

GENERAL CERTIFICATE OF EDUCATION BOARD

Technical and Vocational Education Examination

BUILDING CONSTRUCTION PROJECT MANAGEMENT 2

7211

JUNE 2022

ADVANCED LEVEL

Specialty Name and Acronym	CIVIL ENGINEERING -BUILDING CONSTRUCTION - CE-BC (F4-BA)
Subject Title	BUILDING CONSTRUCTION PROJECT MANAGEMENT
Subject Code No.	7211
Paper No.	2

Duration: 2 Hours 30 minutes

This Paper is has **FOUR** Questions

Answer Questions **ONE (Compulsory)** and **TWO** others.

You are advised to read carefully through the question paper before you start answering the questions.

All rough work should be done in your answer booklet.

Where necessary use drawing instruments and calculators.

You are reminded of the necessity for good English and orderly presentation in your answer.

Where applicable use the following data:

- Acceleration due to gravity, g 9.8 ms^{-2}
- Universal Gas Constant, R $8.314 \text{ J mol}^{-1} \text{ K}^{-1}$
- Speed of light in Vacuum, c $3.00 \times 10^8 \text{ m s}^{-1}$
- Avogadro number, N_A $6.02 \times 10^{23} \text{ mol}^{-1}$
- Density of water, ρ_w 1000 kg m^{-3}
- Density of mercury, ρ_{Hg} 13600 kg m^{-3}
- Ratio of specific heat capacities C_p/C_v 1.40
- Faraday's constant, F 96500 C mol^{-1}
- Relative atomic masses..... $H = 1; C = 12; O = 16; Al = 27$
- Surface area of Trapezium..... $\frac{1}{2} h (a + b)$
- Volume of a Pyramid..... $\frac{1}{3} h (a \times b)$
- Volume of a Truncated Cone..... $\frac{\pi h}{3} (R^2 + Rr + r^2)$
- Area of any regular Polygon..... $\frac{ns^2}{4 \tan(\frac{180}{n})}$
- Volume of Pyramid Square Frustum..... $V = \frac{H}{3} (B + b + \sqrt{B \cdot b})$
- Volume of Pyramid Rectangular Frustum..... $V = \frac{H}{6} [b(2a + a') + b'(2a' + a)]$

Turn Over

Question 1 (Compulsory)

The drawings on page 4 are the extracts from a technical file for the construction of a reinforced concrete structures to carry two water reservoirs for a secondary school in Community. The structure is made up of 4 identical footings of 80cm x 80cm lying on a lean concrete of 5cm thick. It has 4 ground Beams just immediately after the ground level. The dimensions of the structural elements are as shown on the drawings.

Evaluate the surfaces of formwork for the following:

- a) The reinforced concrete pillars. (6 marks)
- b) The reinforced concrete ground beams. (4 marks)
- c) The reinforced concrete floor. (4 marks)
- d) The reinforced concrete upper beams. (14 marks)
- e) Total surface area of formwork. (4 marks)

Total (40 Marks)

Question 2

After technical studies of a certain project; the following information was obtained:

Table 1: Quantities

S/N	Designation	Unit	Quantity
1	Excavation	m ³	142
2	Lean Concrete	m ³	17.6
3	Reinforced Concrete	m ³	38
4	Formwork	m ²	82
5	Striking formwork	m ²	78
6	Reservations	m ²	8
7	Water proofing	m ²	48
8	Backfilling	m ³	96

Table 2: Batching of concrete for a 1m³

S/N	Designation	Cement	Sand	Gravel	Reinforcement
1	Lean concrete	150kg	400l	800l	-
2	Reinforced concrete	350kg	420l	800l	120kg

Table 3: Unit time designation

S/N	Designation	Unit time	S/N	Designation	Unit time
1	Mixing of concrete	5.5h/m ³	6	Striking of formwork	5.5h/m ²
2	Casting of concrete	4h/m ³	7	Striking of formwork reservation	5.5h/m ²
3	Formwork	5h/m ²	8	Placing of water proof	5.5h/m ²
4	Reinforcement	75h/ton	9	Excavation	5.5h/m ³
5	Reservation	16h/m ³	10	Backfilling	5.5h/m ³

Work to be done

- a) Determine the quantity of cement, sand, gravel and reinforcement for the project **3x4= (12 marks)**
- b) Evaluate the time spent for; excavation, lean concrete, reinforced concrete, formwork, reservation, water proofing **2.5 x6 = (15 marks)**
- c) Deduce the labour hours spent for; excavation, lean concrete, reinforced concrete, formwork, reservation and water proofing. **(3 marks)**

Total (30 marks)

Question 3

Given that the quantities of materials for a project is as follows: sand = 23.00m^3 , gravel = 46.00m^3 , Cement = 15.94 tons, reinforcement = 4.56 tons, formwork = 82m^2 , water proofing material = 48m^2 .

Consider the unit prices of materials as follows: cement = 120 frs/kg, sand = 11000 frs/ m^3 , Gravel = 18000 frs/ m^3 , Reinforcement = 760 frs/kg, formwork = 42000 frs/ m^2 , Water proofing = 16000 frs/ m^2

If the total number of labour hours to be 6,010 hours, concrete works take 45% of the project time, formwork 25%, reinforcement 20% and water proofing the rest

Evaluate

- | | |
|---|-------------------------|
| a) The cost of each material. | 2x6= (12marks) |
| b) The total cost for materials. | (3marks) |
| c) The percentage of time for water proofing. | (3 marks) |
| d) The labour hours for each of the activities. | 3X4=(12marks) |
| | Total (30 marks) |

Question 4

Given that the total cost of materials for a given project is equal to 11,000,000 FCFA, labour is estimated at 22% of the dry price. Also consider that; site expenses = 15% of Dry Price, General expenses = 22% of dry price, Profit = 6% of Dry Price, Stamp duty = 1% of selling price without taxes, Value added tax = 19.25% of selling price without taxes.

Calculate:

- | | |
|--------------------------------------|-----------|
| a) The dry price of the project. | (8 marks) |
| b) The cost of labour. | (4marks) |
| b) The selling price without taxes | (8 marks) |
| c) The company coefficient K. | (5marks) |
| d) The selling price with all taxes. | (5 marks) |

Total (30 Marks)

