THE UNITED REPUBLIC OF TANZANIA

NATIONAL EXAMINATIONS COUNCIL

DIPLOMA IN TECHNICAL EDUCATION EXAMINATION.

784 **BRICKWORK AND MASONRY**

(SUPPLEMENTARY)

Time : 3 Hours **ANSWERS** **Year : 2008**

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 “masonry pier”.

A masonry pier is a vertical structural member, usually thicker than a wall, constructed to support loads from beams, arches, or other structural elements. It acts as a concentrated support, transferring the weight safely to the foundation.

(b) Give three reasons for constructing masonry piers in wall structures.

Piers are constructed to provide intermediate support for long walls, reducing bending and deflection. They enhance the overall stability of the wall against lateral forces such as wind. Piers also serve as anchor points for structural elements like arches, beams, or vaults.

(c) Describe the correct procedure for building a masonry pier to bond with an existing wall.

Begin by preparing a suitable foundation for the pier, ensuring it is level and capable of carrying the expected loads. Lay bricks in successive courses, bonding them with the existing wall at regular intervals to create mechanical interlock. Check vertical alignment using a plumb line and maintain consistent mortar thickness. Continue construction up to the required height, finishing with proper leveling at the top to support beams or other loads.

2. (a) What is meant by the term “efflorescence” in masonry?

Efflorescence is the deposit of soluble salts on the surface of masonry, typically appearing as a white powder or streaks. It occurs when water moves through the wall, dissolving salts, and evaporates at the surface.

(b) State three causes of efflorescence on brick walls.

Excess moisture in bricks or mortar during construction. Poor drainage around the foundation leading to rising damp. Use of materials containing soluble salts, such as certain cement, sand, or bricks.

(c) Describe three methods to prevent or remove efflorescence from masonry walls.

Prevent efflorescence by ensuring proper curing and drying of bricks before construction. Install damp-proof courses to block rising moisture. Remove existing efflorescence by brushing the surface with a dry stiff brush or washing with mild acid solution, ensuring proper safety precautions.

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

(i) Toothing – The arrangement of bricks at the end of a wall left projecting to bond with future work.
(ii) Perpend – The vertical joint between two adjacent bricks in a course.
(iii) Header – A brick laid with its short side facing outwards.
(iv) Stretcher – A brick laid with its long side facing outwards.
(v) Mortar bed – A horizontal layer of mortar on which bricks are laid.

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

Toothing provides a mechanical bond for extensions. Perpends ensure correct alignment and strength of vertical joints. Headers tie adjacent bricks together for wall thickness and stability. Stretchers allow uniform courses and load distribution. Mortar beds distribute loads and fill irregularities between bricks.

4. (a) What is a brick arch?

A brick arch is a curved masonry structure built over openings such as doors or windows to support loads from above by transferring them to the side supports.

(b) Mention four parts of a brick arch.

The four parts are the keystone at the apex, voussoirs as the wedge-shaped bricks forming the arch, the springing point where the arch begins on the support, and the intrados, which is the inner curve of the arch.

(c) With the aid of sketches, differentiate between a flat arch and a semi-circular arch.

A flat arch has a nearly horizontal intrados and exerts minimal lateral thrust. A semi-circular arch forms a perfect half-circle, transferring loads efficiently to abutments but generating greater horizontal thrust at the supports. The sketch would show the curved vs. nearly horizontal alignment of bricks.

5. (a) State four reasons why damp-proof courses (DPCs) are used in masonry walls.

DPCs prevent rising damp from the ground. They protect wall finishes and plaster from moisture damage. They enhance durability by preventing deterioration of bricks and mortar. They also maintain hygiene by avoiding mold growth.

(b) Explain two types of materials commonly used for DPCs.

Bituminous felt sheets are flexible, waterproof, and easy to lay between masonry courses. Polyethylene sheets or plastic membranes provide an impermeable barrier against moisture and can be installed in thinner walls.

(c) Describe the correct method for installing a DPC in a brick wall foundation.

Clean and level the foundation surface. Cut the DPC material to the required length and place it directly above the foundation course. Ensure it extends fully across the wall width and up the vertical face where required. Lay the first brick course over the DPC without damaging it, and maintain continuity around openings to prevent water penetration.

6. (a) Define the term “scaffolding” in construction.

Scaffolding is a temporary structure erected to provide workers access to elevated parts of a building safely during construction, repair, or maintenance.

(b) Give four reasons why scaffolding is necessary in brickwork construction.

It allows workers to reach higher courses safely. It provides a stable platform for carrying materials. It ensures correct alignment of bricks and mortar. It improves efficiency by allowing multiple workers to operate simultaneously at different levels.

(c) Explain three safety precautions that must be observed when erecting and using scaffolding on site.

Ensure scaffolding is erected on firm, level ground and properly braced to prevent collapse. Use guardrails and toe boards to prevent falls. Inspect scaffolding regularly for damage or loose fittings before use, and avoid overloading the platform beyond its designed capacity.