THE UNITED REPUBLIC OF TANZANIA

NATIONAL EXAMINATION COUNCIL

DIPLOMA IN TECHNICAL EDUCATION EXAMINATION

784 **BRICKWORK AND MASONRY**

Time: 3 Hour. **ANSWERS** **Year: 2011**

Instructions

1. This paper consists of sections **six (6)** questions.
2. Answer question number **one (1)** and any other **four (4)** questions.
3. Question 1 carries **thirty-two (32)** marks and the rest carries **seventeen (17)** marks each.
4. Non-programmable calculators may be used.
5. Communication devices and any unauthorized materials are **not** allowed in the examination room
6. Write your **Examination Number** on every page of your answer booklet.

1. (a) Define the term “bond beam” in masonry.

A bond beam is a horizontal structural element, usually made of reinforced concrete or filled masonry, constructed within a wall to strengthen and distribute loads. It is placed at regular intervals, such as at floor or lintel levels, to tie the wall together and prevent lateral movement.

Bond beams are typically formed by creating a U-shaped channel in the masonry units and filling it with concrete and reinforcement bars to act as an integrated beam within the wall system.

(b) State three uses of bond beams in wall construction.

Bond beams help distribute vertical and horizontal loads evenly across the wall, improving structural stability.

They provide anchorage points for floor or roof framing systems, ensuring a strong connection between walls and other building components.

Bond beams resist lateral forces such as wind and seismic pressure, reducing the risk of wall failure in tall or unsupported sections.

(c) With the help of a sketch, describe the construction of a reinforced concrete bond beam in a block wall.

To construct a bond beam, hollow concrete blocks with open top channels are laid along a course in the wall.

Steel reinforcement bars are placed longitudinally within the channel to provide tensile strength.

Concrete is poured into the channel to encase the steel, filling the entire cavity. The surface is leveled and allowed to cure.

Once cured, this integrated bond beam acts as a continuous horizontal reinforcement that ties the wall together.

2. (a) What is meant by the term “wall thickness”?

Wall thickness refers to the measurement from the inner face to the outer face of a wall. It determines the wall's ability to bear loads, resist weather, and provide insulation.

Thickness may vary depending on whether the wall is load-bearing, partition, internal, or external, and is chosen based on structural and environmental requirements.

(b) State four factors that influence the choice of wall thickness in buildings.

The structural load that the wall must support determines how thick it should be—heavier loads require thicker walls.

The type of material used affects thickness; stronger materials like concrete may require less thickness than softer materials like earth blocks.

The height of the wall also influences thickness—taller walls often need to be thicker to maintain stability.

Climate conditions play a role; in colder or hotter climates, thicker walls may be preferred for better thermal insulation.

(c) Describe two disadvantages of using walls that are too thin in construction.

Thin walls may not have sufficient strength to bear loads or resist impact, leading to cracking or collapse.

They offer poor sound and thermal insulation, which results in uncomfortable indoor environments and increased energy use.

3. (a) Define the term "plastering" in relation to masonry walls.

Plastering is the application of a smooth or textured paste made of cement, sand, and water onto the surface of masonry walls to provide a finished appearance and protect the wall from damage.

It can be applied to internal or external walls and may serve as a base for painting, decoration, or other finishes.

(b) State four differences between plastering and rendering.

Plastering is mainly used on internal walls, while rendering is typically applied to external walls.

Plaster is finer and smoother in texture, designed for interior aesthetics, while render is coarser and weather-resistant.

Rendering usually involves thicker coats and may include additives for waterproofing or flexibility, unlike standard plaster.

Plastering is less exposed to moisture and weather, while rendering must be designed to withstand environmental elements.

(c) Outline the procedure for plastering an internal brick wall.

Clean the wall surface to remove dust, oil, and loose mortar that may affect bonding.

Dampen the wall with water to reduce suction and improve adhesion of the plaster.

Apply a base coat of plaster (usually 10–12 mm thick) with a trowel, pressing it into the wall to fill joints and level the surface.

Level the surface using a straightedge or screed and allow it to set slightly before applying the finishing coat.

Apply the final coat of plaster (3–5 mm thick), smoothen it with a trowel, and cure it by keeping the surface moist for several days.

4. (a) What is the purpose of using expansion joints in walls?

Expansion joints are provided in walls to allow for thermal expansion and contraction of materials due to temperature changes.

They prevent cracking and damage caused by internal stresses that develop when materials expand or contract.

Expansion joints divide large wall surfaces into smaller, more flexible sections to reduce stress buildup.

(b) Mention four materials used to fill expansion joints.

Compressible foam boards are lightweight and allow movement while maintaining joint integrity.

Bituminous filler is flexible and waterproof, often used in external expansion joints.

Rubber or synthetic sealants provide elasticity and resistance to weather and UV rays.

Polythene strips or rods are used as backing materials under sealants in deep joints to maintain shape and adhesion.

(c) Describe the correct location and spacing of expansion joints in long concrete block walls.

Expansion joints are typically located every 6 to 12 meters in straight concrete block walls, depending on the local climate and wall exposure.

They are placed at points of stress such as wall corners, junctions with other structures, or changes in wall height or thickness.

The joint should run vertically through the full height of the wall, with a consistent width of about 10–20 mm, filled with compressible material and sealed to prevent water entry.

5. (a) Mention four tools used in pointing of mortar joints.

A pointing trowel is a small trowel used for applying and shaping mortar in joints.

A jointer or pointing iron is used to press and smooth the mortar to a desired joint profile.

A wire brush helps clean out loose mortar or dust from joints before applying fresh mortar.

A chisel or raker is used to rake out or cut damaged or deteriorated joints before repointing.

(b) Describe the function of each tool mentioned in 5(a).

The pointing trowel helps in placing the mortar accurately into joints and shaping it for a neat finish.

The jointer forms consistent joint shapes, such as concave or weathered profiles, and compacts the mortar.

The wire brush ensures a clean joint surface by removing dust, which is necessary for proper bonding of new mortar.

The raker or chisel is used to remove weak or cracked mortar during repointing, allowing the new mortar to adhere effectively.

(c) Explain three important points to consider when carrying out pointing in masonry work.

The joints should be cleaned thoroughly to ensure good adhesion of the new mortar to the masonry surface.

The mortar should match the existing color and texture of the wall to maintain visual consistency.

Pointing should be done in dry weather, but the joints should be lightly moistened before applying mortar to prevent rapid drying and cracking.

6. (a) (i) Define the term “curtain wall”.

A curtain wall is a non-load-bearing exterior wall attached to a building's structural frame, serving primarily as an enclosure and not carrying any structural load from the roof or floors.

It is often constructed with lightweight materials such as glass, metal panels, or cladding systems.

(ii) Mention three materials used in the construction of curtain walls.

Glass is commonly used for modern curtain walls due to its transparency and aesthetic appeal.

Aluminum is used for framing curtain walls because it is lightweight, corrosion-resistant, and easy to fabricate.

Composite panels made from aluminum, plastic, or fiber-reinforced materials are used for cladding systems in curtain walls.

(b) State four differences between a curtain wall and a load-bearing wall.

A curtain wall does not support floor or roof loads, whereas a load-bearing wall carries the structural loads from above.

Curtain walls are typically lightweight and hung from the building structure, while load-bearing walls are massive and continuous from foundation to roof.

Curtain walls are often made of glass and metal for appearance and insulation, while load-bearing walls are made of bricks, blocks, or concrete for strength.

Curtain walls require anchorage systems to connect them to the building, whereas load-bearing walls are built from the ground up and stand independently.

(c) Describe one advantage and one disadvantage of using curtain walls in high-rise buildings.

An advantage is that curtain walls reduce the overall building weight because they are non-structural and made of lightweight materials.

A disadvantage is that curtain walls are more expensive to install and maintain, especially when incorporating glass, which requires regular cleaning and replacement in case of breakage.