GENERAL CERTIFICATE OF EDUCATION BOARD

Technical and Vocational Education Examination

BUILDING CONSTRUCTION TECHNOLOGY AND PRACTICE 2
7201

JUNE2022 **ADVANCED LEVEL**

Specialty Name and Acronym	**CIVIL ENGINEERING BUILDING CONSTRUCTIONCE-BC (F4-BA)**
Subject Title	**Building Construction Technology and Practice**
Subject Code No.	**7201**
Paper No.	**2**

Duration: 3 Hours

INSTRUCTIONS TO CANDIDATES

This Paper has **THREE SECTIONS**

Section **A** has **TWO** Questions. Answer any **ONE**.

Section **B** has **FOUR** Questions. Answer any **THREE**.

Section **C** has **TWO** Questions. Answer any **ONE**.

All rough work should be done in your Answer Booklet.

Where necessary use Drawing Instruments and Non-Programmable Calculators.

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

You are advised to read carefully through the question paper, before you begin your answers.

Where applicable use the following data:

Acceleration due to gravity, g……9.8 ms^{-2}
Universal Gas Constant, R……8.314 J mol-1 K^{-1}
Speed of light in Vacuum, c……3.00 x 108 m^{s-1}
Avogadro number, Na……6.02 x 1023 mol^{-1}
Density of water, ρw…… 1000kg m^{-3}
Density of mercury, pHg……13600kg m
Ratio of specific heat capacities CP/CV……1.40
Faraday's constant, F……96500 C mol^{-1}
Relative atomic massesH = 1; C = 12; O =16; Al = 27

SECTION A: Answer any **ONE**Question from this Section.

Question 1:

After feasibility studies has been carried out, different soil analysis were done to choose the right foundation type for the different structures.

a) Outline and briefly explain two (02) factors to be considered before choosing a particular type of foundation for a structure. **(4 marks)**

b) Preliminary studies also indicated that the level of the water table of the site is high. The base of the foundation trench will be situated below the water table. With the aid of a neat sketch, show and briefly describe how this water can be lowered to permit work to be done on a dry area. **(3 marks)**

c) Outline three (03) instances where a combined footing is necessary when constructing a pad foundation. Support your answer with a sketch. **(5 marks)**

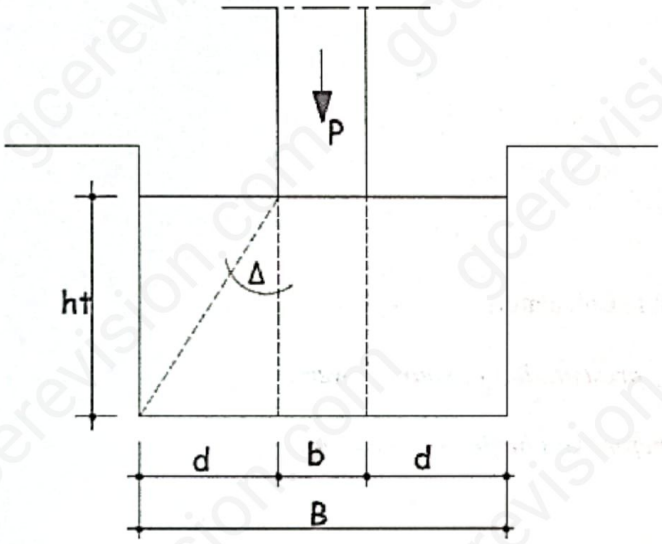
d) The linear weight of a wall on a foundation, **P=20 000kg/ml.** the bearing capacity of the soil, $\sigma = 2.5\ daN/cm^2$.

i. Calculate the breadth B of the foundation required for 1m length of the wall. **(3 marks)**

ii. Deduce the projection (d) of the foundation if the thickness of the wall is 30cm. **(1 mark)**

iii. Calculate the height (ht) of the foundation. **(4 marks)**

Take $g = 10N/kg$; $d \leq \frac{ht}{2}$



Total (20 marks)

Question 2:

The block-work of a church house built in a town is to be roofed. Due to the span of the building and the importance of the roof to be constructed, it was decided that laminated wooden truss should be used for the roofing.

a) What do you understand by laminated wood? **(5 marks)**

b) What is laminated wood used for? **(5 marks)**

c) We know that plywood is a laminated product. What is the difference between plywood and laminated wood? **(5 marks)**

d) Give some advantages of laminated wood over solid wood. **(5 marks)**

Total (20 marks)

SECTION B: Answer any **THREE** Questions from this Section

Question 3:

A client invited you to conceive and realize a factory building in one of the industrial zones in your locality. On the site, he referred you to an existing factory building in the area which was constructed with portal frames insisting he will like his factory to have similar characteristics with the existing structure.

a) Outline three (03) advantages of portal frames over other framed structures. **(3 marks)**
b) List three (03) advantages of a laminated timber portal frame. **(3 marks)**
c) Neatly sketch the elevation of a castellated steel portal framework and show the assembly joints at the haunch and the apex. Label the joints. **(4 marks)**
d) With the help of a clean sketch, show how the steel portal framework is connected to its reinforced concrete foundation. Label the constitutive elements of the assembly joint. **(6 marks)**

Total (20 marks)

Question 4:

A foundation is the lower portion of a building that transmit loads of the building to the ground. Foundations are generally broken into categories and if a building must stand for a long time, it must have a strong foundation. Once a foundation has been packed down tightly, or dried hard the building of the infrastructure can begin.

a) What are the type of loads received by the foundation of a building? **(3 marks)**
b) What is the role played by the foundation? **(2 marks)**
c) Vividly explain the Four causes of failure of foundations and how they can be overcome. **(5 marks)**
d) What influences the choice of a foundation during the design of a building? **(5 marks)**
e) List the classes of foundation you know categories. **(5 marks)**

Total (20 marks)

Question 5

The duration of a project specified in the technical document is six months. The technical specification also describes the details of the roof members, external and internal finishing and other installations.

a) Outline three (03) reasons why expansion joints are used in buildings. **(4.5 marks)**
b) Explain the process of plastering a block wall. **(4 marks)**
c) Vividly describe the process of fixing ceramic tiles on a wall. **(5.5 marks)**
d) Outline three (03) primary requirements of any roof. **(3 marks)**
e) List three means of providing natural roof lights into factory buildings **(3 marks)**

Total (20 marks)

Question 6

Design of concrete structures:

In present days most structures are realized with concrete as the main material and prepared in the form and method designed by the engineer. It is said that the maximum aggregate sizes adopted range from 10mm to 20mm.

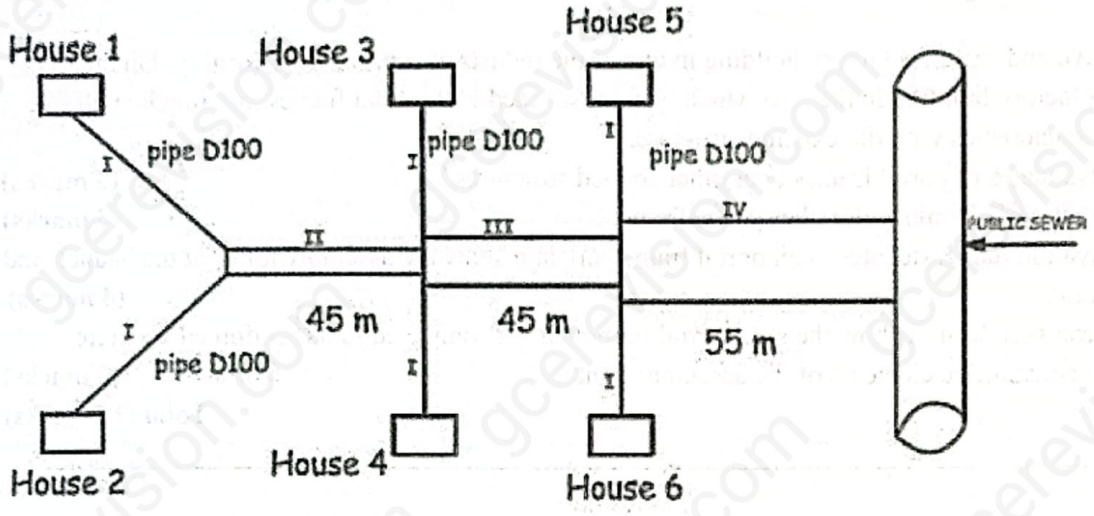
a) Does the increase of maximum aggregate size benefit the structure? **(8 marks)**
b) What are the major problems encountered in using pumps for concreting? **(12 marks)**

Total (20 marks)

SECTION C: Answerany ONE Question from this Section

Question 7:

The figure below is the drainage system of an administrative residential area of a city.



a) Outline five (05) principles of a good drainage system in an area like this. **(5 marks)**

b) You are given the option to drain the area using the recommended combined system of drainage for the quarter.

i) Attribute names to the drains indicated on the sketch of the system materialised by **I, II, III, IV.** **(2 marks)**

ii) After reproducing the sketch, indicate on it the various positions you will place the inspection chamber and explain why the choice. **(8 marks)**

c) List and explain the other systems that are used in drainage. **(5 marks)**

Total (20 marks)

Question 8

A technician has been called upon to study and realise the drainage network for a series of residential buildings. After his study, he came to the conclusion that a number of fittings will be installed within the network so as to permit access into the drains.

a) With the help of a clean sketch, show the difference between a combined drainage system and a separate drainage system. **(6 marks)**

b) State two (02) instances where an inspection chamber can be possibly used in a drainage network **(2 marks)**

c) List three (03) possibilities of accessing a drainage network. **(3 marks)**

d) State two means of testing drains for leakages. **(1 mark)**

e) What is the purpose of an earth connection in electricity installation? **(2 marks)**

f) Explain the following terms used in air conditioning:

- Dew point
- Entropy
- Enthalpy
- Latent heat.

(6 marks)

Total (20 marks)