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## Scoring Indicators

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April. 2024

COURSE NAME: ESTIMATION AND COSTING

COURSE CODE: 4013

QID:2103230193

Q No	Scoring Indicators	Split score	Sub Total	Total score
<b>PART A</b>				<b>9</b>
I. 1	Administrative approval.	1	1	
I. 2	Lead.	1	1	
I. 3	$\frac{L}{2}[(A_1 + A_n) + 2(A_2 + A_3 + \dots + A_{n-1})]$	1	1	
I. 4	1%	1	1	
I. 5	Hip roof is a roof formed by four sloping surfaces in four directions.	1	1	
I. 6	i) RCC work-m <sup>3</sup> ii) Pointing-m <sup>2</sup>	0.5x2	1	
I. 7	Valuation is the art of assessing the present fair value of a property at a stated time.	1	1	
I. 8	Obsolescence is loss in the value of the property due to change in fashion, design in structure, inadequacy to present or growing needs, necessity for replacement due to new inventions, etc.	1	1	
I. 9	A free hold property means that the owner is in absolute possession of the property, and the owner can utilize the same in any manner, he likes, subject to the rules and regulations of the Government and local authorities.	1	1	
<b>PART B</b>				<b>24</b>
II. 1	Purpose of estimation 1. To ascertain the necessary amount of money required by the owner (to get administrative sanction for public work) to complete the proposed work.	Any 3 1x3	3	

	<p>2. To ascertain quantities of the materials required in order to programme their timely procurement.</p> <p>3. To calculate the number of different categories of workers that are to be employed to complete the work.</p> <p>4. To assess the requirement of tools and plants.</p> <p>5. To prepare the construction schedule and to arrange the funds at various stages of work.</p> <p>6. To invite tenders and prepare bills for payment.</p>			
II. 2	<p>i) Approximate estimate</p> <p>ii) Detailed estimate</p> <p>iii) Revised estimate</p> <p>iv) Supplementary estimate</p> <p>v) Repair and maintenance estimate</p> <p>vi) Renovation estimate</p>	0.5x6	3	
II. 3	<p>Rates of particular item of work depend on the following.</p> <p>1. Specifications of works and material about their quality, proportion and constructional operation method.</p> <p>2. Quantity of materials and their costs.</p> <p>3. Cost of labours and their wages.</p> <p>4. Location of site of work and the distances from source and conveyance charges.</p> <p>5. Overhead and establishment charges</p> <p>6. Profit</p>	Any 3 1x3	3	
II. 4	<p>➤ Standard data book- This is a book which is kept in PWD and is prepared by Superintending Engineer and got approved by Chief Engineer.</p> <p>➤ It describes the quantity of materials and labour to complete one unit of each item.</p> <p>➤ Used for the preparation of rates.</p>	3	3	



II. 8	<p>a) Common rafter- These are inclined wooden members running from the ridge to the eaves.</p> <p>b) Hip rafters- Sloping rafters which form the hip of a sloped roof.</p> <p>c) Ridge- Ridge is defined as the apex line of the sloping roof.</p>	1	3		
II.9	<p><b>Scrap value</b></p> <p>Scrap Value is the value of dismantled materials of a property at the end of its utility period, and absolutely useless except for sale as scrap.</p> <p>For a building, when the life is over, at the end of the utility period, the dismantled materials as steel, bricks, timber, etc. will fetch a certain amount. Amount got by selling the useful material less the demolition cost of building is Scrap Value</p> <p>Usually considered as 10% of cost of construction.</p>	<p><b>Salvage value</b></p> <p>Estimated value of a built-up property at the end of its useful life without being dismantled.</p> <p>Generally accounted by deducting the depreciation from its cost.</p>	1.5x2	3	
II.10	<p>Methods of determining depreciation</p> <ul style="list-style-type: none"> <li>• Straight line Method</li> <li>• Constant Percentage Method</li> <li>• Sinking Fund Method</li> <li>• Quantity Survey Method</li> </ul> <p>Explanation of any one method.</p>	1	3		
		2			

<b>PART C</b>				
III. 1	<p>Given Carpet area =6,000m<sup>2</sup></p> <p>Extra provision of 12% of carpet area for walls, toilets etc =720m<sup>2</sup></p> <p>Plinth area = 6000+720=6,720 m<sup>2</sup></p> <p>Plinth area rate =900/-m<sup>2</sup>. (given)</p> <p>Total cost=6,720 x 900 = Rs. 60,48,000/-</p> <p>Extra provisions</p> <p>(i) 8% for water supply of building cost = 60,48,000 x 8/100 = 4,83,840/-</p> <p>(ii) 10% for electric fittings = 60,48,000 ×10/100 =6,04,800/-</p> <p>(ii) 6% for other services = 60,48,000 × 6/100 = 3,62,880/-</p> <p>(iv) 1.5% for special architectural treatment =60,48,000×1.5/100 = 90,720/-</p> <p>Total= Rs. 75,90,240/-</p>	1 1 1 1 1 1	7	7
III. 2	<p>Top width of embankment, b=15 m</p> <p>s= 2; L = 30m; d<sub>1</sub>=2.25m; d<sub>2</sub>=3.04m; d<sub>3</sub>=1.40m; d<sub>4</sub> = 0.65m; d<sub>5</sub> = 0.5m</p> <p>Area of C/S at different chainages area are given below:</p> <p>A<sub>1</sub>= chainage at 0 m =(b+sd<sub>1</sub>)d<sub>1</sub> =(15 + 2 x 2.25)2.25=43.88 m<sup>2</sup></p> <p>A<sub>2</sub>=chainage at 30m =(b+sd<sub>2</sub>)d<sub>2</sub>= (15 + 2 x 3.04)3.04 =64.08m<sup>2</sup></p> <p>A<sub>3</sub>=chainage at 60m =(b + sd<sub>3</sub>)d<sub>3</sub>= (15 + 2 ×1.4)1.40 =24.92m<sup>2</sup></p> <p>A<sub>4</sub>= chainage at 90m= (b + sd<sub>4</sub>)d<sub>4</sub>= (15+2x0.65)0.65 =10.60 m<sup>2</sup></p> <p>A<sub>5</sub>= chainage at 120 m= (b + sd<sub>5</sub>)d<sub>5</sub>= (15 + 2 x 0.5)0.5 = 8 m<sup>2</sup></p> <p>Volume of earth work by Prismoidal rule</p> <p>V = L/3 * [(A<sub>1</sub>+ A<sub>5</sub>) + 4(A<sub>2</sub>+ A<sub>4</sub>) + 2(A<sub>3</sub>)]</p> <p>V = 30/3 * [(43.88 + 8) + 4(64.08 + 10.6) + 2(24.92)]</p> <p>=4004.4 m<sup>3</sup></p>	2 3 2	7	7
III. 3	<p>➤ Before the earth work is started, the whole area where the work is to be done shall be cleared of grass, roots of trees and other organic matter.</p>	Any 7 1x7	7	7

	<ul style="list-style-type: none"> <li>➤ The excavation shall be carried out exactly in accordance with the dimensions shown on the drawings or such other dimensions as the Engineer – in – charge may decide.</li> <li>➤ Sides of the trenches shall be vertical and its bottom shall be perfectly leveled, both longitudinally and transversely. Where the soil is soft, loose or slushy the trench shall be widened for allowing steps on either side or the sides sloped or shored up.</li> <li>➤ During excavation if rocks or rocky soils are found those shall be leveled as far as possible and the small spaces which are difficult to level shall be filled in with concrete.</li> <li>➤ If the excavation is in earth, the bottom of the trenches shall be sprinkled with a little water and rammed. Any excess digging or any patches of bad soil or hollows shall be removed by placing concrete or shall be subject to any other special treatment as the Engineer – in – charge decides.</li> <li>➤ No material excavated from foundation trenches, shall be placed nearer than one metre to the outer edges of the excavation.</li> <li>➤ Water in trenches must be bailed or pumped out and where it is apprehended that the sides may fall down arrangement shall be made for adequate timber shoring.</li> <li>➤ When it is specified that the work is to be carried out without removing pipes, cables, sewers, etc.all of them shall be temporarily shored and saved from any damage.</li> <li>➤ The materials or valuables found during excavation shall be the property of the Government. The cost of all</li> </ul>			
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	materials and labour required for fencing in and protection against risk of accidents due to open excavation shall be provided.							
III. 4	<b>Description</b>	<b>Qty</b>	<b>Unit</b>	<b>Rate</b>	<b>Amount(Rs.)</b>		7	7
	<b><u>Materials</u></b>					2		
	Bricks	5000	nos	8000/ 1000	40000			
	Cement	0.45	m <sup>3</sup>	9700	4365			
	Sand	2.7	m <sup>3</sup>	1500	4050			
	<b><u>Labour</u></b>					2		
	Mistri	0.50	E	425	212.50			
	Mason	7	E	400	2800			
	Mazdoor	7	E	250	1750			
	Boy or Women coolie	7	E	230	1610			
	Bhishti	2	E	230	460			
	Sundries, tools and plant	LS		120	120			
				<b>Total</b>	<b>55367.50</b>			
				<b>Add 1% Water charges</b>	<b>553.67</b>	1		
				<b>Total</b>	<b>55921.17</b>			
				<b>Add 15 %CPOH</b>	<b>8388.17</b>	1		
				<b>Total for 10m<sup>3</sup></b>	<b>64309.34</b>			

	Grand Total for 1m <sup>3</sup>				Rs.6430.93/m <sup>3</sup>	1		
III. 5	<b>Description</b>	<b>Qty</b>	<b>Unit</b>	<b>Rate</b>	<b>Amount(Rs)</b>		7	7
	<b><u>Materials</u></b>							
	Broken stone	0.95	m <sup>3</sup>	1500	1425	1.5		
	Sand	0.48	m <sup>3</sup>	1800	840			
	Cement	228	kg	7000/100 0	1596			
	<b><u>Labour</u></b>					1.5		
	Mason	0.1	E	1250	125			
	Man	1	E	800	800			
	Women	1.4	E	600	840			
	<b><u>Conveyance charges</u></b>					1.5		
	Broken stone	0.95	m <sup>3</sup>	30x20	570			
	Sand	0.48	m <sup>3</sup>	24x18	207.36			
	Cement	228	kg	15x40/10 00	136.80			
				Total	6540.16			
				Add 1% Water charges	65.40	0.5		
				Total	6605.56			
				Add 15 %CPOH	990.83	1		
				Grand Total for 1m <sup>3</sup>	Rs.7596.39/m <sup>3</sup>	1		

III. 6	<p>a) Materials:</p> <p>Cement shall be fresh Portland cement and sand shall be medium quality, cleaned, free from organic matter or salts. All the materials including water shall be of standard specification.</p> <p>b) Preparation of mortar:</p> <p>The material shall be at first mixed dry thoroughly till uniform colour in the required proportion and then shall be mixed wet adding water slowly and gradually for at least four times to give a uniform paste. So, such material shall be prepared at a time as can be used within the initial setting time (30 minutes) of cement.</p> <p>c) Preparation of surface:</p> <p>The surface of the wall shall be brushed, cleaned, washed, 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. To ensure uniform thickness of plaster as specified, narrow strips of about 10 cm wide plaster shall be applied first a distance of about 1m centres and the gaps between such strips shall immediately be filled up with mortar.</p> <p>d) Laying:</p> <p>The plastering shall be started from the top and worked towards the ground. The whole surface shall be made flush with wooden straightedges 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.</p> <p>e) Curing:</p> <p>Plastering surface shall be kept wet by sprinkling water</p>	7	7	7
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	after 12 hours for at least 7 days and shall be protected from rain or sun.								
III. 7	Long wall and short wall method C/C length of long wall=3+4+0.3+2(0.3/2) = 7.60m C/C length of short wall=5+2(0.3/2) = 5.30m						2	7	7
	Sl no	Item	No	L	B	D	Qty	Remarks	
	i)	EW in excavation							
		Long walls	2	8.50	0.90	1.10	16.83m <sup>3</sup>	L=7.6+2 x (0.9/2)	
		Short walls	3	4.40	0.90	1.10	13.07m <sup>3</sup>	L=5.3- 2 x (0.9/2)	
		Total					29.90m <sup>3</sup>		
	ii)	2.5cm thick DPC							
		Long walls	2	7.90	0.30		4.74m <sup>2</sup>	L=7.6+2 x (0.3/2)	
		Short walls	3	5.00	0.30		4.50m <sup>2</sup>	L=5.3- 2 x (0.3/2)	
		Total					9.24m <sup>2</sup>		
		Deductions door	2	1.20	0.30		0.72 m <sup>2</sup>		
		Net total					8.52m <sup>2</sup>		

III. 8	Sl no	Item	No	L	B	D	Qty	Remark	4	7	7
	i)	RCC 1:2:4 using 20mm broken stone									
		Base slab	1	40	3.20	0.5	64m <sup>3</sup>				
		Stem	1	40	(0.5+0.3)/2	4.5	72m <sup>3</sup>				
		Total					136 m <sup>3</sup>				
	ii)	Earth work excavation for foundation	1	40	1.20	1.1	52.8				
III. 9	Sl no	Item	No	L	B	D	Qty	Remarks	3	7	7
	i)	Brick Masonry in CM 1:6	1	14.0	0.3	3.00	12.60 m <sup>3</sup>	L=2(4.3+2.7)=14m			
	ii)	Plastering with CM 1:2									
		Walls inside	1	12.8	2.8		35.84 m <sup>2</sup>	L=2(4+2.4)=12.8m			
		Floor	1	4.0	2.4		9.6 m <sup>2</sup>				
		Total					45.44 m <sup>2</sup>				
III. 10	Eave to eave length = 9.9 + 2x0.2 + 2x0.6 = 11.5m									7	7
	Eave to eave span = 5.4 + 2x0.2 + 2x0.6 = 7m										
	Length of ridge piece = 11.5 - 2x3.5 = 11.5 - 7 = 4.5m										
	Sl no	Item of work	No	L	B	H/D	Qty	Remarks	3.5	7	7
	i)	Ridge piece	1	4.50	0.12	0.15	0.081 m <sup>3</sup>	Size of ridge piece is 120 x 150 mm			
	Length of common rafter = $\sqrt{\left(\frac{\text{Span}}{2}\right)^2 + \left(\frac{\text{Span}}{3}\right)^2}$										

$$\bullet \text{ Length of common rafter} = \sqrt{(3.5)^2 + \left(\frac{7}{3}\right)^2}$$

$$= 4.2 \text{ m}$$

$$\text{Length of hip rafter} = \sqrt{(4.2)^2 + 3.5^2} = 5.46 \text{ m}$$

SI no	Item of work	No	L	B	H/D	Qty	Remarks
ii)	Hip rafter	4	5.46	0.05	0.125	0.137 m3	Size of hip rafter is 50 x 125 mm

3.5

III. 11 Sinking Fund is an amount which has to be set aside at fixed intervals of time (say annually) out of the gross income so that at the end of the useful life of the building or property, the fund should accumulate to the initial cost of property.

Annual installment of sinking fund,

$$I = \frac{Si}{(1+i)^n - 1}$$

S – Total amount of Sinking Fund

i – Rate of interest expressed in decimal

n – No. of years

I – Annual instalment required

Rate of interest,  $i = 0.04$

No of years,  $n = 20$  yrs

The total amount of sinking fund to be accumulated at the end of 20 years,  $S = 30000 \times 90/100 = \text{Rs. } 27000/-$

Annual installment of sinking fund,  $I = \frac{Si}{(1+i)^n - 1}$

$$I = \frac{27000 \times 0.04}{(1+0.04)^{20} - 1} = 27000 \times 0.0336 = \text{Rs. } 907.20/-$$

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III. 12	<p>To Calculate Capital Cost:</p> <p>Cost of building = Rs. 75000/-</p> <p>Cost of Sanitary and water supply = 10% building cost = Rs. 7500/-</p> <p>Cost of electric installation @ 8% of building cost = Rs. 6000/-</p> <p>Cost of internal roads and compound wall = Rs. 10000</p> <p>Total = Rs. 98500/-</p> <p>Method 1 – Overall Percentage basis</p> <p>Standard rent per annum with 6 % interest on capital cost = <math>6/100 \times 98500 = \text{Rs.}5910/-</math></p> <p>Municipal taxes per annum = Rs. 300/-</p> <p>Total = Rs.6210/-</p> <p>Standard rent per month = <math>6210/12 = \text{Rs.}517.50/-</math></p> <p>Method 2 – Individual percentage basis</p> <p>Interest on capital cost @ 6% = <math>98500 \times 6/100 = \text{Rs.}5910/-</math></p> <p>Annual Maintenance charges:</p> <p>Buildings, roads and compound wall @ 1.5 % = <math>85000 \times 1.5/100 = \text{Rs.}1275/-</math></p> <p>Sanitary and water supply works @ 1% = <math>7500 \times 1/100 = \text{Rs.}75/-</math></p> <p>Electric installation @ 1.5 % = <math>6000 \times 1.5/100 = \text{Rs.}90/-</math></p> <p>Municipal and all other taxes = Rs. 300/-</p> <p>Total= Rs.7650/-</p> <p>Standard rent per month=<math>7650/12 = \text{Rs.}637.50/-</math></p> <p>The chargeable rent is the minimum of the above two methods = Rs. 517.50/-</p>	2	7	7
		2		
		2		
		1		