

Fall Semester Retake Exam. (2022 -2023) Typical Answers

University of Salahaddin-Erbil

College of Engineering

Geomatics (Surveying) Department

Date: 17 / 1 / 2023

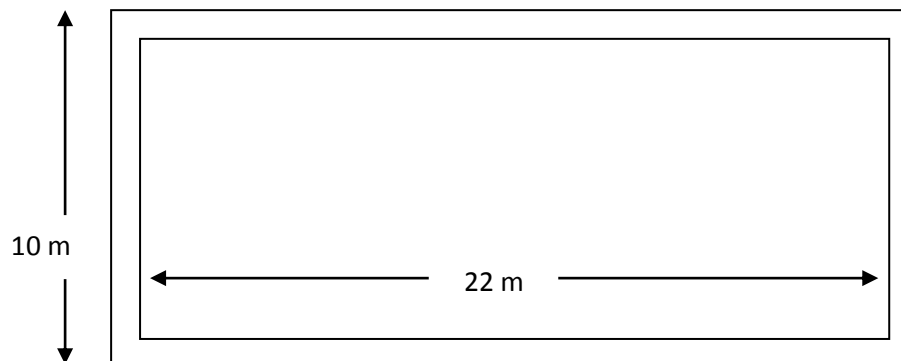
Subject: Quantity Surveying

Examiner: Azad Arshad Hawezi

Time Allowed: 150 min.

Theoretical Part:**Question 1) (30 Mark)**

Calculate the excavation quantity of the following trench depth 1.20 m .and width 0.90 m. then compute the cement, sand, gravel and water for casting the same trench concrete ratio 1:2:4

**Solution:**

$$\text{Area} = [10 + 10 + 21.1 + 21.1] \times 0.90 \text{ m} = 55.98 \text{ m}^2$$

$$\text{Trench Volume} = 55.98 \text{ m}^2 \times 1.20 \text{ m} = 67.176 \text{ m}^3$$

$$\text{Cement} = 67.176 \text{ m}^3 \times 300 \text{ kg} = 20152.8 \text{ kg} \approx 20 \text{ tons}$$

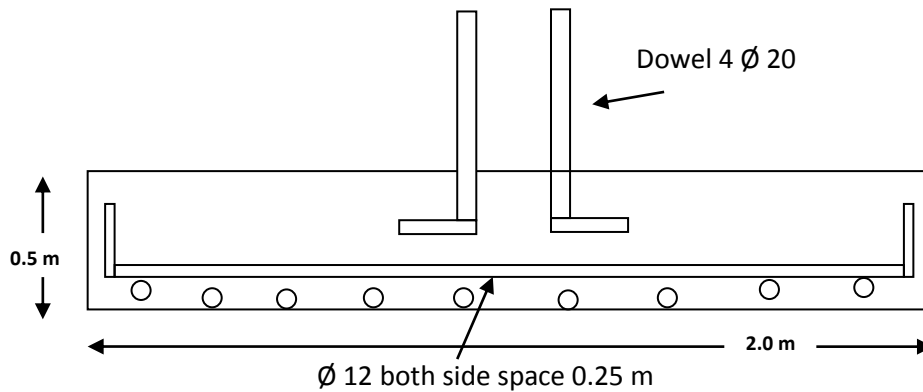
$$\text{Sand} = 67.176 \text{ m}^3 \times 0.5 = 33.588 \text{ m}^3 \approx 34 \text{ m}^3$$

$$\text{Gravel} = 67.176 \text{ m}^3 \approx 67 \text{ m}^3$$

$$\text{Water} = 20152.8 \text{ kg} / 2 = 10076.4 \text{ kg} \approx 10100 \text{ Liters}$$

Question 2) (30 Mark)

Compute the steel quantity of the square raft foundation n (2x2) m, cover 0.025 m for all directions

**Solution:**

for foundation:

$$\text{Distribution distance for reinforcement} = 2 - (2 \times 0.025) = 1.95 \text{ m}$$

$$\text{No. of bars} = 1.95 / 0.25 + 1 = 8.8 = 9$$

$$l_1 = 1.95 + 32db = 1.95 + 32 \times 0.012 = 2.334 \text{ m}$$

$$L_1 = 2.334 \times 9 \times 2 = 40.012 \text{ m}$$

$$w_1 = L_1 \cdot D_1^2 / 162 = 40.012 \times 12^2 / 162 = 35.566 \text{ kg}$$

$$l_2 = 56db + H - \text{cover} = 56 \times 0.020 + 0.50 - 0.025 = 1.1325 \text{ m}$$

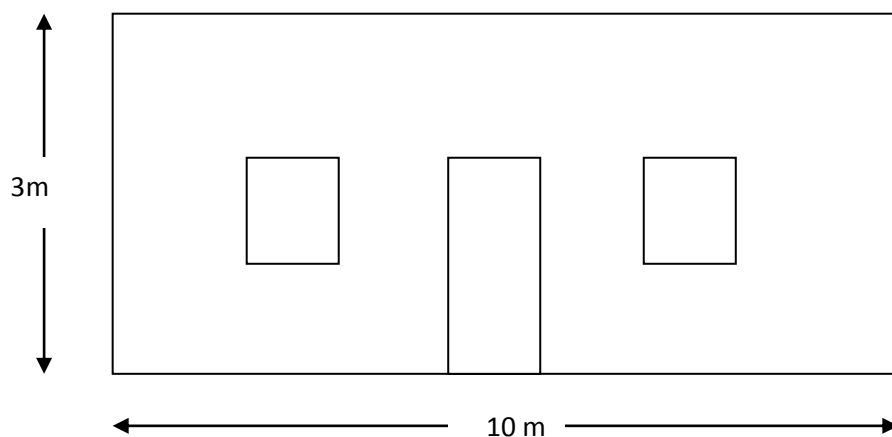
$$L_2 = 4 \times 1.1325 \text{ m} = 4.53 \text{ m}$$

$$w_2 = L_2 \cdot D_2^2 / 162 = 4.53 \times 20^2 / 162 = 11.19 \text{ kg}$$

$$\text{weight of steel} = w_1 + w_2 = 35.566 \text{ kg} + 11.19 \text{ kg} = 46.756 \text{ kg} \approx 47 \text{ kg}$$

Question 3) (40 Mark)

Find the quantity of the brick and cement, sand water for the building following room wall, the wall is two rows and mortar joint for bricks and between rows is 0.01 m, brick dimension is (7, 20, 13) cm, mortar component ratio 1:3. the drawings is not to scale. brick and mortar loss are 10%. Door 1x2 m , window 1x1 m .



Solution:

For brick number:

$$\text{Wall Gross area} = (10 \times 3) = 30 \text{ m}^2$$

$$\text{Wall net area} = 30 \text{ m}^2 - (\text{door} + \text{windows}) \text{ area} = 30 \text{ m}^2 - [(1 \times 2) \text{m} + (1 \times 1) \text{m} \times 2] = 26 \text{ m}^2$$

$$\text{Area of brick as positioned} = 0.07 \text{ m} \times 0.2 = 0.014 \text{ m}^2$$

$$\text{Area of brick with mortar joint} = (0.07 + 0.005) \text{ m} \times (0.13 + 0.005) \text{ m} = 0.1 \text{ m}^2$$

Number of bricks = area of net wall / Area of brick with mortar joint x number of wall rows

$$= 26 \text{ m}^2 / 0.1 \text{ m}^2 \times 2 = 520$$

$$\text{loss ratio} = \%10 \quad \text{Final number of bricks} = 520 \times 1.1 = 572 \approx \underline{\underline{600 \text{ bricks}}}$$

$$\text{mortar per brick} = (t \times w) (h + L + t)$$

$$= (0.01 \text{ m} \times 0.13 \text{ m}) (0.07 \text{ m} + 0.2 \text{ m} + 0.01 \text{ m}) = 0.000364 \text{ m}^3$$

total mortar = mortar per brick x No. of bricks + mortar for joint between two walls

$$= (0.000364 \text{ m}^3 \times 572) + (26 \text{ m}^2 \times 0.01 \text{ m}) = 0.49 \text{ m}^3$$

$$\text{Mortar loss ratio} = \%10 \quad \text{final mortar quantity} = 0.49 \text{ m}^3 \times 1.1 = 0.539 \text{ m}^3 \approx 0.50 \text{ m}^3$$

$$\text{Cement in mortar} = 1 \times 1.33 / (1+3) = 0.3325 \text{ m}^3$$

$$\text{Cement in Kg} = 0.3325 \text{ m}^3 \times 1440 \text{ kg/ m}^3 = 478.8 \text{ kg}$$

$$\text{Cement in mortar} = 0.50 \text{ m}^3 \times 478.8 \text{ kg} = 239.4 \text{ kg} \approx 250 \text{ kg} \approx 0.25 \text{ tons}$$

$$\text{Sand in mortar} = 3 \times 1.33 / (1+3) = 0.9975 \text{ m}^3$$

$$\text{Total Sand in mortar} = 0.5 \text{ m}^3 \times 0.9975 = 0.49875 \text{ m}^3$$

$$\text{Water} = \text{cement wight} / 2 = 250 \text{ kg} / 2 = 125 \text{ kg} = \underline{\underline{125 \text{ Liters}}}$$

Practical Part: (100 Mark)

Find volume of the following topographic area ,Grid (5x5)m cut of level the lowest point .

400.41	400.35	400.67	400.52	400.15
400.91	400.78	400.18	400.37	400.26
399.03	399.55	399.71	399.22	399.19
398.48	398.06	398.77	398.87	398.54
397.89	397.75	397.33	397.69	397.03

Solution : $400.41 - 397.03 = 3.38$ m for all 25 points are :

Grid poin elevations m	Lowest point elevation m	Deference in high m
400.41	397.03	3.38
400.35	397.03	3.32
400.67	397.03	3.64
400.52	397.03	3.49
400.15	397.03	3.12
400.91	397.03	3.88
400.78	397.03	3.75
400.18	397.03	3.15
400.37	397.03	3.34
400.26	397.03	3.23
399.03	397.03	2
399.55	397.03	2.52
399.71	397.03	2.68
399.22	397.03	2.19
399.19	397.03	2.16
398.48	397.03	1.45
398.06	397.03	1.03
398.77	397.03	1.74
398.87	397.03	1.84
398.54	397.03	1.51
397.89	397.03	0.86
397.75	397.03	0.72
397.33	397.03	0.3
397.69	397.03	0.66
397.03	397.03	0

Average= summation of deference in high /25 = 2.2384 m

Area =20x20= 400 m²

Volume= Area x average high = 400 m²x2.2384 m =895.36 m³