THE UNITED REPUBLIC OF TANZANIA

NATIONAL EXAMINATIONS COUNCIL

DIPLOMA IN TECHNICAL EDUCATION EXAMINATION.

784 **BRICKWORK AND MASONRY**

(SUPPLEMENTARY)

Time : 3 Hours **ANSWERS** **Year : 2010**

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. Cellular phones are **not** allowed in the examination room.
6. Write your **Examination Number** on every page of your answer booklet(s).

1. (a) Define the term “mortar joint”.

A mortar joint is the space between two masonry units such as bricks or blocks that is filled with mortar to bond them together. It serves both structural and aesthetic purposes, distributing loads and sealing gaps against moisture and air penetration.

(b) Mention four types of mortar joints used in brickwork.

The common types are flush joint, recessed joint, weathered (or weather-struck) joint, and beaded joint.

(c) Explain how the choice of joint type affects the appearance and durability of a brick wall.

Flush joints give a smooth and uniform finish but may not shed water effectively. Recessed joints create shadow lines that enhance visual appeal but can trap water if not sealed properly. Weathered joints shed rainwater efficiently, increasing wall durability. Beaded joints provide decorative finish but are less resistant to water penetration over time.

2. (a) What is meant by the term “load-bearing wall”?

A load-bearing wall is a structural wall that carries and transfers the load of floors, roofs, or other structural elements above it down to the foundation. Unlike partition walls, it is essential for the building’s stability.

(b) State three factors to consider when designing a load-bearing masonry wall.

The compressive strength of the chosen material must be sufficient to support loads. The wall thickness should be proportionate to the height and load requirements. Soil conditions beneath the foundation must be suitable to prevent settlement and cracking.

(c) Describe the construction process of a load-bearing brick wall from foundation to roof level.

Begin by excavating and laying a strong foundation of concrete or stone to distribute the load. Build the brick wall in successive courses using mortar, maintaining bonding patterns for stability. Ensure verticality with a plumb line and alignment with a spirit level. Incorporate openings with lintels where

required and provide reinforcement if necessary. Complete the wall to the roof level, ensuring uniform thickness and proper curing.

3. (a) Explain the following terms as used in bricklaying:

(i) Raking back – Leaving an unfinished wall end stepped rather than vertical for bonding with future work.
(ii) Frog – A depression on the top face of a brick to improve keying of mortar.
(iii) Closer brick – A brick cut longitudinally to maintain bonding at wall ends or corners.
(iv) Quoin closer – A specific type of closer brick placed next to a quoin at the corner to maintain proper bond.
(v) Bedding plane – The horizontal surface on which a brick is laid and bonded with mortar.

(b) For each, state one practical importance in wall construction.

Raking back ensures strong future bonding. Frogs hold mortar better, improving adhesion. Closer bricks reduce vertical joint alignment and increase wall strength. Quoin closers strengthen wall corners. Bedding planes provide even load distribution between courses.

4. (a) State three situations where reinforced masonry walls are preferred.

They are preferred in earthquake-prone zones where extra tensile strength is required. They are used in high-rise buildings to carry heavy loads. They are also applied in retaining walls where lateral earth pressure is high.

(b) Explain two methods of reinforcing masonry walls.

One method is horizontal reinforcement using steel bars or wire mesh embedded in mortar joints at regular intervals. Another is vertical reinforcement by inserting steel rods within cavities or grooves, later filled with grout or concrete.

(c) With the aid of a sketch, show the placement of reinforcement in a brick wall.

The sketch would show horizontal reinforcement placed in mortar joints, and vertical steel bars placed within vertical cavities or at intervals along the wall, both tied together to improve strength.

5. (a) Define the term “dampness” in buildings.

Dampness refers to the presence of unwanted moisture in walls, floors, or roofs of a building, often caused by water penetration or condensation.

(b) List three sources of dampness in masonry walls.

Moisture can rise from the ground due to capillary action. Rainwater can penetrate through poorly protected external walls. Leaks from plumbing or roof defects can also cause dampness.

(c) Describe three methods used to prevent dampness in wall construction.

Installing damp-proof courses at plinth level prevents rising damp. Applying waterproof plaster or rendering on the external surface prevents rainwater penetration. Providing adequate roof overhangs and proper drainage keeps water away from the wall base.

6. (a) What is a retaining wall in masonry?

A retaining wall is a wall constructed to resist the lateral pressure of soil, water, or other materials, thereby holding back earth at different ground levels.

(b) State three factors to consider when designing a retaining wall.

The type of soil and its angle of repose should be considered. The drainage behind the wall must be adequate to reduce hydrostatic pressure. The thickness and batter of the wall must be sufficient to resist overturning and sliding forces.

(c) Describe the construction process of a gravity retaining wall using random rubble masonry.

Begin with excavation for a wide foundation to ensure stability. Lay large stones in the base course, well bonded and filled with mortar. Build successive layers of stones with a batter so the wall tapers inward as it rises. Incorporate weep holes for drainage to relieve water pressure. Finish with coping stones on top to protect the wall from weathering.