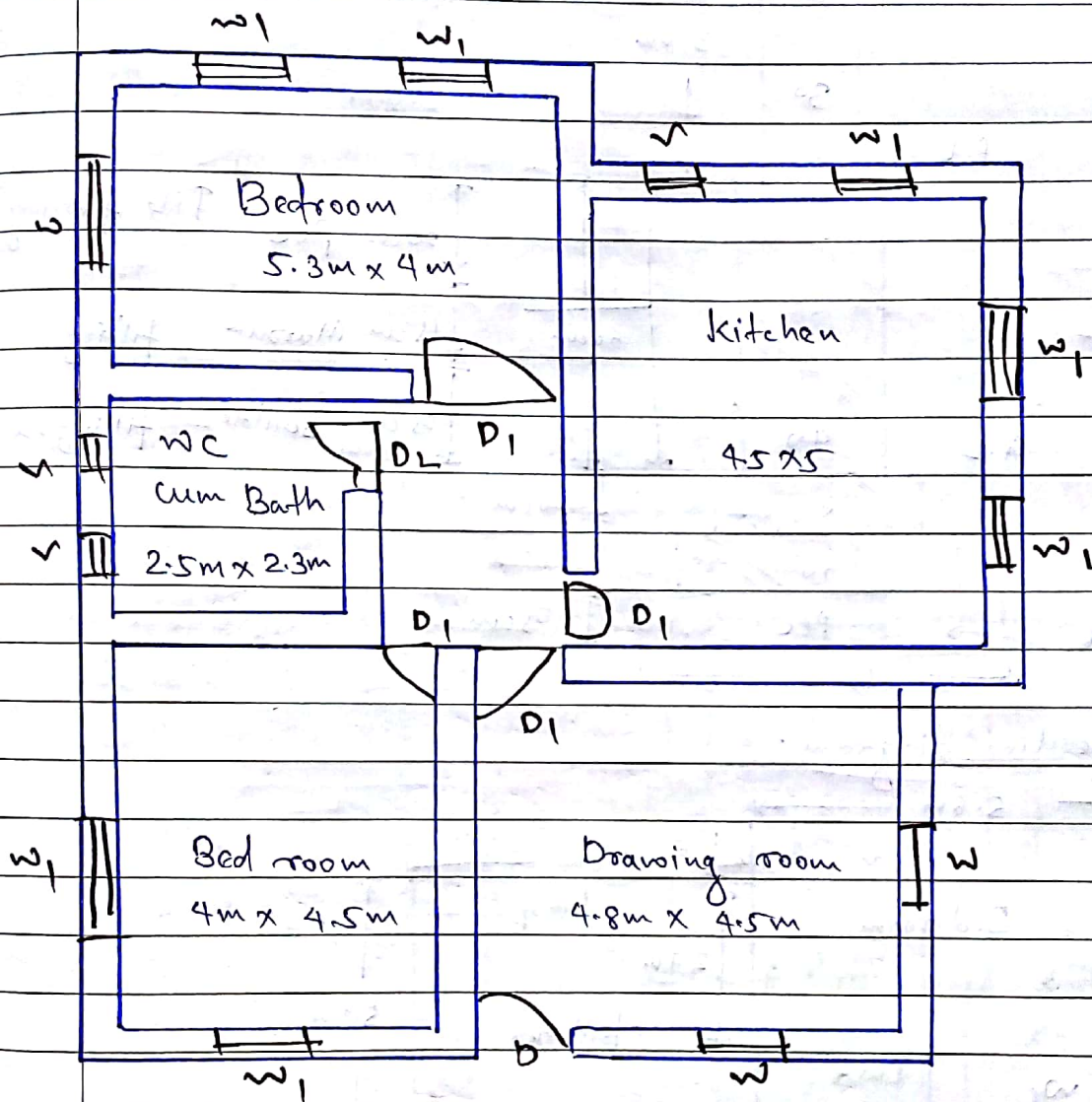


# MEASUREMENT BOOK

NOVELTY GENERAL STORE

No.	Description and details of work	Nos.	Dimensions			Quantity	Remarks
			Length	Breadth	Height/Depth		
	$LW_1 \Rightarrow$						
	$L = 5.4 + 0.4 = 5.8$	3	5.8	0.4	—	$6.96m^3$	
	$SW_1 \Rightarrow$						
	$L = 4.4 - 0.4 = 4.0$	4	4.0	0.4	—	$6.4m^3$	$13.36m^3$
	Deductions:-						
	for Doors (D)						
	Because below						
	door D.P.C is not						
	provided,						
	D	2	1.2	0.4	—	$0.96m^3$	$12.4m^3$
05.	Brickwork in Super-structure C.M (1:6)						
	$LW_1 \Rightarrow$						
	$L = 5.4 + 0.4 = 5.8$	3	5.8	0.4	3	$20.88m^3$	
	$SW_1 \Rightarrow$						
	$L = 4.4 - 0.4 = 4.0$	4	4.0	0.4	3	$19.2m^3$	$40.08m^3$
	Deduction:						
	Doors (D)	2	1.2	0.4	2.1	$2.016m^3$	
	Windows (W)	4	1.2	0.4	1.2	$2.304m^3$	
	Lintels for						
	Doors (D)	2	1.5	0.4	0.2	$0.24m^3$	
	Windows (W)	4	1.5	0.4	0.2	$0.48m^3$	$5.04m^3$
	Net Quantity						$35.04m^3$
06.	Plindh filling materials for Room						
	$L = 4.4 - 0.25 \times 2$	2	3.9	4.9	0.6	$22.932m^3$	$22.932m^3$
	$= 3.9m$						
	$B = 5.4 - 0.25 \times 2$						
	$= 4.9m$						

Q3. Prepare an estimate.



Ht. of room - 3.0m

Slab thickness - 150mm

Wall thickness - 300mm

D → 1.2 x 2.1

D1 → 1.0 x 2.1

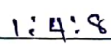
D2 → 0.9 x 2.1

W → 1.5 x 1.5

W1 → 1.2 x 1.5

V → 0.5 x 0.5





Soln  $\rightarrow$



# MEASUREMENT BOOK

Que No. 03

NOVELTY GENERAL STORE

No.	Description and details of work	Nos.	Dimensions			Quantity	Remarks
			Length	Breadth	Height/Depth		
01	Excavation						
	Lw <sub>1</sub> ⇒						
	$L = 9.4 + 0.9 = 10.3$	1	10.3	0.9	0.65	6.03m <sup>3</sup>	
	Lw <sub>2</sub> ⇒						
	$L = 10.4 + 0.9 = 11.3$	1	11.3	0.9	0.65	6.60m <sup>3</sup>	
	Lw <sub>3</sub> ⇒						
	$L = 5.6 + 0.9 = 6.5$	2	6.5	0.9	0.65	7.61m <sup>3</sup>	
	Lw <sub>4</sub> ⇒						
	$L = 4.8 + 0.9 = 5.7$	1	5.7	0.9	0.65	3.31m <sup>3</sup>	
	Sw <sub>1</sub> ⇒						
	$L = 4.8 - 0.9 = 3.9$	3	3.9	0.9	0.65	6.83m <sup>3</sup>	
	Sw <sub>2</sub> ⇒						
	$L = 2.6 - 0.9 = 1.7$	3	1.7	0.9	0.65	2.98m <sup>3</sup>	
	Sw <sub>3</sub> ⇒						
	$L = 4.3 - 0.9 = 3.4$	1	3.4	0.9	0.65	1.98m <sup>3</sup>	
	Sw <sub>4</sub> ⇒						
	$L = \frac{2.7 - 0.9}{5.3 - 0.9} = 1.8$ <del><math>L = 5.3 - 0.9 = 4.4</math></del>	1	4.4	0.9	0.65	<del>2.57m<sup>3</sup></del>	1.05m <sup>3</sup>
	Sw <sub>5</sub> ⇒						
	$L = 1.6 - 0.9 = 0.7$	1	0.7	0.9	0.65	0.41m <sup>3</sup>	
	Sw <sub>6</sub> ⇒						39.42m <sup>3</sup>
	$L = 5.3 - 0.9 = 4.4$	1	4.4	0.9	0.65	2.57m <sup>3</sup>	<del>40.84m<sup>3</sup></del>
02.	PCC below foundation						
	or						
	PCC (1:4:8) in foundation						
	Lw <sub>1</sub> ⇒						
	$L = 9.4 + 0.9 = 10.3$	1	10.3	0.9	0.25	2.32m <sup>3</sup>	
	Lw <sub>2</sub> ⇒						
	$L = 10.4 + 0.9 = 11.3$	1	11.3	0.9	0.25	2.53m <sup>3</sup>	
	Lw <sub>3</sub> ⇒						
	$L = 5.6 + 0.9 = 6.5$	2	6.5	0.9	0.25	2.93m <sup>3</sup>	
	Lw <sub>4</sub> ⇒						
	$L = 4.8 + 0.9 = 5.7$	1	5.7	0.9	0.25	1.28m <sup>3</sup>	



# MEASUREMENT BOOK

NOVELTY GENERAL STORE

No.	Description and details of work	Nos.	Dimensions			Quantity	Remarks
			Length	Breadth	Height/Depth		
	SW <sub>1</sub> ⇒						
	$L = 4.8 - 0.9 = 3.9$	3	3.9	0.9	0.25	2.63m <sup>3</sup>	
	SW <sub>2</sub> ⇒						
	$L = 2.6 - 0.9 = 1.7$	3	1.7	0.9	0.25	1.15m <sup>3</sup>	
	SW <sub>3</sub> ⇒						
	$L = 4.3 - 0.9 = 3.4$	1	3.4	0.9	0.25	0.76m <sup>3</sup>	
	SW <sub>4</sub> ⇒						
	<del><math>L = 5.3 - 0.9 = 4.4</math></del>	<del>1</del>	<del>4.4</del>	<del>0.9</del>	<del>0.25</del>		
	$L = 2.7 - 0.9 = 1.8$	1	1.8	0.9	0.25	0.41m <sup>3</sup>	
	SW <sub>5</sub> ⇒						
	$L = 1.6 - 0.9 = 0.7$	1	0.7	0.9	0.25	0.16m <sup>3</sup>	
	SW <sub>6</sub> ⇒						
	$L = 5.3 - 0.9 = 4.4$	1	4.4	0.9	0.25	0.99m <sup>3</sup>	15.18m <sup>3</sup>
03.	Brick Masonry in foundation and plinth						
	Step-1-						
	Lw <sub>1</sub> ⇒						
	$L = 9.4 + 0.6 = 10$	1	10	0.6	0.20	1.2m <sup>3</sup>	
	Lw <sub>2</sub> ⇒						
	$L = 10.4 + 0.6 = 11$	1	11	0.6	0.20	1.32m <sup>3</sup>	
	L <sub>3</sub> ⇒						
	$L = 5.6 + 0.6 = 6.2$	2	6.2	0.6	0.20	1.49m <sup>3</sup>	
	Lw <sub>4</sub> ⇒						
	$L = 4.8 + 0.6 = 5.4$	1	5.4	0.6	0.20	0.65m <sup>3</sup>	
	SW <sub>1</sub> ⇒						
	$L = 4.8 - 0.6 = 4.2$	3	4.2	0.6	0.20	1.51m <sup>3</sup>	
	SW <sub>2</sub> ⇒						
	$L = 2.6 - 0.6 = 2.0$	3	2.0	0.6	0.20	0.72m <sup>3</sup>	
	SW <sub>3</sub> ⇒						
	$L = 4.3 - 0.6 = 3.7$	1	3.7	0.6	0.20	0.49m <sup>3</sup>	
	SW <sub>4</sub> ⇒						
	$L = 2.7 - 0.6 = 2.1$	1	2.1	0.6	0.20	0.25m <sup>3</sup>	

# MEASUREMENT BOOK

NOVELTY GENERAL STORE

No.	Description and details of work	Nos.	Dimensions			Quantity	Remarks	No.
			Length	Breadth	Height/Depth			
	Sw5 $\Rightarrow$							
	$L = 1.6 - 0.6 = 1$	1	0.6	0.6	0.20	$0.12m^3$		
	Sw6 $\Rightarrow$							
	$L = 5.3 - 0.6 = 4.7$	1	4.7	0.6	0.20	$0.56m^3$		
	Step-II							
	Lw1 $\Rightarrow$							
	$L = 9.4 + 0.5 = 9.9$	1	9.9	0.5	0.2	$0.99m^3$		
	Lw2 $\Rightarrow$							
	$L = 10.4 + 0.5 = 10.9$	1	10.9	0.5	0.2	$2.18m^3$		
	Lw3 $\Rightarrow$							
	$L = 5.6 + 0.5 = 6.1$	2	6.1	0.5	0.2	$0.61m^3$		
	Lw4 $\Rightarrow$							
	$L = 4.8 + 0.5 = 5.3$	1	5.3	0.5	0.2	$0.53m^3$		
	Sw1 $\Rightarrow$							
	$L = 4.8 - 0.5 = 4.3$	3	4.3	0.5	0.2	$1.29m^3$		
	Sw2 $\Rightarrow$							
	$L = 2.6 - 0.5 = 2.1$	3	2.1	0.5	0.2	$0.63m^3$		
	Sw3 $\Rightarrow$							
	$L = 4.3 - 0.5 = 3.8$	1	3.8	0.5	0.2	$0.35m^3$		
	Sw4 $\Rightarrow$							
	$L = 2.7 - 0.5 = 2.2$	1	2.2	0.5	0.2	$0.22m^3$		
	Sw5 $\Rightarrow$							
	$L = 1.6 - 0.5 = 1.1$	1	1.1	0.5	0.2	$0.11m^3$		
	Sw6							
	$L = 5.3 - 0.5 = 4.8$	1	4.8	0.5	0.2	$0.48m^3$		
	Step-III							
	Lw1 $\Rightarrow$							
	$L = 9.4 + 0.4 = 9.8$	1	9.8	0.4	0.6	$2.35m^3$		
	Lw2 $\Rightarrow$							
	$L = 10.4 + 0.4 = 10.8$	1	10.8	0.4	0.6	$3.18m^3$		
	Lw3 $\Rightarrow$							
	$L = 5.6 + 0.4 = 6$	2	6	0.4	0.6	$1.44m^3$		
	Lw4 $\Rightarrow$							
	$L = 4.8 + 0.4 = 5.2$	1	5.2	0.4	0.6	$1.21m^3$		



# MEASUREMENT BOOK

NOVELTY GENERAL STORE

No.	Description and details of work	Nos.	Dimensions			Quantity	Remarks
			Length	Breadth	Height/Depth		
	SW <sub>1</sub> ⇒						
	L = 4.8 - 0.4 = 4.4	3	4.4	0.4	0.6	3.17 m <sup>3</sup>	
	SW <sub>2</sub> ⇒						
	L = 2.6 - 0.4 = 2.2	3	2.2	0.4	0.6	1.58 m <sup>3</sup>	
	SW <sub>3</sub> ⇒						
	L = 4.3 - 0.4 = 3.9	1	3.9	0.4	0.6	0.94 m <sup>3</sup>	
	SW <sub>4</sub> ⇒						
	L = 2.7 - 0.4 = 2.3	1	2.3	0.4	0.6	0.55 m <sup>3</sup>	
	SW <sub>5</sub> ⇒						
	L = 1.6 - 0.4 = 1.2	1	1.2	0.4	0.6	0.29 m <sup>3</sup>	
	SW <sub>6</sub> ⇒						
	L = 5.3 - 0.4 = 4.9	1	4.9	0.4	0.6	1.18 m <sup>3</sup>	31.98 m <sup>3</sup>
04.	Brick Masonary in Super-structure						
	LW <sub>1</sub> ⇒						
	L = 9.4 + 0.3 = 9.7	1	9.7	0.3	3	8.73 m <sup>3</sup>	
	LW <sub>2</sub> ⇒						
	L = 10.4 + 0.3 = 10.7	1	10.7	0.3	3	9.63 m <sup>3</sup>	
	LW <sub>3</sub> ⇒						
	L = 5.6 + 0.3 = 5.9	2	5.9	0.3	3	10.62 m <sup>3</sup>	
	LW <sub>4</sub> ⇒						
	L = 4.8 + 0.3 = 5.1	1	5.1	0.3	3	4.59 m <sup>3</sup>	
	<del>LW<sub>5</sub></del> SW <sub>1</sub> ⇒						
	L = 4.8 - 0.3 = 4.5	3	4.5	0.3	3	12.15 m <sup>3</sup>	
	SW <sub>2</sub> ⇒						
	L = 2.6 - 0.3 = 2.3	3	2.3	0.3	3	6.21 m <sup>3</sup>	
	SW <sub>3</sub> ⇒						
	L = 4.3 - 0.3 = 4	1	4.0	0.3	3	3.6 m <sup>3</sup>	
	SW <sub>4</sub> ⇒						
	L = 2.7 - 0.3 = 2.4	1	2.4	0.3	3	2.16 m <sup>3</sup>	
	SW <sub>5</sub> ⇒						
	L = 1.6 - 0.3 = 1.3	1	1.3	0.3	3	1.17 m <sup>3</sup>	

# MEASUREMENT BOOK

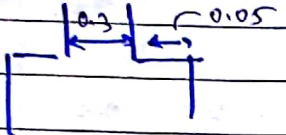
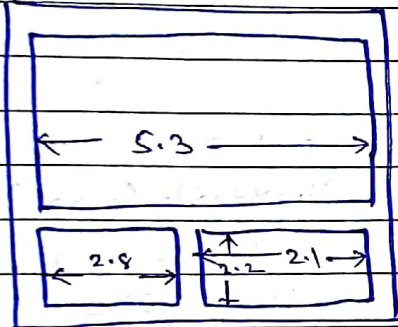
NOVELTY GENERAL STORE

No.	Description and details of work	Nos.	Dimensions			Quantity	Remarks	No.
			Length	Breadth	Height/Depth			
	Swg $\Rightarrow$							05
	$L = 5.3 - 0.3 = 5.0$	1	5.0	0.3	3	$4.5m^3$		
						Gross Quantity = $63.36m^3$		
	Deductions							
	Door - D	1	1.2	0.3	2.1	$0.76m^3$		
	D <sub>1</sub>	4	1.0	0.3	2.1	$2.52m^3$		
	D <sub>2</sub>	1	0.9	0.3	2.1	$0.57m^3$		0
	Window - W	2	1.5	0.3	2.15	$1.35m^3$		
	W <sub>1</sub>	8	1.2	0.3	1.5	$4.32m^3$		
	Ventilator - V	3	0.5	0.3	0.5	$0.23m^3$		
	Lintels							
	Door, D	1	1.5	0.3	0.15	$0.07m^3$		
	D <sub>1</sub>	4	1.3	0.3	0.15	$0.23m^3$		
	D <sub>2</sub>	1	1.2	0.3	0.15	$0.05m^3$		
	Window W	2	1.8	0.3	0.15	$0.16m^3$		
	W <sub>1</sub>	8	1.5	0.3	0.15	$0.54m^3$		
	<del>W</del> V	3	0.8	0.3	0.15	$0.11m^3$		
						$10.91m^3$	$52.45m^3$	
05.	Plinth filling or Masonry and boulder filling							
01.	Drawing room							
	$L' = 4.8 - 0.05 - 0.05 = 4.7$							
	$B' = 4.5 - 0.05 - 0.05 = 4.4$	1	4.7	4.4	0.4	$8.2m^3$		
02.	Kitchen							
	$L' = 4.5 - 0.05 - 0.05 = 4.4m$							
	$B' = 5 - 0.05 - 0.05 = 4.9m$	1	4.4	4.9	0.4	$8.62m^3$		
03.	Bedroom							
	$L' = 5.3 - 0.05 - 0.05 = 5.2m$							
	$B' = 4 - 0.05 - 0.05 = 3.9m$	1	5.2	3.9	0.4	$8.11m^3$		
04.	Wc Bath							
	$L' = 4 - 0.05 - 0.05 = 2.7m$							
	$B' = 2.3 - 0.05 - 0.05 = 2.2m$	1	2.7	2.2	0.4	$2.38m^3$		



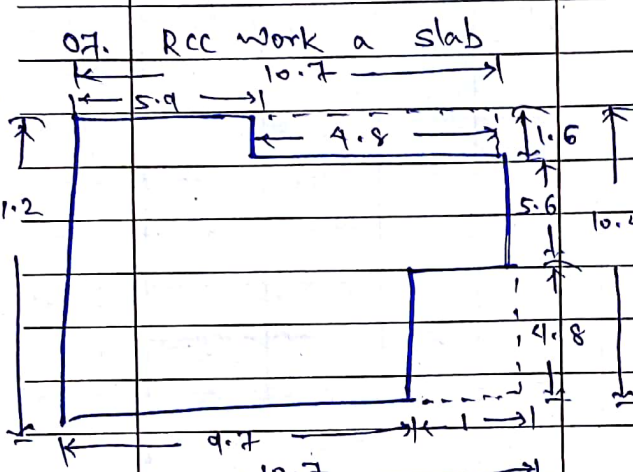
# MEASUREMENT BOOK

NOVELTY GENERAL STORE

No.	Description and details of work	Nos.	Dimensions			Quantity	Remarks
			Length	Breadth	Height/Depth		
05.	Bed room						
	$L1 = 4 - 0.05 - 0.05 = 3.9m$						
	$B1 = 4.5 - 0.05 - 0.05 = 4.4m$	1	3.9	4.4	0.4	6.86m <sup>3</sup>	
							
06.	Passage Portion						
							
	$5.3 - 2.8 - 0.3 = 2.2$						
	$L1 = 2.1$						
	$B1 = 2.2$	1	2.1	2.2	0.4	1.85	36.09m <sup>3</sup>
06.	Pcc below flooring						
1.	Drawing Room						
	$L1 = 4.8 - 0.05 - 0.005 = 4.7$						
	$B1 = 4.5 - 0.05 - 0.05 = 4.4$	1	4.7	4.4	0.2	4.31m <sup>3</sup>	
2.	Kitchen						
	$L1 = 4.5 - 0.05 - 0.05 = 4.4$						
	$B1 = 5 - 0.05 - 0.05 = 4.9$	1	4.4	4.9	0.2	4.31m <sup>3</sup>	
3.	Bed room						
	$L1 = 5.3 - 0.05 - 0.05 = 5.2$						
	$B1 = 4 - 0.05 - 0.05 = 3.9$	1	5.2	3.9	0.2	4.06m <sup>3</sup>	
4.	wc Bath						
	$L1 = 2.8 - 0.05 - 0.05 = 2.7$						
	$B1 = 2.3 - 0.05 - 0.05 = 2.2$	1	2.7	2.2	0.2	1.19m <sup>3</sup>	

# MEASUREMENT BOOK

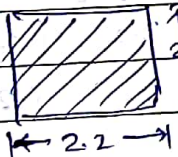
NOVELTY GENERAL STORE

No.	Description and details of work	Nos.	Dimensions			Quantity	Remarks
			Length	Breadth	Height/Depth		
5.	Bed room						
	$L' = 4 - 0.05 - 0.05 = 3.9m$						
	$B' = 4.5 - 0.05 - 0.05 = 4.4m$	1	3.9	4.4	0.2	$3.43m^3$	
6.	Passage Portion.						
	$L = 2.1m$						
	$B' = 2.2m$	1	2.1	2.2	0.2	$0.92m^3$	$18.05m^3$
07.	RCC work a slab						
							
	Area = $(10.7 \times 12) - (1.6 \times 4.8) - (4.8 \times 1)$						
	$= 115.92$						
	Area = 115.92	1	(115.92)		0.15	$17.39m^3$	
	Lintel Door						
	D	1	1.5	0.3	0.15	$0.07m^3$	
	D <sub>1</sub>	4	1.3	0.3	0.15	$0.23m^3$	
	D	1	1.2	0.3	0.15	$0.05m^3$	
	w	2	1.8	0.3	0.15	$0.16m^3$	
	w <sub>1</sub>	8	1.5	0.3	0.15	$0.54m^3$	
	w	3	0.8	0.3	0.15	$0.11m^3$	$18.55m^3$
	Steel on volumetric % basis					1.16	
	Assuming 5% steel						
	$V_{steel} = \frac{0.5}{100} \times 18.55 = 0.093$						
	$w_{steel} = 0.093 \times 7850$						
	$= 730.05 kg$						



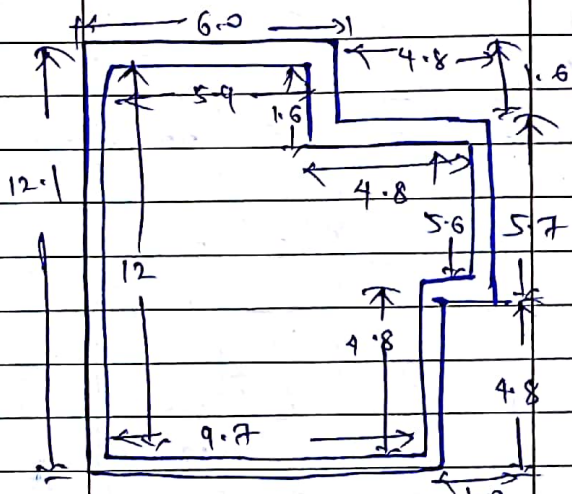
# MEASUREMENT BOOK

NOVELTY GENERAL STORE

No.	Description and details of work	Nos.	Dimensions			Quantity	Remarks
			Length	Breadth	Height/Depth		
08.	Internal Plaster						
	(i) Drawing room						
	$P = 2(4.8 + 4.5) = 18.6$	1	18.46	—	3	55.8 m <sup>2</sup>	
	Ceiling	1	4.8	4.5	—	21.6 m <sup>2</sup>	
	(ii) kitchen						
	$P = 2(4.5 + 5) = 19$	1	19	—	3	57 m <sup>2</sup>	
	Ceiling	1	4.5	5	—	22.5 m <sup>2</sup>	
	(iii) Bed room						
	$P = 2(5.3 + 4) = 18.6$	1	18.6	—	3	55.8 m <sup>2</sup>	
	Ceiling	1	5.3	4	—	21.2 m <sup>2</sup>	
	(iv) Bed Room						
	$P = (2 \times 4 + 2 \times 4.5)$	1	17	—	3	51 m <sup>2</sup>	
	Ceiling	1	4	4.5	—	18 m <sup>2</sup>	
	(v) WC Cum Bath						
	$P = 2 \times (2.8 + 2.3)$	1	10.2	—	3	30.6 m <sup>2</sup>	
	Ceiling	1	2.8	2.3	—	6.44 m <sup>2</sup>	
	(vi) Passage Portion						
	 $P = 2(2.2 + 2.3)$	1	9	—	3	27 m <sup>2</sup>	
	$= 9$	1	2.2	2.3	—	5.06 m <sup>2</sup>	
						Gross Area = 372 m <sup>2</sup>	
	Deduction						
	Door - D	8 x 1/2	1.2		2.1	1.26 m <sup>2</sup>	
	D <sub>1</sub>	8 x 1/2	1.0		2.1	8.4 m <sup>2</sup>	
	D <sub>2</sub>	2 x 1/2	0.9		2.1	1.89 m <sup>2</sup>	
	Windows - W	2 x 1/2	1.5		1.5	2.25 m <sup>2</sup>	
	W <sub>1</sub>	8 x 1/2	1.2		1.5	7.2 m <sup>2</sup>	
						21 m <sup>2</sup>	351 m <sup>2</sup>

# MEASUREMENT BOOK

NOVELTY GENERAL STORE

No.	Description and details of work	Nos.	Dimensions			Quantity	Remarks
			Length	Breadth	Height/Depth		
09.	External Plaster						
	(I) Plinth Plaster						
	$P = 12.1 + 6 + 1.6 + 4.8$						
	$+ 5.7 + 1 + 9.8 = 45.8m$	1	45.8	—	0.6	27.48m <sup>2</sup>	
							
	(II) for super-structure wall						
	$P = (12 + 5.9 + 1.6 + 4.8 +$						
	$5.6 + 1 + 4.8 + 9.7)$						
	$= 45.4$	1	45.4	—	3.2	145.28m <sup>2</sup>	
						172.76m <sup>2</sup>	
	Deductions.						
	Door D	1 x 1/2	1.2	—	2.1	1.26m <sup>2</sup>	
	Window W	2 x 1/2	1.5	—	1.5	2.25m <sup>2</sup>	
	W <sub>1</sub>	8 x 1/2	1.2	—	1.5	7.2m <sup>2</sup>	
						10.71m <sup>2</sup>	
						162m <sup>2</sup>	



**NOVELTY GENERAL STORE**

Scanned by CamScanner

Also calculate centre line length,

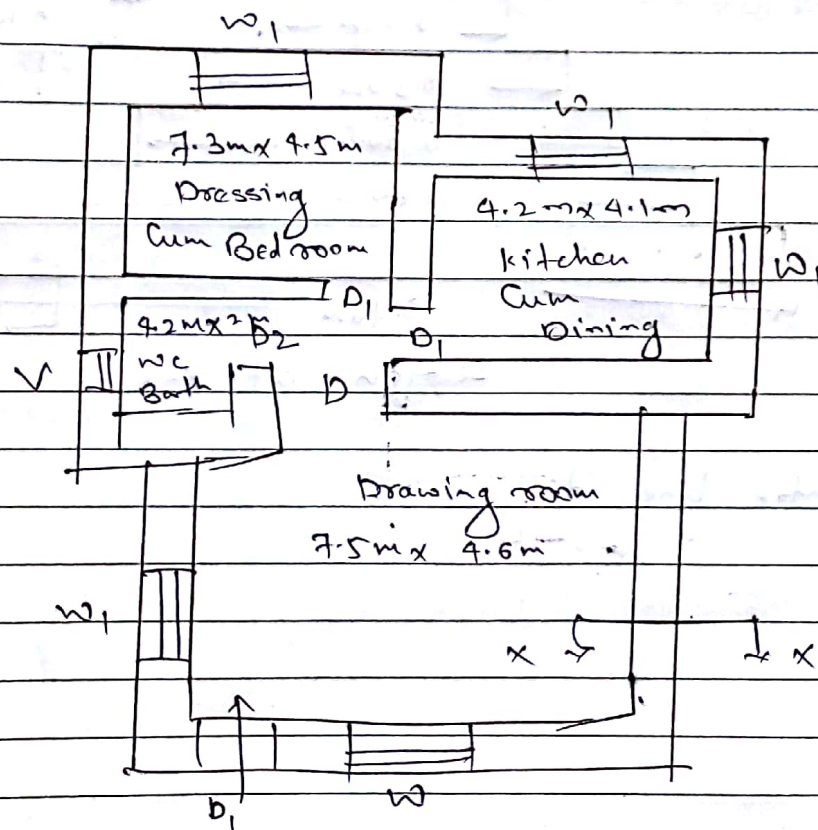
$$9.4 + 10.4 + 5.6 \times 2 + 4.8 \times 3 + 3 \times 2.6 + 4.3 \times 2 + 5.3 = 71.9m$$

5/2017

04.

The accompanying drawing shows a building plan and a typical wall section. Prepare centre line plan and estimate the quantities of the following items of work in standard perform.

- (1) Earthwork in Excavation in foundation
- (2) Brickwork in foundation upto plinth level.



Doors  $D = 1.50 \times 2.10m$

$D_1 = 1.20 \times 2.1m$

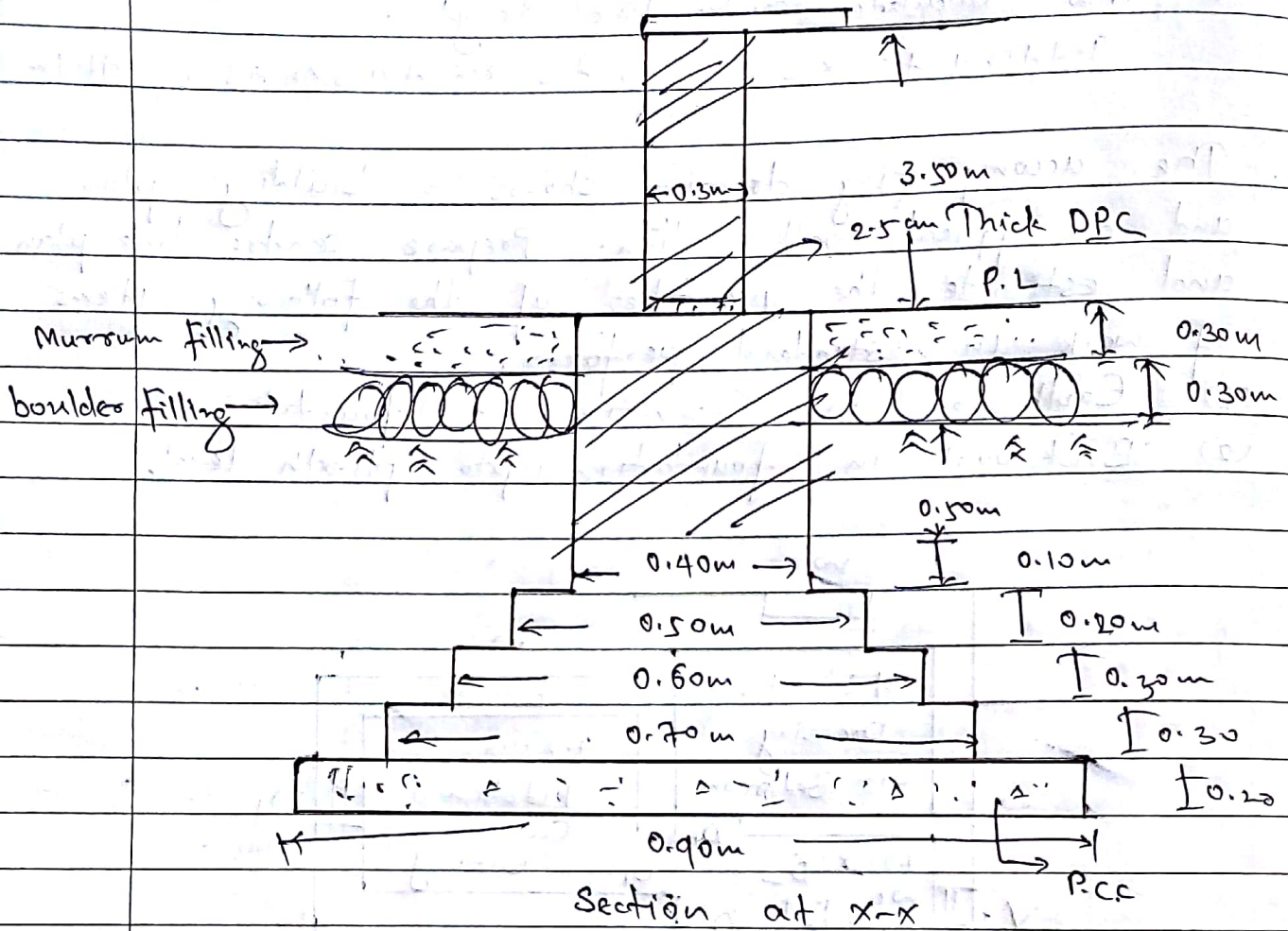
$D_2 = 1.00 \times 2.1m$

Window  $W = 1.2 \times 1.5m$

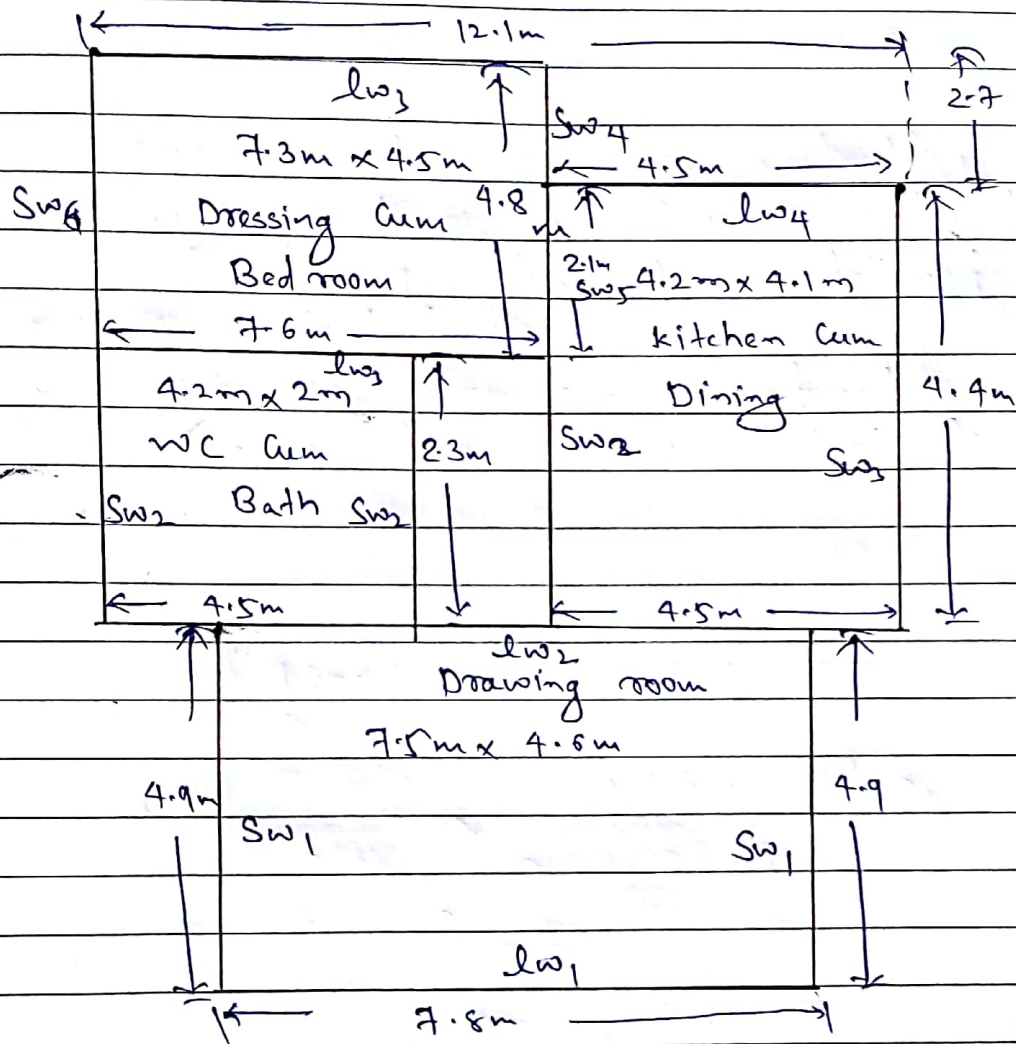
$W_1 = 1.0 \times 1.5m$

$V = 0.25 \times 0.25m$





Soln → Centre-line diagram :-





Que No. 04

## MEASUREMENT

No.	Description and details of work	Nos.	Dimensions			Quantity	Remarks
			Length	Breadth	Height/Depth		
01.	Earthwork in excavation in foundation						
	Lw <sub>1</sub> ⇒						
	$L = 7.8 + 0.90 = 8.7$	1	8.7	0.9	1.6	12.528 m <sup>3</sup>	
	Lw <sub>2</sub> ⇒						
	$L = 12.1 + 0.90 = 13$	1	13	0.9	1.6	18.72 m <sup>3</sup>	
	Lw <sub>3</sub> ⇒						
	$L = 7.6 + 0.90 = 8.5$	2	8.5	0.9	1.6	24.48 m <sup>3</sup>	
	Lw <sub>4</sub> ⇒						
	$L = 4.5 + 0.90 = 5.4$	1	5.4	0.9	1.6	7.776 m <sup>3</sup>	
	Sw <sub>1</sub> ⇒						
	$L = 4.9 - 0.90 = 4$	2	4	0.9	1.6	11.52 m <sup>3</sup>	
	Sw <sub>2</sub> ⇒						
	$L = 2.3 - 0.90 = 1.4$	3	1.4	0.9	1.6	6.048 m <sup>3</sup>	
	Sw <sub>3</sub> ⇒						
	$L = 4.4 - 0.90 = 3.5$	1	3.5	0.9	1.6	5.04 m <sup>3</sup>	
	Sw <sub>4</sub> ⇒						
	$L = 2.7 - 0.90 = 1.8$	1	1.8	0.9	1.6	2.592 m <sup>3</sup>	
	Sw <sub>5</sub> ⇒						
	$L = 2.1 - 0.90 = 1.2$	1	1.2	0.9	1.6	1.728 m <sup>3</sup>	
	Sw <sub>6</sub> ⇒						
	$L = 4.8 - 0.90 = 3.9$	1	3.9	0.9	1.6	5.616 m <sup>3</sup>	96.048
02.	Brickwork in foundation upto plinth level						
	Step-1						
	Lw <sub>1</sub> ⇒						
	$L = 7.8 + 0.70 = 8.5$	1	8.5	0.70	0.20	1.19 m <sup>3</sup>	
	Lw <sub>2</sub> ⇒						
	$L = 12.1 + 0.70 = 12.8$	1	12.8	0.70	0.20	1.792 m <sup>3</sup>	
	Lw <sub>3</sub> ⇒						
	$L = 7.6 + 0.70 = 8.3$	2	8.3	0.70	0.20	2.324 m <sup>3</sup>	

## TYPE-II [6 MARKS]

DATE

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[Based on BBS] [Compulsary]

### TYPE-I

[Based on slab]

2/2016

- Q1. A R.C.C slab of clear size  $3.10\text{m} \times 6.3\text{m}$  is reinforced with  $10\text{mm } \phi$  bars with a spacing of  $120\text{mm c/c}$  alternate bars bent up. Distribution bars are  $6\text{mm } \phi$  with a spacing of  $130\text{mm c/c}$ . Thickness of slab  $130\text{mm}$ , bearing of slab is  $150\text{mm}$  each side. Calculate the total quantity of mild steel reinforcement. Also prepare schedule of bar.

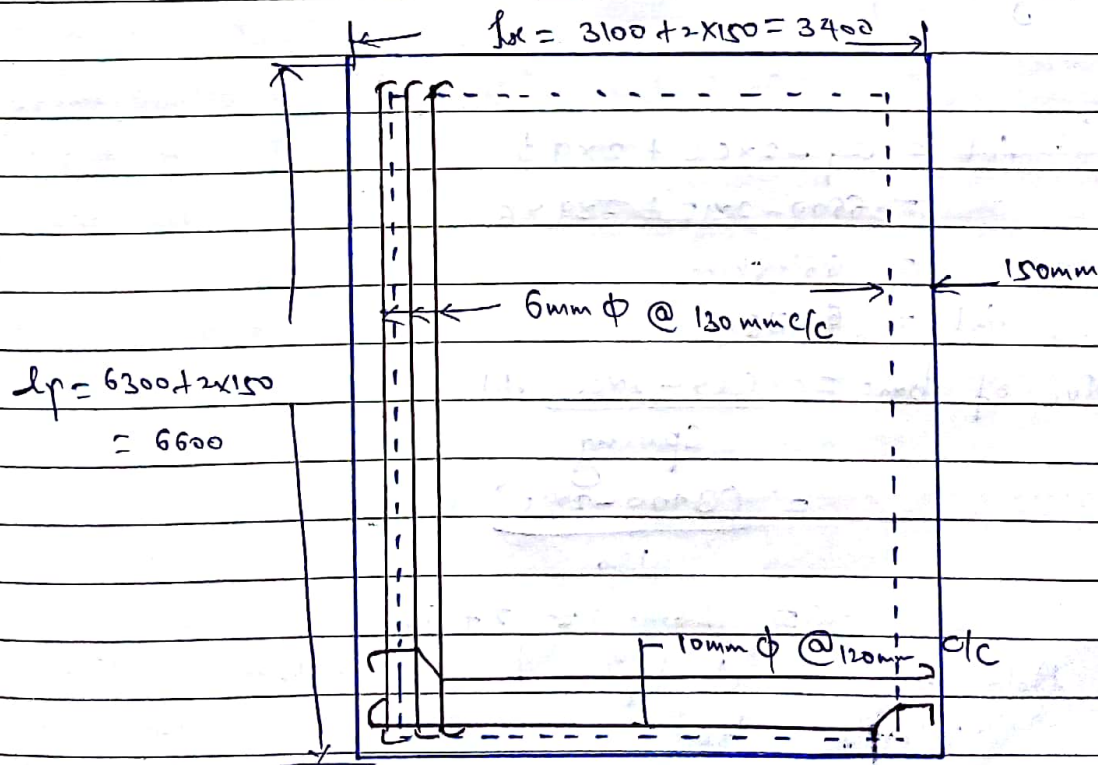
Soln → Given data,

Thickness of slab =  $130\text{mm}$

Assume, clear cover on all sides =  $15\text{mm}$

$$\therefore d = D - 2 \times 15$$

$$\therefore d = 130 - 30 = 100\text{mm}$$





Step 1.

length of main bar (10mm  $\phi$  120 c/c)

$$L = l_x - 2 \times c.c + 2 \times 9 \phi + 0.42d$$

$$= 3400 - 2 \times 15 + 2 \times 9 \times 10 + 0.42 \times 100$$

$$= 3592 \text{ mm}$$

$$\therefore L = 3.592 \text{ m}$$

$$\text{No. of bars} = \frac{l_y - 2 \times c.c}{\text{Spacing}} + 1$$

$$= \frac{6600 - 2 \times 15}{120} + 1$$

$$= 55.75 \approx 56 \text{ Nos.}$$

Step 2.

length of distribution bars (6mm  $\phi$  @ 130mm c/c)

$$\therefore L = l_y - 2 \times c.c + 2 \times 9 \phi$$

$$= 6600 - 2 \times 15 + 2 \times 9 \times 6$$

$$= 6678 \text{ mm}$$

$$\therefore L = 6.678 \text{ m}$$

$$\text{No. of bars} = \frac{(l_x - 2 \times c.c)}{\text{Spacing}} + 1$$

$$= \frac{(3400 - 2 \times 15)}{130} + 1$$

$$= 26.92 \approx 27 \text{ Nos.}$$



Add 2 bars at top on each side

$\therefore$  Add 4 bars

$$\therefore \text{Total bars} = 27 + 4 = 31 \text{ Nos.}$$

## Bar bending schedule :-

 $\frac{\phi^2}{162}$ 

Sl. No.	Description	Shape	Nos.	$\phi$ in mm	L (m)	Total Length	wt in kg/m	Total wt (kg)
1.	Main bar alt bent-up		56	10	3.592	201.152	0.62	124.71
2.	Distribution bars		31	6	6.678	207.018	0.222	45.96
Total								170.67 kg

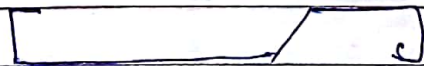
 $\therefore$  Total weight = 170.67 kg.

02. An RCC roof slab of overall size 6600mm x 2200mm and thickness 150mm is provided with 12mm diameters main bars bent up alternately and placed at 150mm/cc, the distribution steel of 6mm diameters is provided @ 200mm c/c. The all-around cover is 15mm. Find out the total quantity of plain steel. Prepare bar schedule.

Soln  $\rightarrow$  Thickness of slab = 150mm  
Cover = 15mm (Assume)

So, effective depth,  $d = D - (2 \times 15)$   
 $d = 150 - 30 = 120\text{mm}$

(a) Length of Main bar (12mm  $\phi$  150 c/c)



$$L = L_x - (2 \times \text{Cover}) + (2 \times 9\phi) + 0.42d$$

$$L = 2200 - 2 \times 15 + 2 \times 9 \times 12 + 0.42 \times 120$$

$$L = 2436.4\text{mm}$$

$$\therefore L = 2.4364\text{m}$$



$$\text{No. of main bars} = \frac{L_y - (2 \times c_c)}{\text{spacing}} + 1$$

$$\text{No. of main bars} = \frac{6600 - (2 \times 15)}{150} + 1$$

$$= 44.8$$

$$\approx 45 \text{ Nos.}$$

(b) length of Distribution bar (6mm  $\phi$  200mm c/c)

$$L = L_y - (2 \times c_c) + (2 \times 9 \phi)$$

$$L = 6600 - (2 \times 15) + (2 \times 9 \times 6)$$

$$\therefore L = 6678 \text{ mm} = 6.678 \text{ m.}$$



$$\text{No. of bars} = \frac{L_x - (2 \times c_c)}{\text{Spacing}} + 1 = \frac{2200 - (2 \times 15)}{200} + 1$$

$$= 11.85$$

$$\approx 12 \text{ Nos.}$$

Bar bending schedule

$\phi^{12}$   
162

S. No	Description	Shape	Nos.	$\phi$ (mm)	L (m)	Total L	wt in kg/m	Total wt in kg
01	Main bar		45	12	2.4364	109.64	0.89	97.58
02	Distribution bar		12	6	6.678	80.136	0.22	17.63
						Total =		115.21 kg

So, total quantity of steel = 115.21 kg  
 $\approx 116 \text{ kg.}$

## TYPE - B -

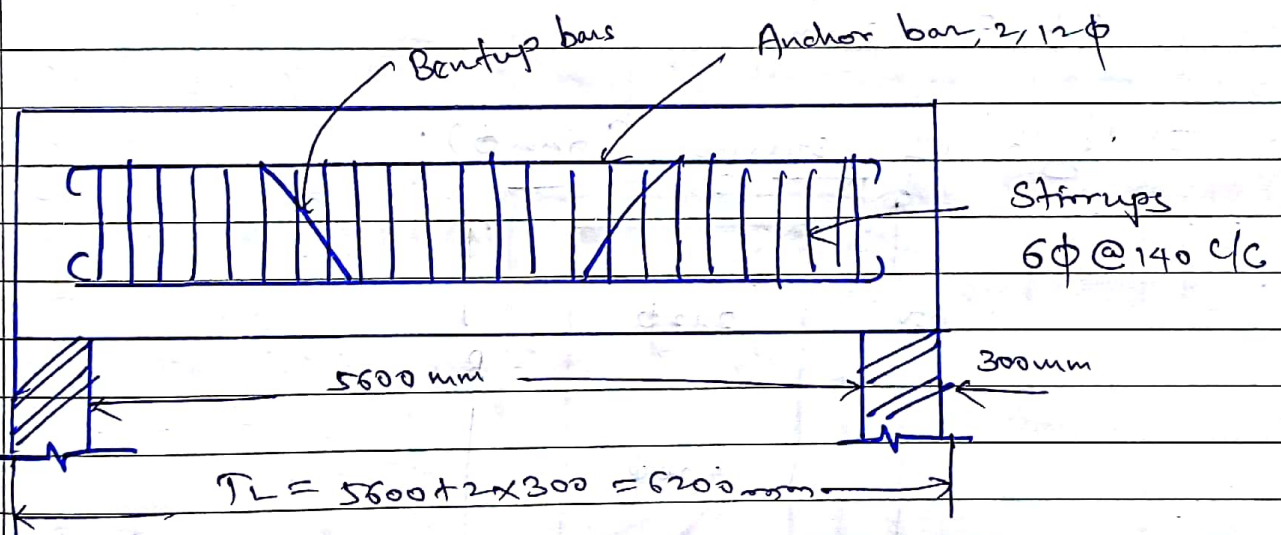
[ Based on ~~stab~~ beam ]

DATE

01. A RCC simply supported beam of size  $300\text{ mm} \times 650\text{ mm}$  is reinforced with  $4, 20\text{ mm}$  diameters bars. The main bars are placed in one row and two are bent-up. Two anchor bars of  $12\text{ mm } \phi$  are provided to top, and  $6\text{ mm}$  diameter. Stirrups are provided at  $140\text{ c/c}$ . The span of beam is  $5.6\text{ m}$  and end bearing is of  $30\text{ cm}$ . Calculate total Quantity of mild steel reinforcement. Also prepare schedule of bars.

Sol<sup>n</sup> Assume clear cover on all sides =  $25\text{ mm}$

$$b = 300\text{ mm}, D = 650\text{ mm}$$



(1) length of main bars:

(a) Straight bars ( $2, 20\phi$ )

$$\therefore \text{length of straight bar} = TL - 2 \times cc + 2 \times 9\phi$$

$$= 6200 - 2 \times 25 + 2 \times 9 \times 20$$

$$= 6510\text{ mm} = 6.51\text{ m}$$

(b) Bentup bars ( $2, 20\phi$ )

$$d = b - 2 \times cc$$

$$d = 650 - 2 \times 25$$

$$= 600\text{ mm}$$

classmate

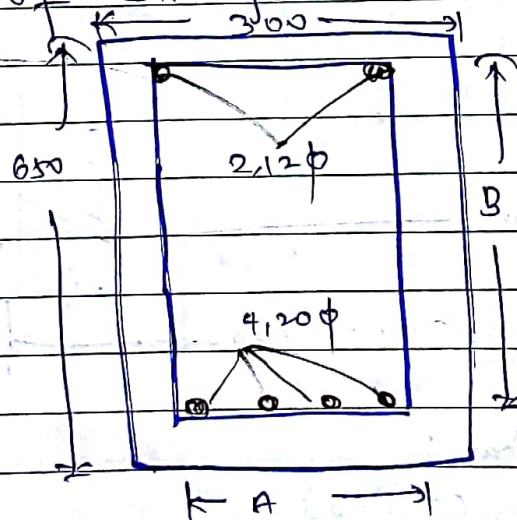


$$\begin{aligned}
 L &= TL - 2 \times \text{side cover} + 2 \times 0.42d + 2 \times 9\phi \\
 &= 6200 - 2 \times 25 + 2 \times 0.42 \times 600 + 2 \times 9 \times 20 \\
 &= 7014 \text{ mm} \\
 \therefore L &= 7.014 \text{ m}
 \end{aligned}$$

(2) Length of Anchor bars ( $2, 12\phi$ ):

$$\begin{aligned}
 L &= TL - 2 \times cc + 2 \times 9\phi \\
 &= 6200 - 2 \times 25 + 2 \times 9 \times 12 \\
 &= 6366 \text{ mm} \\
 \therefore L &= 6.366 \text{ m}
 \end{aligned}$$

(3) Length of stirrups ( $6\text{mm } \phi$ ):



$$A = 300 - 2 \times cc$$

$$A = 300 - 2 \times 25 = 250 \text{ mm}$$

$$B = 650 - 2 \times 25 = 600 \text{ mm}$$

$$\begin{aligned}
 L &= 2(A+B) + 24\phi = 2(250+600) + 24 \times 6 \\
 \therefore L &= 1844 \text{ mm} = 1.844 \text{ m}
 \end{aligned}$$

DATE




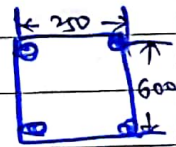
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$$\text{No. of stirrups} = \frac{L - 2 \times cc}{\text{Spacing}} + 1 = \frac{6150}{140} + 1$$

$$= 44.92$$

$$= 45 \text{ Nos.}$$

Bar bending Schedule:-

S.No.	Description of bar	Shape of bar	No.	$\phi$ mm	L (m)	Total length (m)	wt in kg/m	Total weight (kg)
1.	Main straight bars		2	20	6.51	13.02	2.47	32.15
2.	Main bent-up bars		2	20	7.014	14.028	2.47	34.65
3.	Anchor bars		2	12	6.366	12.732	0.89	11.32
4.	Stirrups		45	6	1.844	82.98	0.22	18.25

Total Quantity 96.37kg

$\therefore$  Total quantity of mild steel reinforcement = 96.37kg  
 $\approx 100\text{kg}$



## Important Concept:-

DATE 

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(1) Minimum clear cover for different members:

- (a) for slab, minimum clear cover = 15 mm
- (b) for beams, minimum clear cover = 25 mm
- (c) for column, minimum clear cover = 40 mm
- (d) for footing, minimum clear cover = 50 mm

(2) Weight of bars:-

weight of bar in kg is calculated for every meter length.

$$\text{Weight of bar in kg/m} = \frac{\phi^2}{162}$$

$\therefore \phi = \text{dia of bar}$