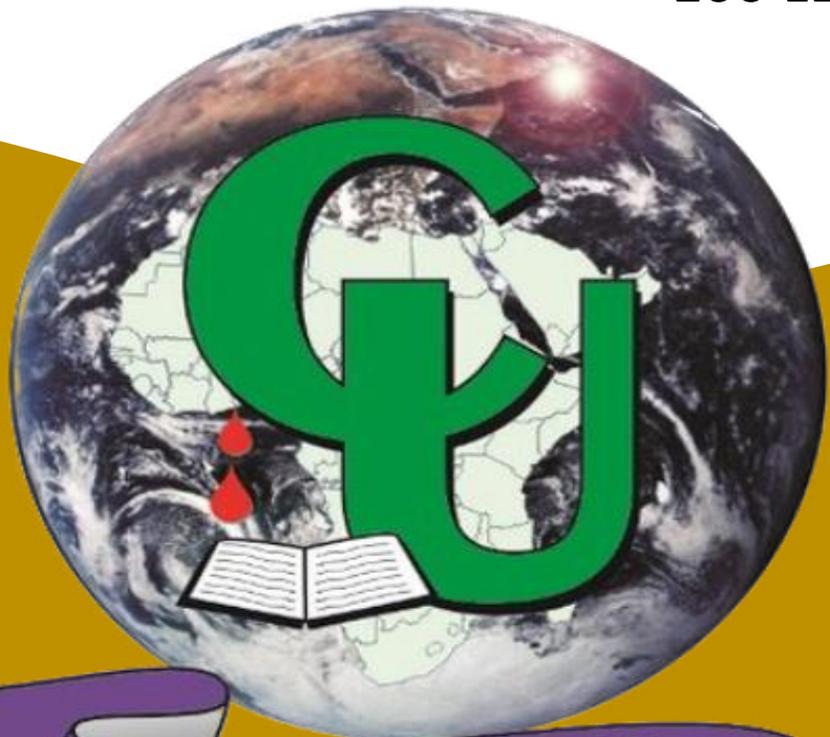


COVENANT UNIVERSITY

OMEGA SEMESTER TUTORIAL KIT
(VOL. 2)

PROGRAMME: BUILDING TECH
100 LEVEL



Raising A New Generation Of Leaders

DISCLAIMER

The contents of this document are intended for practice and learning purposes at the undergraduate level. The materials are from different sources including the internet and the contributors do not in any way claim authorship or ownership of them. The materials are also not to be used for any commercial purpose.

LIST OF COURSES

BLD121: Intro to Building

***Not included**



Covenant University,

CANAANLAND, KLM 10, IDIROKO ROAD P.M.B 1023, OTA, OGUN STATE,
NIGERIA.

TITLE OF EXAMINATION: BSc EXAMINATION

COLLEGE: COLLEGE OF SCIENCE AND TECHNOLOGY

DEPARTMENT: BUILDING TECHNOLOGY

SESSION: 2015/2016

SEMESTER: OMEGA

COURSE CODE: BLD 121

CREDIT UNIT: 2

COURSE TITLE: INTRODUCTIO TO BUILDING II

TIME: 2Hours

Instructions: Attempt Any Three Questions

Question 1 (a) Explain the function of the following features in building (i) Slabs (ii) Beams (iii) Collumns.

10marks

(b) Discuss with the aid of relevant sketches the different foundation types that are often used in building construction

10marks

(c) What is a foundation within the context of building work?

5marks

Question 2 (a) What are the factors influencing the choice of foundation type in building construction.

5marks

(b) List and describe different types of material that could be used in wall construction.
10marks (b) Describe with appropriate sketches different types of doors that are used in residential building.
10marks

Question 3 (a) Describe functions of wall in a building. 10marks

(b) Distinguish between the following: (i) Brick and Sand crete blocks (ii) In-situ and reinforced concrete
5marks

(c) What are the functions of opening in walls? 10marks

Question 4 (a) List and describe with the aid of appropriate sketches different bonding system often used in building work
10marks

(b) Describe material mix proportion and procedure to be followed in mixing mortar during block work in building.
5marks

(c) What is a Lintel?, List and describe types of Lintel that are used in building 10marks

Question 5 (a) Describe with relevant illustration steps involved in wall construction
10marks

(b) List and describe types of Beam, Slab and Column that can be used for construction work

10marks

(c) State the primary design concerns in foundation



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(b) Discuss with the aid of relevant sketches the different foundation types that are often used in building construction

(c) What is a foundation within the context of building work? 25marks.

ANSWER:

Q1 (a) Explain the function of the following features in building (i) Slabs (ii) Beams (iii) Columns.

- **SLABS.** The horizontal portion of a building that covers the building or each floor of the type is called slab.
- **Types of slab**

- (a) Simple RCC slab
- (b) Tee-beam slab

(a) Simple RCC slab

It is suitable for covering small spans of room. It cannot with-stand heavy load. The thickness of the slab depends on the type of concrete used, the floor loads etc. If the ration of length of the room to the width of the room is less than 1.5, then two way reinforced slabs is used. If it is greater than 1.5 one way reinforced slab is used.

(b) Tee-Beam slab

Tee-beam is used for wide opening. In the tee-beam slab, the loads from the slab is transmitted to the beams and then from beam to the columns. The tee-beam act as intermediate supports and the slab is layer continuously over these beams.

BEAMS:

A beam is a structural member which carries the horizontal load in a structure.

Important definitions (Beams)

(a) Span of the Beam: the horizontal distance between inner faces of the supporting wall is known as clear span.

(b) Joists

Members used to carry roofing and floors of buildings.

Types of Beams

(a) Simply supported beam (b) Cantilever beam (c) Rigidly fixed beam (d) Over hanging beam

(e) Continuous beam

(a) Simply supported beam

In this type of beams, the ends of the beams are supported freely on columns or walls. In this case the moment is not induced at supports, because it allows rotation.

(b) Rigidity fixed beam

Two ends of the beam are rigidity fixed in the walls. In this case the moments are induced at the supports.

c) Cantilever Beams

Here the beam is fixed at one end and the other end is free. In this case the moment is induced in fixed end only.

(d) Over hanging beam

The beams having its end portions extended beyond the support is called hanging beam.

(e) Continuous Beam

If the beam is supported on more than two supports, then it is known as continuous beam.

COLLUMNS:

It is vertical structural member that support the beams. Column transmits the load given on it to the soil below.

Types of columns

(a) Short column

(b) Long column

(c) RCC column

(d) Steel column.

(a) Short column

If the effective length of a column is less than or equal to 12 times the least internal dimension, then it is called a short column.

(b) Long column

If the effective length is more than 12 times the least lateral dimension, the column is said to be a long column.

(c) RCC column

Usually RCC column are cast in situ type. They are constructed in square, rectangular, circular or hexagonal shapes. Vertical reinforcements are provided to take the major load on to the columns. Lateral stirrups are provided to keep the main reinforcement in position.

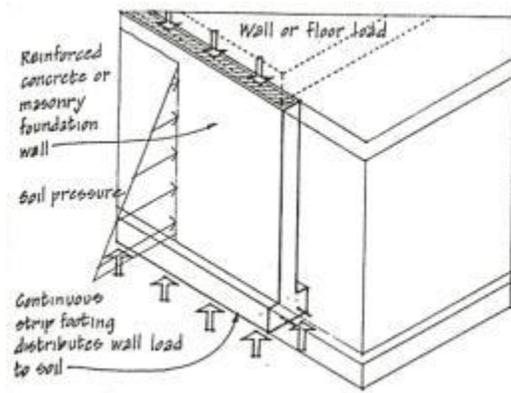
(d) Steel columns

Steel columns are fabricated by using steel joists, angle and plates. Steel columns are mostly used in industrial structures. Some form of steel stanchions is I section, H section etc.

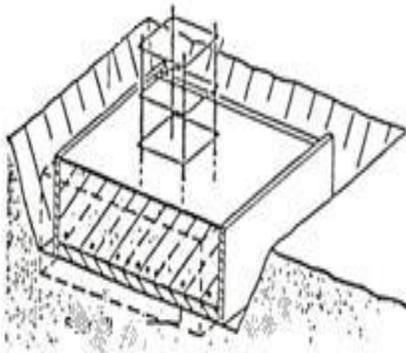
Q1 (b) Discuss with the aid of relevant sketches the different foundation types that are often used in building construction.

ANSWER:

strip foundation (wall footing)

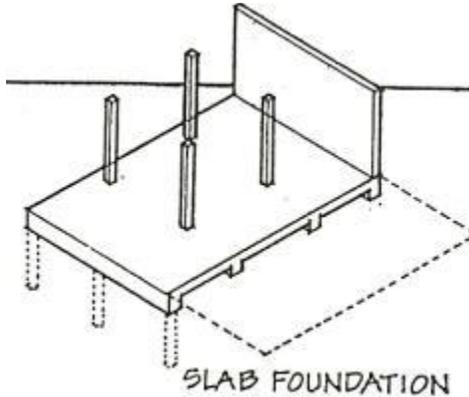


PAD FOUNDATIONS



pad foundation (beam)

Mat foundation



Q1 (c) What is a foundation within the context of building work?
25marks.

Definition 1: Foundation: The structure, that transmits the load of the building to the soil

Definition 2: Load bearing soil (strata): The soil layer, that has the sufficient load bearing capacity in relation to the chosen foundation type

The primary design concerns are:

settlement (total settlement and differential settlement)

load bearing capacity.

Question 2 (a) What are the factors influencing the choice of foundation type in building construction.

5marks

(b) List and describe different types of material that could be used in wall construction.
10marks

(b) Describe with appropriate sketches different types of doors that are used in residential building.

10marks

Question 2 (a) What are the factors influencing the choice of foundation type in building construction.

ANSWER:

Factors Influencing Choice of Foundation Type

The choice of building foundation depends on the following factors:

- i. the ground conditions: compressible soil, hard ground (rocky, sand stone ground, sedimentous ground bed (e.g sedimentary deposits), loose ground, make up ground (e.g vibro floatated ground), sinking ground.
- ii. the groundwater conditions: high water table ground, low water table ground, sulphate saturated ground, calcium carbonate saturated ground.
- iii. the site topography
- iv. the environment (the buildings nearby)
- v. the nature of structure or the building to be constructed

Q2 (b) List and describe different types of material that could be used in wall construction.

ANSWER:

- i. Walling Materials
- ii. Bricks (from Adobe Clay)
- iii. Sandcrete Blocks
- iv. Concrete Blocks
- v. Timber
- vi. Plastic
- vii. Glass
- viii. Polystyrene (Hydraform polystyrene strips)
- ix. Stone (Ashlar walling)

Walling Materials:

i. Bricks (from Adobe Clay):

Bricks are made from clay. There are different types of clay that could be used; the adobe clay, white clay and laterite. When moulded into balls, the bricks are fired or allowed to be exposed to sunlight and elements for strength.

ii. Sandcrete Blocks:

iii. Concrete Blocks:

iv. Timber:

v. Plastic:

vi. Glass:

vii. Polystyrene(Hydraform polystyrene strips):

viii. Stone(Ashlar walling)

Q2(c) Describe with appropriate sketches different types of doors that are used in residential building. 25marks

ANSWER:

Types of Door often Used in Building

Domestic Door

-Flush Door

-Solid Door

-Metal Door

-Curtain Glass Door

Commercial or General Utility Doors

Revolving Door

Metal Gate

Rolling Door

Sliding Door

- I. A hollow-core flush interior door is a common choice for new construction. It has a frame made of solid wood boards that are typically about 1 1/2 inches wide.

A cardboard webbing runs through the interior to provide rigidity and prevent drumming.

These doors can last for decades if treated gently, but can be dented or punctured if hit hard.

A door with a lauan mahogany veneer is the least expensive but will soak up paint like a sponge. It often pays in the long run to buy a door with oak or birch veneer.

- II. A **solid-core flush exterior door** is made much like a hollow-core interior door, but the space within the wood frame is filled with solid particleboard. These are very heavy but not as durable as other exterior doors. If not kept protected with paint, the veneer may delaminate from the particleboard. And if the particleboard gets wet, the door can become unusable.

III. Fiberglass exterior doors are quickly gaining in popularity. Fiberglass is easily molded into most any shape and style. Fiberglass is durable, hard, and not prone to shrinking, expanding, or warping. These doors are available in a variety of colors and are easy to paint.

IV. Wood-panel doors, made for interior and exterior applications, have a classic appeal. Solid wood has good strength and insulating properties.

Hardwoods such as oak are very resistant to denting; softwoods such as pine are more easily dented but are still quite durable.

You'll pay more for a stain-grade door, which is made of full-length attractive pieces of wood. A paint-grade door joins together smaller pieces.

All exterior doors must be protected with paint or finish to prevent them from warping or cracking.

V. Glass doors : Glass-paneled doors need to be well built, especially if they are exterior doors. Individual glass panes are often referred to as "lights" (or "lites"). Be sure to get gas-filled thermal glass panes for an exterior door, and make sure the glass is well sealed against the stiles and rails.

VI. steel exterior doors are increasingly popular for homes. Some have a steel face with a foam core for insulation. Others have a core made of foam wrapped in steel, with a wood veneer applied to the exterior. The result is a door with good insulating properties that is also very strong and burglar resistant.

VII. In most stores, sliding doors with auto sensors prove to be a great choice. This type of doors give customers the feeling of being always welcome. As the activated sensor detects a customer coming near, the door is automatically opens up for the customer to freely enter.

VIII. Revolving doors are also good for commercial establishments. Designed as two door panes perpendicular to each other, divided into four quarters and revolving around, customers can enter and leave simultaneously or at the same time. These types of doors have another advantage because they keep the heat and cold inside and therefore save you money on your utility bill.

IX. Aluminum Entrance Doors

They are available in standard and custom sizes. They can be fabricated with many different stile and rail configurations. In addition, they are available in an array of standard and custom finishes. Entrance doors typically have glass infill, however, we can install an aluminum composite panel or even a combination of both. For these commercial

doors just remember to take into considerations the over-all cost, general appeal and energy-efficiency of the materials.

Question 3 (a) Describe functions of wall in a building. 10marks

(b) Distinguish between the following: (i) Brick and Sand crete blocks (ii) In-situ and reinforced concrete

5marks

(c) What are the functions of opening in walls? 10marks

ANSWER:

Q3 (a) Describe functions of wall in a building.

I.The building wall (or building enclosure) is the physical separator between the interior and the exterior environments of a building.

It serves as the outer shell to help maintain the indoor environment (together with the mechanical conditioning systems) and facilitate its climate control.

II.Building envelope design is a specialized area of architectural and engineering practice that draws from all areas of building science and indoor climate control.

The building wall (or building enclosure) is the physical separator between the interior and the exterior environments of a building.

III. It serves as the outer shell to help maintain the indoor environment (together with the mechanical conditioning systems) and facilitate its climate control.

IV. Support (to resist and transfer mechanical loads).

V. Control (the flow of matter and energy of all types).

VI. Finish (to meet human desires on the inside and outside).

VII. Control function: The control function is at the core of good performance, and in practice focuses, in order of importance, on rain control, air control, heat control, and vapor control.

VIII. Control of rain is most fundamental, and there are numerous strategies to this end, namely, perfect barriers, drained screens, and mass / storage systems.

Control: Control of air flow is important to ensure indoor air quality, control energy consumption, avoid condensation (and thus help ensure durability), and to provide comfort.

Control of air movement includes flow through the enclosure (the assembly of materials that perform this function is termed the air barrier system).

Hence, air control includes the control of wind washing and convective loops.[citation needed]

Support Function:

The physical components of the envelope include the foundation, roof, walls, doors and windows.

The dimensions, performance and compatibility of materials, fabrication process and details, their connections and interactions are the main factors that determine the effectiveness and durability of the building enclosure system.

Finish function: it provides aesthetic effect. The combination of color and design feature of building provides satisfaction to the occupants of owner.

Q3(b) Distinguish between the following: (i) Brick and Sand crete blocks (ii) In-situ and reinforced concrete.

Q3(c) What are the functions of opening in walls?

25marks

Function of Openings in Walls:

Support function to Building Façade

Aesthetic effect/Decoration

Restrictive Purpose

Protection of internal property

Shielding effect from inclement environmental conditions

Accommodate Services

Separates building's exterior from interior

It is a fulfilment of Statutory standard in building design

Question 4 (a) List and describe with the aid of appropriate sketches different bonding system often used in building work

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(c) What is a foundation within the context of building work? 25marks.

ANSWER:

Q1 (a) Explain the function of the following features in building (i) Slabs (ii) Beams (iii) Columns.

- **SLABS.** The horizontal portion of a building that covers the building or each floor of the type is called slab.

- **Types of slab**
- (a) Simple RCC slab
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(a) Simple RCC slab

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COLLUMNS:

It is vertical structural member that support the beams. Column transmits the load given on it to the soil below.

Types of columns

(a) Short column

(b) Long column

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(d) Steel column.

(a) Short column

If the effective length of a column is less than or equal to 12 times the least internal dimension, then it is called a short column.

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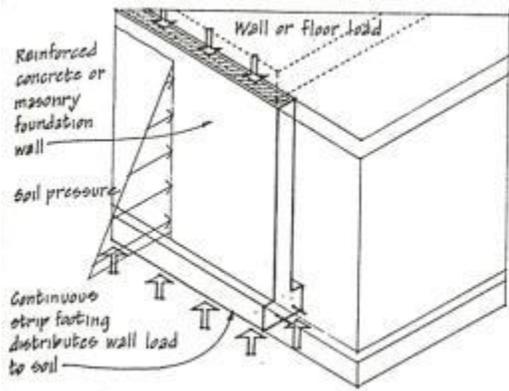
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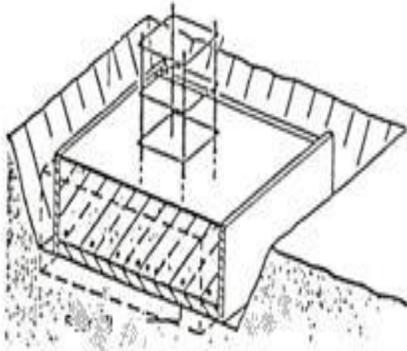
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ANSWER:

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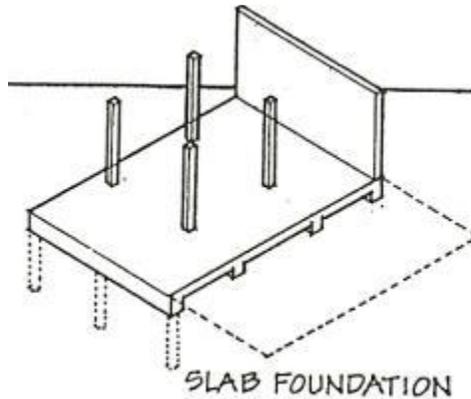


PAD FOUNDATIONS



pad foundation (beam)

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Q1 (c) What is a foundation within the context of building work?
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Question 2 (a) What are the factors influencing the choice of foundation type in building construction.

5marks

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ANSWER:

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ANSWER:

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- vi. Plastic
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Walling Materials:

i. Bricks (from Adobe Clay):

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ANSWER:

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Question 3 (a) Describe functions of wall in a building. 10marks

(b) Distinguish between the following: (i) Brick and Sand crete blocks (ii) In-situ and reinforced concrete

5marks

(c) What are the functions of opening in walls? 10marks

ANSWER:

Q3 (a) Describe functions of wall in a building.

I.The building wall (or building enclosure) is the physical separator between the interior and the exterior environments of a building.

It serves as the outer shell to help maintain the indoor environment (together with the mechanical conditioning systems) and facilitate its climate control.

II.Building envelope design is a specialized area of architectural and engineering practice that draws from all areas of building science and indoor climate control.

The building wall (or building enclosure) is the physical separator between the interior and the exterior environments of a building.

IX. It serves as the outer shell to help maintain the indoor environment (together with the mechanical conditioning systems) and facilitate its climate control.

X. Support (to resist and transfer mechanical loads).

XI. Control (the flow of matter and energy of all types).

XII. Finish (to meet human desires on the inside and outside).

XIII. Control function: The control function is at the core of good performance, and in practice focuses, in order of importance, on rain control, air control, heat control, and vapor control.

XIV. Control of rain is most fundamental, and there are numerous strategies to this end, namely, perfect barriers, drained screens, and mass / storage systems.

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Support Function:

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The dimensions, performance and compatibility of materials, fabrication process and details, their connections and interactions are the main factors that determine the effectiveness and durability of the building enclosure system.

Finish function: it provides aesthetic effect. The combination of color and design feature of building provides satisfaction to the occupants of owner.

Q3(b) Distinguish between the following: (i) Brick and Sand crete blocks (ii) In-situ and reinforced concrete.

Q3(c) What are the functions of opening in walls?

25marks

Function of Openings in Walls:

Support function to Building Façade

Aesthetic effect/Decoration

Restrictive Purpose

Protection of internal property

Shielding effect from inclement environmental conditions

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Separates building's exterior from interior

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(c) What is a foundation within the context of building work?

5marks

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Question 3 (a) Describe functions of wall in a building. 10marks

(b) Distinguish between the following: (i) Brick and Sand crete blocks (ii) In-situ and reinforced concrete
5marks

(c) What are the functions of opening in walls? 10marks

Question 4 (a) List and describe with the aid of appropriate sketches different bonding system often used in building work
10marks

(b) Describe material mix proportion and procedure to be followed in mixing mortar during block work in building.
5marks

(c) What is a Lintel?, List and describe types of Lintel that are used in building 10marks

Question 5 (a) Describe with relevant illustration steps involved in wall construction
10marks

(b) List and describe types of Beam, Slab and Column that can be used for construction work

10marks

(c) State the primary design concerns in foundation
5marks