THE UNITED REPUBLIC OF TANZANIA

NATIONAL EXAMINATION COUNCIL

DIPLOMA IN TECHNICAL EDUCATION EXAMINATION

784 **BRICKWORK AND MASONRY**

Time: 3 Hour. **ANSWERS** **Year: 2007**

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. Define the term "blockwork" and explain three advantages of using blocks over bricks in large-scale construction projects.

Blockwork refers to wall construction using large precast concrete or cement blocks, typically hollow or solid, which are laid in mortar like bricks. Blocks are larger in size compared to bricks, making them efficient for covering larger wall surfaces quickly.

One advantage of using blocks is speed of construction. Their larger size means fewer units are needed, which significantly reduces laying time and labor costs.

Another benefit is thermal and sound insulation. Hollow concrete blocks offer better insulation than bricks due to the air cavities, which help control internal temperatures and reduce noise transmission.

Blocks are also more economical for foundations and large walls because they require less mortar and offer better load distribution, reducing the number of joints and potential weak spots.

2. (a) State four methods of bonding bricks in wall construction.

The main methods of brick bonding include English bond, Flemish bond, stretcher bond, and header bond. These patterns determine the strength, thickness, and visual appeal of the wall.

(b) Describe how English bond is constructed, including the arrangement of headers and stretchers.

English bond consists of alternating courses of headers and stretchers. One course is laid with bricks showing only their short face (headers), and the next course is laid with bricks showing the long face (stretchers). This pattern provides strong interlocking and ties the wall effectively across its thickness, especially in one and a half brick or thicker walls.

(c) What are two advantages of English bond compared to Flemish bond?

English bond is structurally stronger because it has fewer continuous vertical joints, providing better load distribution. It is also easier to construct, as the alternating pattern is more straightforward for masons to follow and maintain alignment.

3. Imagine you are constructing a one-storey residential house in an area with high humidity:

(i) To protect the walls from moisture, apply external rendering using waterproof cement-sand plaster. Install damp proof courses at the plinth level and beneath door and window openings. Use water-repellent sealers on external surfaces and overhangs or eaves to shield the walls from direct rainfall. Also, ensure proper site drainage around the perimeter.

(ii) The most durable wall finish in humid conditions is textured cement rendering or water-resistant acrylic paint. These finishes form a barrier against moisture while being resistant to mold and algae growth, which are common in damp environments.

(iii) Damp proof courses (DPCs) should be installed horizontally above ground level, typically using bituminous felt, plastic membrane, or chemical treatments. DPCs must extend across the full wall thickness and be joined carefully at corners and junctions to ensure continuity. Vertical DPCs may also be needed where walls abut retaining structures.

4. (a) Differentiate between load-bearing walls and non-load-bearing walls.

Load-bearing walls support structural loads from above, such as roofs, floors, or other walls, and transfer those loads down to the foundation. Non-load-bearing walls, on the other hand, serve mainly as partitions or enclosures and do not support any vertical structural weight apart from their own.

(b) Internal partition walls may serve structural functions like bracing the building or supporting ceiling frames. Non-structurally, they divide interior spaces for privacy and may support fittings like cabinets or electrical systems.

(c) When demolishing a load-bearing wall, it is crucial to assess the structure and provide temporary supports such as props or beams to carry the displaced loads. Removal should be done gradually under supervision of an engineer to avoid collapse or cracking of other parts of the building.

5. With the help of sketches, answer the following:

(a) In a stretcher bond, each brick is laid with its long face (stretcher) visible, and joints are staggered halfway along the brick below. This pattern is best used for half-brick thick walls.

(b) A cavity wall cross-section shows two parallel brick or block leaves with a gap (typically 50–100 mm) between them. Wall ties connect the leaves, and insulation material is placed within the cavity. Weep holes are included at the base to allow moisture to drain out, while a DPC prevents water from rising.

(c) Cavity walls improve thermal performance by acting as a barrier against heat transfer, keeping interiors cooler in hot weather and warmer in cold weather. They also reduce water penetration, as the cavity prevents rainwater from reaching the inner leaf of the wall.

6. (a) What is efflorescence in masonry?

Efflorescence is the appearance of white, powdery deposits on the surface of bricks or plaster. It results from the crystallization of salts carried to the surface by moisture migrating through the masonry.

(b) One cause of efflorescence is the presence of soluble salts in the brick, mortar, or sand used in construction. Another cause is the use of excessive water during construction, which allows salts to dissolve and move through capillary action.

(c) To prevent efflorescence, use low-salt materials and clean water for mixing mortar. Protect fresh masonry from rain and excess moisture during curing. For control, dry brushing and rinsing with water or diluted acid can remove visible salt deposits. Also, ensure proper drainage and waterproofing around the site.