#132, AECS Layout, IT Park Road, Kundalahalli, Bangalore – 560 037 T:+9180 28524466 / 77

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Department of Civil Engineering

17CV81 - Quantity Survey and Contracts Management

Scheme and Solution-IAT2-ACADEMIC YEAR 2020-21

Q.No.	Question	M	CO	RBL
1.	a. Write the detailed specification for 'Size Stone masonry in footing and plinth 1:6 CM'	5	CO1	2
Ans	**Material:** Stone: a stone when broken, should not be dull in appearance and should show uniformity of texture. It should be free from cavities, cracks, and patches of loose or soft material. Stratifications, which are usually found in sedimentary rocks should not be visible to naked eye. Compressive strength of building stone should not be less than 60N/mm^2. Cement: M43 grade cement should be used. Sand: river confirming to zone – IV should be used. **Proportion:** Cement mortar should be prepared with 1:6 C:M ratio. Cement and sand are dry mixed thoroughly and then water is added and mixed till homogeneous mix is obtained. **Laying:** All stones shall be thoroughly **wetted** before laying. The walls shall be carried up **truly plumb. Face stone** shall not be narrower than its height and shall tail back and bond well into the backing. The stones shall be arranged to break joint on the face for at least half the height with those of courses above or below. The thickness of joints shall not be more than 2 cm. Stones shall be laid with Broader face downward to give good bedding Cornerstones of **quoins** should be a good stone and dressed to correct angle and laid as headers and stretchers. The Interstices between stones shall be wedged with stone chips and spalls to avoid thick beds of joints and mortar. **Through stones**: Through bond stones of one piece shall be provided and for every **0.5 sq. m of face** and should extend to the full thickness of the wall. For walls thicker than 75 cm, bond stone may be of **two pieces** placed side by side overlapping at least 15 cm. Breadth of bond stones shall not be less than 1.5 times the height. Not more than 60 cm height of wall shall be **constructed at a time**. If any part of a wall is required to be raised in advance, tooting must be formed by giving projections to bond with the wall to be built later. **(C) Curing** The work shalt be protected from rain or sun while it is green At the end of the day's work the tops of walls shall be left flooded. The masonry shall be kept moist on all the faces for at **least 7 days.** **(D) Measurement:** The Uncoursed random rubble masonry work shall be taken in **cu. m** after measuring Length. breadth and thickness to the nearest 1 cm. The rate of item Include the cost of scaffolding.	1 1 1 1 1		
1.	b. Write the detailed specification for 'Reinforced Cement concrete for column'	5	CO1	2
Ans	**Proportion-** The proportion of cement concrete shall be of one part of cement, two parts of sand four parts of aggregates by volume. **Cement-** The cement shall be used in this work shall comply with the standard requirements. Fine Aggregate- The sand to be used shall be clean and coarse and shall be free from any organic or vegetable matter. The sand shall be washed, if there is any trace of earth in it. **Coarse Aggregate-** The coarse aggregate shall consist of 67% of black trap metal carrying in size from 20mm to 40mm and 33% of black trap metal carrying in size from 20mm to 6mm. The coarse aggregate for the concrete work shall be clean and free from impurities such as earth, coal dust and other organic materials. The unclean aggregates shall have to be screened and washed before use. **Water-** The water to be used in concrete work shall be clean and fresh. **Reinforcement-** All reinforcement shall be of steel which shall comply with the standard requirements. All bars shall be placed as per design given by the engineer and utmost care shall be taken to keep them in the same	1 1		

position while packing concrete around them. Before laying the concrete, the reinforcement shall be got approved by the engineer.

Centering- The centering for the concrete work shall be sufficiently strong and rigid and in good condition so as to turn out a good smooth surface. The props to be used for centering shall be of timber bullies. The spacing of bullies shall not be more than 120cm centre to centre. The bullies shall be supported at the base on 40mm thick wooden plate having area not less than 0.10sq m. 1

The surface of formwork shall be oiled before placing of concrete.

Mixing- The mixing of concrete shall be done in a mechanical mixer or by hand operations depending on the quantity of the concrete which shall be decided by the engineer. In the former case, the mixing drum shall be turned at least for 1.5 minutes after all the ingredients are added and the drum shall be completely emptied every time. The concrete from the drum shall be placed on a water tight platform. 1

Laying and Curing- Before start laying of concrete in position; the centering shall be well watered. The concrete shall be laid in forms and tapped in such a way that no honeycomb surface appears on removal of the forms. The cement concrete shall be kept well watered for at least 20 days.

Finishing of Exposed surface- All exposed surfaces of the concrete work shall be finished with 12mm thick cement plaster of sagol finish and three coats of white or colour was shall be applied on these exposed surfaces of concrete.

Measurement: measurement is taken in cu.m. 1

2.	From first principle work out the rate per unit of 'First class brickwork in superstructure'	10	CO1	5

Ans

Take 10 m^3, Unit 1 m^3, Brick size = 20 cm x 10 cm x 10 cm 1

No. of bricks required for construction of 10 m^3 of brick masonry = 10/(0.2x0.1x0.1) = 5000 no. 1

Calculations for dry ingredients for mortar for 10 m^3 of brickwork which require 3 m^3 of dry ingredients of mortar.

Cement = 1/(1+6) x 3x30 = 12.9 bags 1

Fine aggregate = 6/(1+6) x 3 = 2.58 m^3 1

Particulars	quantity	rate	Cost
Materials			
Cement	12.9 bags	350/- per bag	4515.00
Sand	2.58 m^3	250/- per m^3	645.00
bricks	5000 No.	3/- per brick	15000.00
Labour			
Head Masson	½ No.	500/- per day	250.00
Masson	10 No.	450/- per day	4500.00
Mazdoor (heavy)	12 no.	350/- per day	4200.00
Mazdoor(light)	5 No.	300/- per day	1500.00
Waterman	2 No.	250/- per day	500.00
Tools and plants	Lump sum	100/-	100.00
			31210.00
		10% contractors	3121.00

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			profit				
			1.5% water charges	468.15	1		
			Grand total	34799.15	1		
	Rate per 1m^3 of Brick work = 34799.15/10= **3479.91 per m^3**				1		
3.	From first principle work out the rate per unit of 12mm thick plastering for inside walls in CM 1:6'				10	CO1	5
Ans	Materials for 12 mm thick plastering						
	Take 100m^2 of plastering area				1		
	Volume of percent mortar = 100x0.012 = 1.2 m^3						
	Add 30 % for unevenness = 1.2 + (0.3x1.2) = 1.56m^3						
	Increase by 25% for total dry volume = 1.56 + 0.25*1.56 = 1.95 m^3				1		
	Therefore dry volume of ingredients required for 12mm thick plaster = 2 m^3.						
	Calculations for dry ingredients of mortar: we know that for 100 m^2 of 12 mm plastering we require 2 m^3 of dry ingredients of mortar.						
	Cement = 1/(1+6) * 2* 30 =8.57 bags.				1		
	Fine aggregates = 6/(1 =6) *2 = 1.71 m^3				1		
	Particulars	quantity	rate	Cost			
	Materials						
	Cement	8.57 bags	350/- per bag	2999.50			
	Sand	1.71 m^3	250/- per bag	427.50	1		
	Labour						
	Head Masson	½ no.	500/- per day	250.00			
	Masson	10 no.	450/- per day	4500.00			
	Mazdoor (heavy)	10 no.	350/- per day	8500.00			
	Mazdoor(light)	5 no.	300/- per day	1500.00	1		
	Waterman	2 no.	250/- per day	500.00			
	Tools and plants	Lump sum	100/-	100.00			
			total	13777.00			
			10% contractors profit	1377.70	1		
			1.5% water	206.65	1		

		charges		
		Grand total	15361.35	
Rate per 1 m^2 of plastering = 15361.35/100 = **153.61/-**				

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4. Estimate the quantity of earthwork between chainage 500m to 700m from the following data by using mid sectional area method. — 10 — CO1 — 5

Chainage (m)	500	520	540	560	580	600	620	640	660	680	700
Ground level (m)	17.55	17.50	17.40	17.35	17.20	17.00	16.80	16.65	16.60	16.50	16.45

The formation level at all the chainage points is 17.00m. The formation width of road is 10m and side slopes in cutting and banking is 2:1.

Ans

Given: formation width = b = 10m, side slope S=2:1

Chainage (m)	RL of ground	RL of Formation	Depth	Mean depth	Total sectional area $bd+sd^2$	L (m)	Quantity of cutting	Quantity of filling
500	17.55	17.00	-0.55	-	-	-	-	-
520	17.50	17.00	-0.50	0.525	5.801	20	116.02	
540	17.40	17.00	-0.40	0.45	4.905	20	98.1	
560	17.35	17.00	-0.35	0.375	4.031	20	80.62	
580	17.20	17.00	-0.20	0.275	2.901	20	58.01	
600	17.00	17.00	0	0.10	1.02	20	20.4	
620	16.80	17.00	0.20	0.10	1.02	20		20.4
640	16.65	17.00	0.35	0.275	2.901	20		58.01
660	16.60	17.00	0.40	0.375	4.031	20		80.62
680	16.50	17.00	0.50	0.45	4.905	20		98.10
700	16.45	17.00	0.55	0.525	5.801	20		116.02
							373.15	**373.15**

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Item no.	Particulars	Quantity	Unit	Rate	Per	Cost
1	Earthwork in cutting	373.15	Cu.m	350	% cu.m	1306.025
2	Earthwork in filling	373.15	Cu.m	275	% cu. m	1026.11

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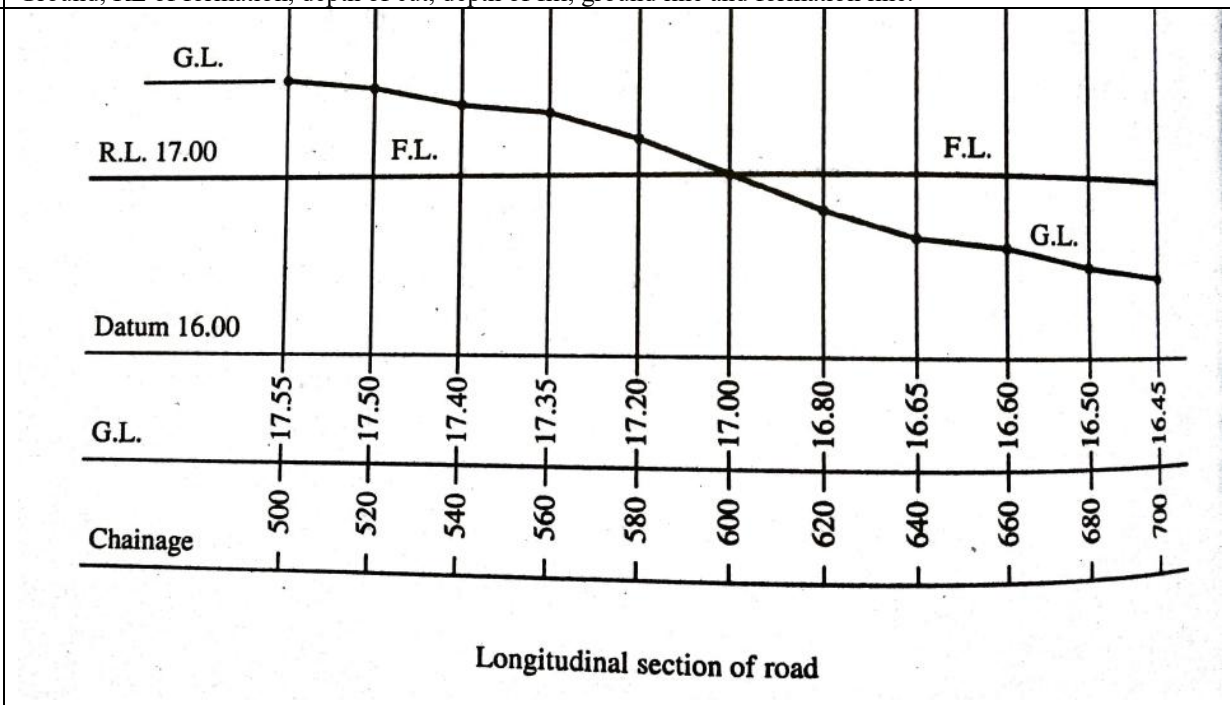
						total	2332.135			
						Add 5%	116.609			
						Grand total	2448.79			
5.	Draw the longitudinal section of road for the data given in the Q4 with the following details: chainage, RL of Ground, RL of formation, depth of cut, depth of fill, ground line and formation line.							10	CO1	5
	 Longitudinal section of road							5 5		