

QUANTITY SURVEYING -I - Rev 2015 TED 4013 ANSWER KEY			
Q no	Scoring Indicators	split score	Total score
I	PART A		
a	<ul style="list-style-type: none"> • Familiarity in modern construction techniques • Accuracy in taking measurements and calculations • Sound knowledge of construction materials and construction practice 	2	2
b	<ul style="list-style-type: none"> i.Center line method ii. Long wall short wall method 	2	2
c	It gives the cost of each item calculated with the quantity in detailed estimate and the rate arrived at the site in prescribed format	2	2
d	Lead is the average horizontal distance between the centre of excavation to the centre of deposition. The unit of lead is 50m. Lift is the average height through which the earth has to be lifted from source to the place of spreading or heaping.	2	2
e	The standard data book gives the quantities of materials and labour required for unit item of work.	2	2
II	PART B		
a	<p>explain any three of following:</p> <ul style="list-style-type: none"> • Preliminary Estimate: It is otherwise known as approximate estimate or abstract estimate. The approximate estimate is prepared from the practical knowledge of similar work. This estimate is prepared showing separately the approximate cost of every important item of work. • Plinth Area Estimate: This is prepared on the basis of plinth area of a building. It is calculated by finding the plinth area of a building and multiplying by the plinth area rate. • Cube Rate Estimate: It is a preliminary estimate or approximate estimate and it is prepared on the basis of cubical contents of the building. This is calculated by finding the cubical content such as length, breadth and height and multiplied it with cubic rate. • Approximate Quantity Estimate: In this method approximate total length of the wall is found in running meter and this total length is multiplied by rate by running meter and which gives accurate cost 		6

	<ul style="list-style-type: none"> • Revised Estimate: It is a detailed estimate and is required to be prepared under any one of the reason: i) when the original sanctioned estimate is exceeded or likely to be exceed more than 5%. Ii) When the expenditure on a work exceed or likely to be exceed by more than 10%. Iii) When there is material deviation from the original proposal even though the cost may be met from the sanctioned amount. • Detailed Estimate: It is an accurate estimate and consisting of working out the quantities of each item of work and their cost. The dimension such as length, breadth and height of each item are taken out correctly from the plan and quantities of each items are calculated and the billing are done. • Supplementary Estimate: It is the detailed estimate and prepared when additional work are required to supplement original work or when future development are required during progress of work. • Supplementary and Revised Estimate: It is the combination of supplementary andrevised estimation. It is prepared when the work is partially abundant & the estimated cost of remaining work is less than 95% of original work or when there are material deviation & changes in the design which may result in substantial saving in the estimate. 		
b	<ul style="list-style-type: none"> • Prepare bill of quantities • Visiting sites to assess quantity and quality • Computing the values of work done with agreement • To give advice in legal cases • To prepare approximate estimate of the work at planning stage • To prepare bill of adjustments in case of any deviation from the contract drawings 		6

c	<p>In this method, the cost of construction is determined by multiplying plinth area with plinth area rate. The area is obtained by multiplying length and breadth (outer dimensions of building). As per IS 3861-1966, the following areas include while calculating the plinth area of building.</p> <ul style="list-style-type: none"> • Area of walls at floor level. • Internal shafts of sanitary installations not exceeding 2.0m², lifts, air conditioning ducts etc., • Porches of non cantilever type. <p>Areas which are not to be included</p> <ul style="list-style-type: none"> • Area of lofts. • Unenclosed balconies. • Architectural bands, cornices etc., • Domes, towers projecting above terrace level. • Box louvers and vertical sun breakers. 		6
d	<p>i) Long wall-short wall method:</p> <p>In this method, the wall along the length of room is considered to be long wall while the wall perpendicular to long wall is said to be short wall. To get the length of long wall or short wall, calculate first the centre line lengths of individual walls. Then the length of long wall, (out to out) may be calculated after adding half breadth at each end to its centre line length. Thus the length of short wall measured into in and may be found by deducting half breadth from its centre line length at each end. These lengths are multiplied by breadth and depth to get quantities.</p> <p>ii) Centre line method:</p> <p>This method is suitable for walls of similar cross sections. Here the total centre line length is multiplied by breadth and depth of respective item to get the total quantity at a time. When cross walls or partitions or verandah walls join with main wall, the centre line length gets reduced by half of breadth for each junction. The estimates prepared by this method are most accurate and quick</p>		6

e	<p>To prepare detailed estimate first of all details of measurement and calculation of quantities are worked out. Respective measurements for dimensions of individual item involved in the work are taken off from the drawing and entered in the respective column of a standard measurement form.</p> <table border="1" data-bbox="416 427 1362 584"> <thead> <tr> <th data-bbox="416 427 564 495">Item No</th> <th data-bbox="564 427 727 495">Particulars</th> <th data-bbox="727 427 876 495">No</th> <th data-bbox="876 427 1027 495">Length</th> <th data-bbox="1027 427 1185 495">Breadth</th> <th data-bbox="1185 427 1362 584">Height or Depth</th> </tr> </thead> <tbody> <tr> <td> </td> <td> </td> <td> </td> <td> </td> <td> </td> <td> </td> </tr> </tbody> </table> <p>Second part of the detailed estimation includes abstract of estimated cost. The quantity of each item is multiplied with the appropriate rate mentioned in the abstract form and cost of each item is worked out. This cost is added and total estimated cost is worked out.</p>	Item No	Particulars	No	Length	Breadth	Height or Depth								
Item No	Particulars	No	Length	Breadth	Height or Depth										
f	<p>i. Measurement shall be made for finished item of work and description of each item shall include materials, transport, labour, fabrication tools and plant and all types of overheads for finishing the work in required shape, size and specification.</p> <p>ii. In booking, the order shall be in sequence of length, breadth and height or thickness.</p> <p>iii. All works shall be measured subject to the following tolerances.</p> <ul style="list-style-type: none"> • Linear measurement shall be measured to the nearest 0.01m. • Areas shall be measured to the nearest 0.01 sq.m • Cubic contents shall be worked-out to the nearest 0.01 cum <p>iv. Same type of work under different conditions and nature shall be measured separately under separate items.</p> <p>v. The bill of quantities shall fully describe the materials, proportions, workmanships and accurately represent the work to be executed.</p>		6												

g	<p>Specification explains the nature and class of the work, materials used for the work, workmanship etc. & it is very important for the execution of work. The cost of work depends on the specification of materials used in the construction. From this specification one can easily understand the nature of work and what the work shall be.</p> <ul style="list-style-type: none"> • General Specification (Brief Specification) <p>It gives the nature and class of work and materials in general terms; it is used in various parts of the work, from the foundation to the superstructure. It gives a short description of different part of work specifying materials their proportions, qualities etc which gives the general idea of a work& it is used for the preparation of details estimation.</p> <ul style="list-style-type: none"> • Detailed Specification <p>The detailed specification is a detailed description and expresses the requirements in detail. The detailed specification of an item of work specifies the qualities and quantities of materials, proportion of mortar, workmanship, method of preparation and execution and the methods of measurement.</p>		6
PART C			
III (a)	<p>a. 1. Drawings i.e.plans, elevations, sections etc.</p> <p>2. Specifications.</p> <p>3. Rates.</p> <p>Drawings: If the drawings are not clear and without complete dimensions the preparation of estimation become very difficult. So, It is very essential before preparing an estimate.</p> <p>Specifications:</p> <p>i. General Specifications: This gives the nature, quality, class and work and materials in general terms to be used in various parts of wok. It helps no form a general idea of building.</p> <p>ii. Detailed Specifications: These gives the detailed description of the various items of work laying down the quantities and qualities of materials, their proportions, the method of preparation workmanship and execution of work.</p>		5

	<p>Rates: For preparing the estimate the unit rates of each item of work are required.</p> <ul style="list-style-type: none"> • For arriving at the unit rates of each item. • The rates of various materials to be used in the construction. • The cost of transport materials. • The wages of labour, skilled or unskilled of masons, carpenters, Mazdoor, 		
(b)	<p>Building cost = $1500 \times 950 = 1425000$</p> <p>Cost for architectural work = $1425000 \times \frac{(3/2)}{100} = 21375$</p> <p>Cost for water supply and sanitary installation = $1425000 \times \frac{5}{100} = 71250$</p> <p>Extra for internal installation = $14 \times \frac{1425000}{100} = 199500$</p> <p>Extra for services = $6 \times \frac{1425000}{100} = 85500$</p> <hr/> <p>Total = 1802625 /-</p> <p>Contigencies cost = 54078.75</p> <p>Supervision cost = 144210</p> <p>Grand total = 2000913.75 Rs.</p>		
IV (a)	<p>Revised Estimate: It is a detailed estimate and is required to be prepared under any one of the reason:</p> <p>i) When the original sanctioned estimate is exceeded or likely to be exceed more than 5%.</p> <p>ii) When the expenditure on a work exceed or likely to be exceed by more than 10%.</p> <p>iii) When there is material deviation from the original proposal even though the cost may be met from the sanctioned amount.</p>		10

	<p>Supplementary Estimate: It is the detailed estimate and prepared when additional work are required to supplement original work or when future development are required during progress of work.</p>		5												
(b)	<p>Top width of embankment $b = 15$ m $n : 1 = 2 : 1$; $n = 2$; $L = 30$ m $d_1 = 2.25$ m; $d_2 = 3.04$ m; $d_3 = 1.40$ m; $d_4 = 0.65$ m; $d_5 = 0.50$ m Area of C/S at different chainages area are given below :</p> <p>$A_1 =$ chainage at 0 m $= (b + nd_1)d_1 = (15 + 2 \times 2.25) 2.25 = 43.88$ m² $A_2 =$ chainage at 30 m $= (b + nd_2)d_2 = (15 + 2 \times 3.04) 3.04 = 64.08$ m² $A_3 =$ chainage at 60 m $= (b + nd_3)d_3 = (15 + 2 \times 1.4) 1.40 = 24.92$ m² $A_4 =$ chainage at 90 m $= (b + nd_4)d_4 = (15 + 2 \times 0.65) 0.65 = 10.60$ m² $A_5 =$ chainage at 120 m $= (b + nd_5)d_5 = (15 + 2 \times 0.5) 0.5 = 8$ m²</p> <p>Volume of earth work by Trapezoidal rule</p> $V = \frac{L}{2} [(A_1 + A_5) + 2(A_2 + A_3 + A_4)]$ $V = \frac{30}{2} [(43.88 + 8) + 2(64.08 + 24.92 + 10.60)]$ $= 3766.2 \text{ m}^3$ <p>Volume of earth work by Prismoidal rule</p> $V = \frac{L}{3} [(A_1 + A_5) + 4(A_2 + A_4) + 2(A_3)]$ $V = \frac{30}{3} [(43.88 + 8) + 4(64.08 + 10.60) + 2(24.92)]$ $= 4004.4 \text{ m}^3$		10												
V	<p>Total centre line length of all 30 cm walls $= (2 \times 9.2) + (2 \times 3.9) + (3 \times 3.9) = 37.90$ m [2 junctions with 30cm walls]</p> <p>Total centre line length of 20 cm inter wall $= 3.9$ [2 junctions with 30cm walls]</p> <p>Total centre line length of all other 20 cm walls $= 3.9 + 2 + 3.9 + 2.7 = 12.5$ [8 junctions]</p> <table border="1" data-bbox="379 1859 1300 1948" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th style="width: 30%;">ITEM</th> <th style="width: 5%;">NO.</th> <th style="width: 5%;">L (m)</th> <th style="width: 5%;">B (m)</th> <th style="width: 5%;">H/D (m)</th> <th style="width: 10%;">QTY (m³)</th> </tr> </thead> <tbody> <tr> <td> </td> <td> </td> <td> </td> <td> </td> <td> </td> <td> </td> </tr> </tbody> </table>	ITEM	NO.	L (m)	B (m)	H/D (m)	QTY (m ³)								
ITEM	NO.	L (m)	B (m)	H/D (m)	QTY (m ³)										

		Plinth wall	1	37.5	0.4	0.65	9.75		
		20cm inter walls, plinth	1	3.5	0.3	0.65	0.68		
		Verandah pillars							
		1 st footing	2	0.6	0.6	0.2	0.15		
		2 nd footing	2	0.5	0.5	0.2	0.10		
		Plinth wall	2	0.4	0.4	0.65	0.21		9
		All 20 cm walls of verandah, plinth	1	10.9	0.2	0.55	1.2		
		Steps:							
		1 st	1	1.2	0.6	0.15	0.11		
		2 nd	1	1.2	0.3	0.15	0.05		
		Total					20.47 m ³		
(b)	Length of centre line of one side of hexagon = $3 + 2x \frac{0.20}{\tan 60} = 3.23 \text{ m}$ Total length of centre lines = $6 \times 3.23 = 19.38 \text{ m}$								
		ITEM	NO.	L (m)	B (m)	H/D (m)	QTY (m³)		
		i. Earthwork in excavation	1	19.38	0.9	1	17.44	3	
		ii. 2 cm damp proof course	1	19.38	0.5	-	9.69	3	
		Deduct door sill	1	1.2	0.5	-	0.6		
		Net total					9.09 m ²		6
VII	. Outerlength of superstructure wall = $3 + 2x \frac{0.40}{\tan 60} = 3.46 \text{ m}$ Outer length of plinth wall = $3 + 2x \frac{0.45}{\tan 60} = 3.52 \text{ m}$								
		ITEM	NO.	L (m)	B (m)	H/D (m)	QTY (m³)		
		i. First class brick work in lime mortar in foundation and plinth						8	
		1 st footing	1	19.38	0.7	0.2	2.71		
		2 nd footing	1	19.38	0.6	0.2	2.33		
		Plinth wall	1	19.38	0.5	0.9	8.72		
		Total					13.76 m ³		
		ii. 12mm cement plastering 1:6 inside and							15

IX
(a)

Item no	Particular	Quantity or numbers	Rate	Cost
				rs
1	Material			
	1. Brick ballast	10 m ³	400/ m ³	4000
	2. White lime	1.6 m ³	700/ m ³	1120
	3. surkhi	3.2 m ³	350/ m ³	1120
			total	6240
2	Labour			
	1. mistri	0.5 no	160/day	80
	2. mason	1 no	150/ day	150
	3. boy or woman	12 nos	70/ day	840
	4. mazdoor	12 nos	80/ day	960
	5. bhishhti	2 nos	70/ day	140
	6. miscellaneous thing	lumsum	45	45
			total	2215

Total rate= 2215+6240 = 8455

Add 10 % as contractors profit=8455x10/100=845.5

Total rate = 8455+ 845.5 = 9300.5

For 1 m³ = Rs. 930

8

2

10

(b)

Drawings : It include plan, elevation an sectional views of a building or structure to show the arrangement of the rooms and the various parts, and the dimension- length, breadth and height, with very brief description of various parts. It donot furnish the details of different items of work, the quantity of materials, proportion of mortar and workmanship which are described in specification.

Specifications: Specification explains the nature and class of the work, materials used for the work, workmanship etc. & it is very important for the execution of work. The cost of work depends on the specification of materials used in the construction. From this specification one can easily understand the nature of work and what the work shall be.

- General Specification (Brief Specification)

It gives the nature and class of work and materials in general terms; it is used in various parts of the work, from the foundation to the superstructure. It gives a short description of different part of work specifying materials their proportions, qualities etc which gives the general idea of a work& it is used for the preparation of details estimation.

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	<ul style="list-style-type: none"> Detailed Specification <p>The detailed specification is a detailed description and expresses the requirements in detail. The detailed specification of an item of work specifies the qualities and quantities of materials, proportion of mortar, workmanship, method of preparation and execution and the methods of measurement.</p>						
X a	Item no.	Particular	Quantity	Rate		Cost (Rs)	
	1	Materials					
		1. Brick first class	5000 no.s	2000/1000 no.s		10000.00	
		2. Cement (13.5 bags)	0.45 m ³	6325/ m ³		2846.25	
		3. Sand (local)	2.7 m ³	400/ m ³		1080.00	
	Total					13926.25	
	2.	Labour					
		1. Mistri(Head mason)	0.5 nos	160/day		8 80	
		2. Mason	10 nos.	150/day		1500	
		3. Boy or women coolie	10 nos	70/ day		700	
		4. Mazdoor	7 nos	80/day		560	
		5. Bhishti	2 nos	70/ day		140	
		6. Scaffolding	LS	130 LS		130	
		7. Sundries, T. and P. etc	LS	35 LS		35	
	Total					3145	
<p>Total rate= 17071.25 Add 10 % as contractors profit=1707.1 Grand Total = 17071.25 + 1707.1 = 18778 per 10 m³ For 1 m³ = Rs. 1877.8</p>					2	10	
X b	<p>Purpose of Analysis of rates:</p> <ul style="list-style-type: none"> To work out the actual cost of per unit of the items. To work out the economical use of materials and processes in completing the particulars item. To work out the cost of extra items which are not provided in the contract bond, but are to be done as per the directions of the department. To revise the schedule of rates due to increase in the cost of material and labour or due to change in technique. 						
5							