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April-24
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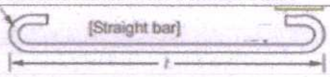
Scheme of Evaluation
Scoring Indicators

Revision: 2015 Course Code : 5014
Course Title : Quantity Surveying II

Q No	Scoring Indicator	Split up score	Sub Total	Total
	PART A			
I 1	Common Rafters: Inclined wooden members running from the ridges to the eaves Jack Rafters: Rafters shorter in length, which run from hip or valley to the eaves	1 1		2
2	Retaining walls are relatively rigid walls used for supporting soil or the like laterally so that it can be retained at different levels on the two sides. They are designed and constructed to withstand lateral pressure of soil or hold back soil materials.			2
3	 L = l + 2x9d = l + 18d d= diameter of bar			2
4	Specification is a description of items of work to be provided in a project along with details regarding the materials to be used and the workmanship (quality of the work that is done by someone) to be done.			2
5	Value of a property depends on the demand and supply. It is the fair price of the property in a stated time. Cost is the expense incurred by the property. It is a constant amount	1 1		2
	PART B			
II 1.	Span (eave to eave) = 6m + 2x0.3 m + 2 x 0.6 m = 7.8 m Length of common rafter = $\sqrt{\left(\frac{Span}{2}\right)^2 + \left(\frac{Span}{3}\right)^2}$ = 4.687m No. of common rafters required can be found out by dividing length of ridge piece by spacing of common rafters. Length of ridge piece = 9.5 m + 2x0.3 m + 2x0.6 m = 11.3 m No. of common rafters on one side = $\frac{Length\ of\ ridge\ piece}{Spacing\ of\ common\ rafter} + 1 = \frac{11.3}{0.5} + 1$ = 24 No. of common rafters on both sides = 2 x 24 Wood work for common rafters = 48 x 4.687 x 0.05 x 0.125 = 1.406 m^3	1 1 2 2		6
2	Total Centre line length = (4.2 + 2.8 + 1.4) x 2 + 3 x 5.2 + 2 + 4.2 = 38.6 m	2 2 2		6

Sl No	Description of item	No	L	B	H	Quantity	Unit	Remarks
1	Earthwork in excavation	1	36.2	0.8	0.8	23.168	m^3	$L = 38.6 - 6x\frac{0.8}{2}$
	Step1	1	1.7	0.35	0.1	0.0595	m^3	
	Step 2	1	1.5	.0.35	0.1	0.0525	m^3	$B = 0.55 - \frac{0.8-0.4}{2}$
						23.28	m^3	

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Sl No	Item of Work	No	Length m	Breadth m	Height m	Quantity
1	R.C.C work 1:2:4 excluding steel and its bending but including centering and shuttering Base slab (Toe and Heel)	1	30	3	0.5	45m³
	Stem	1	30	$\frac{0.6+0.2}{2}$	6	72m³
					Total	117 m³

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Bar bending schedule or schedule of bars (BBS) is a list of reinforcement bars for a given reinforced concrete work item, and is presented in a tabular form for easy visual reference.

Sl no	Description of bar	Shape	Length of each bar	Unit	No.of bars	Total length	Total weight (kg)

Purposes:

- To Estimate the required steel quantity.
- To calculate the cutting length of different types of Reinforcement bars in different locations and members exactly.
- To calculate the no of Stirrups /Rings/Ties/hooks along with cutting length of bars for different structural members.
- To provide a guidance to the bar bending workmen and task force in a systematic way.
- To minimize the wastages.
- It will be easier and effective to cross verify and check the onsite Reinforcement works with BBS in hand.
- To claim the Bill from Client or to prepare the bills of sub-contractors.
- Helpful to calculate the material consumption.
- It will become a good record in future if maintained properly for each work.

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All of the bricks used shall be of first class. Soaking of bricks shall be done by submerging in a tank before use. Soaking shall be continued until the air bubbles are ceased. Soaking shall be for a period of 12 hour before use.

Mortar specifications for first class brickwork

- Material of mortar shall be of standard specifications.
- For mortar, cement should be fresh ordinary Portland cement of standard specifications.
- Sand shall be sharp and free from organic and foreign particles.
- If we want to make rich mortar, sand shall be coarse or medium. For weak mortar, local fine sand shall be used.
- Cement sand ratio of mortar shall be 1:3 to 1:6 as specified.
- To get the required proportion, materials of mortar shall be measured with the measuring box. Materials of mortar shall be first mixed dry to have a uniform color.
- The platform shall be clean for mortar mixing.
- Mixing shall be done at least three times. Then water shall be added gradually for workable consistency.
- Mortar shall be freshly mixed. Old mortar shall not be used. Mortar shall be mixed with water for one hour work so that mortar may be used before setting.

Laying of first class brickwork

- Bricks shall be laid in English bond unless otherwise specified. Every course of brick shall be horizontal.
- Wall shall be truly in plumb. Vertical joints of consecutive brick layer shall not come on each other.
- Vertical joints of alternate brick layer shall come directly over one

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	another. Closers shall be of clean cut bricks. ▪ Best shaped brick shall be used for face work. Mortar joints shall not exceed 6 mm or 0.5 inch in thickness. ▪ Joints shall be fully filled with mortar. ▪ Bricks shall be laid with frogs upwards except in the top brick layer. In the top course of brickwork, frog shall be laid downward. ▪ Brickwork shall be done for 1 meter or 3 feet height at a time. ▪ When one part of the wall has to be delayed then stepping should be done. ▪ All joints shall be raked and faces of wall shall be cleaned at the end of every day's work. <u>Curing of First-class brickwork</u> ▪ Brickwork shall be kept wet for the period of at least 10 days. ▪ Top of the walls shall be flooded with water at the end of the days work by making small weak mortar edging to contain at least 2.5 cm or 1-inch-deep water.	1		
6	Valuation is the art of assessing the present fair value of a property at a stated time. • Rental method of valuation • Direct comparison of cost method of valuation • Profit based valuation • Development method of Valuation • Depreciation method of valuation Rental method of valuation: • Net rental income is calculated after deducting all outgoings from the gross rent and YP is calculated after adopting the current bank interest • Capitalised Value = Net rent x YP • Net rent = Gross rent – Outgoings • When the rent has been proved and is likely to be maintained for years to come then the rental method of valuation should be applied to determine market value of property Direct comparison of cost: • Capitalised value of a property is fixed by direct comparison with capitalised value of a few adjoining properties • Adopted when particulars of sale of a few adjoining properties are available • Properties should be similar, transactions are to be new and normal, details of each property is known • This method is suitable where it is not possible to know the fair rent like owner occupied properties, schools, clubs, out houses etc Profit based valuation • Similar to rental method of valuation • Valuation of hotels, Cinemas, Shops, etc • Net profit is worked out after deducting all possible outgoings including interest on capital investment and also remuneration of labour rendered by owner • Capitalised Value = Net profit x YP Development method of valuation • This method is better suited for developed stage properties which are in under or partly developed stage • This is used when a building is required to be renovated by making additions, alterations or improvements. • The building or property may fetch source amount after its renovation • This net income is multiplied with YP to get capitalised value of property Depreciation Method of Valuation:			6

- Depreciated value, D = $P(\frac{100-rd}{100})^n$
- rd – rate of depreciation
- Structures with 100 years life, rd= 1
- 75 years life,rd = 1.3
- 50 years life, rd =2.0
- 25 years life, rd = 4.0
- 20 years life, rd = 5.0
- P – Cost at present market rate
- rd – fixed percentage of depreciation

Listing the methods : 2 Marks
Explaining any two methods : 2x2 = 4 Marks

7 Scrap Value: 2 6

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. 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 = Scrap Value. Usually considered as 10% of cost of construction

Salvage Value:

Estimated value of a built-up property at the end of its useful life without being dismantled. Generally accounted by deducting the depreciation from its cost. Depreciation: Loss in the value of the property due to its use, life, wear, tear, decay,etc 2

Market Value:

The value at which it can be sold in the open market at a particular time. Open market means the property is offered for sale by advertising in daily News Papers and all necessary steps are adopted so that every person who desires to purchase the same can make an offer. Depends on forces of demand and supply, development of area , etc. 2

PART C

III 15

Sl No	Description of item	No	L	B	Quantity	Weight per unit from steel table	Total quantity or weight	Marks
1	Steel work in one truss: Principal rafters 2- 75 x 50 x8 mm angle	2x2	7.6	---	30.40 m	7.4 kg/m	224.96 kg	3
2	Struts 75 x 50 x 10 mm angle	2	1.2	---	2.40 m	9.0 kg/m	21.60 kg	4
3	Struts 65 x 45 x 8 mm angle	4	0.55	---	2.20 m	6.4 kg/m	14.08 kg	
4	Cleats for purlins 75 x 75 x 8 mm angle	12	0.11	---	1.32m	8.9kg/m	11.75 kg	3

5	Ties main central – 50x8mm FB	2	4.8	---	9.60m	3.1 kg/m	29.76 kg
6	Ties main side – 80 x 6 mm FB	2x2	3.4	---	13.6m	3.8 kg/m	51.68 kg
7	Ties inclined 50 x 8mm FB	4	1.5	---	6 m	3.1 kg/m	18.6 kg
8	Ties inclined 50 x 8mm FB	2	3.3	---	6.60	3.1kg/m	20.46 kg

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IV

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Total Centre line length = (4.2 + 2.8 + 1.4) x 2 + 3 x 5.2 + 2 + 4.2 = 38.6 m
Parapet centre line length = 2x(4.2 + 2.8 + 1.4) + 2x5.2 = 27.2 m

Sl No	Description of item	No	L	B	H	Quantity	Unit	Remarks
1	Brick Work in CM 1:6 in foundation and Plinth							
	1st footing	1	37.4	0.4	0.6	8.976	m^3	$L = 38.6 - 6x\frac{0.4}{2} = 37.4$
	2nd footing	1	37.7	0.3	0.45	5.0895	m^3	$L = 38.6 - 6x\frac{0.3}{2} = 37.7$
	Step 1	1	1.5	0.375	0.3	0.16875	m^3	
	Step 2	1	1.3	0.375	0.3	0.14625	m^3	Step $B_{avg} = \frac{0.5+0.25}{2} = 0.375$
						14.38	m^3	

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Sl No	Description of item	No	L	B	H	Quantity	Unit	Remarks
2	Brick Work in CM 1:5 in superstructure							
	Room	1	38	0.2	2.85	21.66	m^3	$L = 38.6 - 6x\frac{0.2}{2}$
	Parapet	1	27.2	0.2	0.48	2.61	m^3	
	Deduct:							
	D1	2	0.9	0.2	2	0.72	m^3	
	D2	3	0.8	0.2	2	0.96	m^3	
	W1	2	0.9	0.2	1.2	0.432	m^3	
	W2	3	1.35	0.2	1.2	0.972	m^3	
	W3	1	1.8	0.2	1.2	0.432	m^3	
	V1	1	0.9	0.2	0.6	0.108	m^3	
						20.647	m^3	

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V — 15

Sl No	Description of item	No	L	B	H	Quantity	Unit	Remarks	
1	Earth work excavation in foundation								
	Abutment	2	5.1	0.7	0.6	4.28	m^3	L=4.8+ 0.3	4
	Wing walls	4	1.2	0.7	0.6	2.02	m^3		
						6.3	m^3		
2	Cement concrete 1:3:6 in foundation with stone ballast								
	Abutments	2	5.1	0.7	0.3	2.14	m^3		
	Wing Walls	4	1.2	0.7	0.3	1.01	m^3		4
						3.15	m^3		
3	1st class brick work in 1:4 CM								
	Abutments	2	4.8	0.4	1.5	5.76	m^3	Height – taken up to top of roof slab	7
	Wing walls	4	1.2	0.4	1.5	2.88	m^3		
	Parapet up to kerb	2	4.7	0.4	0.3	1.13	m^3	L= 4.9-2x0.1	
	Parapet above kerb	2	4.7	0.3	0.5	1.41	m^3	H=1.5-1.2	
	Parapet coping	2	4.9	0.4	0.1	0.39	m^3		
						11.57	m^3		
	Deduct								
	Bearing of RCC slab in abutment	2	4.8	0.3	0.2	0.57	m^3		
						11	m^3		

VI — 15

Sl No	Item of Work	No	Length m	Total length	Explanatory note	
2	**BASE SLAB** 10mm dia distributing bar at toe @25cm c/c	8	31.24	249.92m	No= $\frac{0.75+0.6+0.3-0.05}{0.25}$ +1 =8 nos	3.5
	10mm dia distributing bar at top heel @ 20cm c/c	14	31.24	413.93m	No= $\frac{1.65+0.60+0.25-0.05}{0.20}$ +1 =13 nos	3.5
	total of 10mm dia bar 1405.8m @ 0.62kg/m =871.596kg					
	16mm dia Bars					
	16mm dia main bars at bottom (Toe)@ 15cm c/c	200	1.89	378.00m	No = $\frac{30-0.10}{0.15}$+ 1 =200nos L=0.75+0.60+0.30-0.05+(18 x0.016) =1.89m	4
	16mm dia main bars at top heel @ 10cm c/c	300	2.74	822.02m	no=$\frac{30-0.10}{0.1}$ +1 =300nos L=(1.65+0.60+0.25)-0.05+(18x0.016) =2.74m	4
	total of 16mm dia bar 1200m @ 1.58kg/m =1896kg					

Q No	Sl no	Description of bar	Shape	Length of each bar	Unit	No.of bars	Total length	Total weight (kg)	Marks	Total
VII										15
	1	16 mm Dia bars (Straight)		3- 2x0.025 + 2x6x0.016 =3.142	m	2	6.284	9.93	3	
	2	16 mm Dia bent up bars		3 – 2x0.025 + 0.84xD'+ 12x 0.016 = 3.338 D' = 0.3 – 2x0.025 – 0.016 = 0.234m	m	1	3.338	5.274	4	
	3	10 mm Dia hanger bars (Straight)		3 – 2x 0.025 + 12x0.01 = 3.07	m	2	6.14	3.807	3	
	4	6 mm Dia stirrups		2(B'+D') + 24d = 0.92 D' = 0.3 – 2x0.025 – 0.006 = 0.244 B' = 0.2 – 2x0.025 - 0.006 = 0.144	m	$\frac{3-2X0.025}{0.2}+1$ = 16	14.72	3.238	4	

Tor steel = 9.93 +5.274 + 3.807 = 19.01 kg — 1
Mild steel = 3.238 kg

VIII A (9)

a) Materials: — 2
- 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.

b) Preparation of mortar: — 2
- 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 mixed 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.

c) Preparation of surface: — 2
- The surface of the wall shall be brushed, cleaned, washed, watered and wetted 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 15 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.			
		<u>d) Laying:</u> ▪ 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.	2		
		e) Curing: Plastering surface shall be kept wet by sprinkling water after 12 hours for at least 7 days and shall be protected from rain or sun.	1		
	b	DPC of cement concrete should have a mix of 1:2:4 or 1:1.5:3 mixed - usual thickness 2.5cm to 4 cm **Materials** ▪ Coarse aggregate shall be of clean, hard and dense stone chips 12 mm down and shall be washed before use. ▪ Sand shall be clean, sharp and coarse of average 5mm size and shall be free from dust, and dirt screened before use. ▪ Cement shall be fresh Portland cement. All the materials in use including water – proofing compound shall be of their respective standard specifications.	1		6
		Mixing ▪ Some sample tests of cement bags shall be made at work site to ensure the specified weight and volume. ▪ The mixing shall be done on a clean solid platform. Dry coarse aggregate shall be stacked evenly on the platform. ▪ Sand and cement in the specified quantities at first shall be mixed dry till uniform colour and spread over the stacked coarse aggregate. ▪ The materials shall then be turned over once without adding water and then at least further 3 times, adding the required quantity of water gradually and slowly to give a uniform concrete. ▪ Water- proofing compound Pudlo or Cico @ 5 or 3 per cent by the weight of cement as specified shall be mixed with concrete to make it water proof.	2		
		Preparation of base ▪ The top of wall (if wall top is not properly protected from rain) on which damp proof course is to be laid shall be constructed with bricks on edge or with frogs of the bricks down. The top of the plinth bed (to prevent rise of water by capillary action)over which damp proof course is to be placed shall be thoroughly cleaned with a steel brush, washed and wetted before laying the course of concrete. Wooden straight edges shall be fixed on plinth wall having the same inner width as that of required width of the DPC.	1		
		Laying ▪ Damp – proof course may be laid to the full width of the plinth or of the superstructure as specified in the drawing or specially mentioned. ▪ It shall be laid to the specified thickness (2.5 cm or 4 cm) over the plinth wall flush with the floor surface and shall not be carried across the doorways or such other openings. ▪ DPC shall then be consolidated by tamping and levelled both	1		

	longitudinally and transversely. ▪ Laying shall be completed on same day; the joints or breaks shall be given at the door opening. ▪ The surface of the concrete shall be roughened and chequered when air dry so as to form a key for the joint with the brick wall above. **Curing** ▪ Damp proof course shall be kept wetted for at least 7 days after laying, if the brickwork is not ready to proceed further. ▪ But in any case no brick work shall be commenced on the freshly laid damp proof course unless the DPC has been flooded with water for at least 48 hours.	1		
IX a	Depreciation is the loss in the value of property due to its use, life, wear, tear, decay, etc. Value of a building or property (but not land) decreases gradually up to the utility period due to depreciation. Methods of determination of depreciation: • Straight line Method • Constant Percentage Method • Sinking Fund Method • Quantity Survey Method Straight line method • Property is assumed to lose value by a constant amount every year, a fixed amount of original cost is written off every year, so that at the end of the term when the asset is worn out, only Scrap/ Salvage Value remains. • Annual Depreciation, D = $\frac{C - S_c}{n}$ • C – Original Cost • S_c – Scrap / Salvage Value • n – Life of property in years Constant percentage method/declining balance method • Property is assumed to lose value annually at a constant percentage of its value • P = $1-(Sc/C)^{1/n}$ • Value of the property at n years = $C(1-P)^n$ • P - Percentage rate of annual depreciation for the constant % method expressed in decimal • C – Original Cost • S_c – Scrap / Salvage Value • The formula doesn't hold good when Scrap / Salvage Value = zero Sinking Fund Method • In this method the depreciation is assumed to be annual sinking fund plus the interest of the accumulated Sinking Fund till that year • Total Depreciation percentage % in that year (m^{th} year) = $\frac{i}{(1+i)^n-1} X \frac{(1+i)^m-1}{i}$ • n -Life Quantity Survey Method • Property is studied in detail and the extend of physical deterioration worked out to calculate depreciation • Property is studied in detail and loss in value is worked out. Each and every step is based on some logical ground, without any fixed percentage of the cost of the property	2 Any 2 methods 2x2 =4		6
IX b	<u>Case 1</u> $YP = \frac{1}{I_p + I_c} I_c = \frac{i}{(1+i)^n-1} = \frac{0.06}{(1+0.06)^{60}-1} = 0.0019$	4.5		

	$YP = \frac{1}{I_p + I_c} = \frac{1}{0.06+0.0019} = 16.155$ Capitalised Value of the property = Net income per annum x YP = 1,00,000 x 16.155 = Rs. 1615500 <u>Case 2</u> Interest for redemption of capital I_c = 3% $YP = \frac{1}{I_p + I_c}$ $I_c = \frac{i}{(1+i)^n - 1} = \frac{0.03}{(1+0.03)^{60} - 1} = 0.0061$ $YP = \frac{1}{I_p + I_c} = \frac{1}{0.06+0.0061}$ = Rs. 15.129 Capitalised Value of the property = Net income per annum x YP = 100000 x 15.129 = Rs. 1512900	4.5		
X a	Sinking Fund: 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. $I = I_c$ x S $I_c = \frac{i}{(1+i)^n - 1}$ S – Total amount of Sinking Fund i – Rate of interest expressed in decimal n – No.of years I_c – Coefficient of annual Sinking Fund I – Annual instalment required Scrap value = 10% of building cost Total amount of Sinking Fund S = 90% of cost of building C – 0.1 C = 0.9 C Years Purchase: YP is defined as the capital sum required to be invested in order to receive a net annual income as an annuity of Rs.1/- at a certain rate of interest. For annual income of Rs.1/-., $YP = \frac{1}{I_p}$ $YP = \frac{1}{I_p + I_c}$, YP becomes reduced if Sinking Fund is there Ip – Rate of interest on capital (Decimal) Ic – Sinking Fund coefficient	4.5 4.5		9
X b	Scrap Value = $\frac{10}{100} X$ 1000000 = Rs. 100000 Total amount of Sinking Fund to be accumulated = 1000000 – 100000 = 900000 Annual Sinking Fund for re – equipment of Rs. 900000 in 20 years is $I = I_c$ x S $I_c = \frac{i}{(1+i)^n - 1}$, $I_c = \frac{0.04}{(1+0.04)^{20} - 1} = 0.0336$ $I = I_c$ x S = 0.0336 x 900000 = Rs. 3024 Annual instalment for SF for a period of 20 years = Rs.3024/-	1 1 2 2		6