THE UNITED REPUBLIC OF TANZANIA

NATIONAL EXAMINATIONS COUNCIL

DIPLOMA IN TECHNICAL EDUCATION EXAMINATION.

784 **BRICKWORK AND MASONRY**

(SUPPLEMENTARY)

Time : 3 Hours **ANSWERS** **Year : 2006**

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).

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1. (a) Define the term “brick bonding” in masonry work.

Brick bonding is the systematic arrangement of bricks in a wall to ensure structural stability and strength. It involves laying bricks in overlapping patterns to tie the masonry units together, preventing continuous vertical joints and distributing loads evenly across the wall.

(b) State four types of brick bonds commonly used in wall construction.

The four common types of brick bonds are:

- Stretcher bond, where bricks are laid lengthwise with joints staggered.
- English bond, which alternates courses of stretchers and headers.
- Flemish bond, where each course alternates stretchers and headers.
- Header bond, where all bricks are laid with the short side facing out, typically used for thicker walls.

(c) Explain how the choice of bond affects the strength and appearance of a masonry wall.

The bond type influences both structural integrity and visual appearance. English and Flemish bonds provide strong walls suitable for load-bearing structures, while stretcher bonds are more economical for partition walls. Visually, Flemish bonds produce a patterned finish, whereas header bonds appear more uniform and massive. Improper bonding can lead to weak walls and unattractive finishes.

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

A parapet wall is a low wall built at the edge of a roof, terrace, or balcony to provide protection against falls and to act as a barrier for rainwater drainage.

(b) Mention three types of parapet walls used in construction.

The three types of parapet walls are solid parapets, which are continuous masonry walls; open or pierced parapets, which have decorative openings; and coping parapets, which are topped with coping stones or concrete to protect against water penetration.

(c) Describe the construction process of a solid parapet wall built on a flat roof slab.

Construction begins with cleaning and preparing the roof surface. A base layer of mortar is spread, and bricks are laid in successive courses, bonded properly with mortar. The wall height is built according to design, ensuring vertical alignment and level. Finally, the top is finished with a coping slab or concrete layer to protect against rainwater and improve durability.

3. (a) Define the term “foundation bed” in masonry construction.

A foundation bed is the prepared surface on which a foundation rests. It ensures that the loads from the building are transmitted uniformly to the underlying soil and provides stability against settlement or lateral movement.

(b) State three factors to consider when preparing a foundation bed for a load-bearing wall.

Consider the soil bearing capacity to ensure it can safely support loads. The surface should be leveled and compacted to prevent uneven settlement. Finally, drainage conditions should be assessed to avoid water accumulation under the foundation.

(c) Describe the step-by-step process of preparing a foundation bed for a brick wall.

Excavate the trench to the required depth and width. Remove loose soil and debris, and level the base. Compact the soil to increase its load-bearing capacity. Lay a blinding layer of lean concrete if needed to provide a smooth, stable base. Ensure proper alignment and slope for drainage before starting the foundation masonry.

4. (a) State four environmental factors that can affect the curing of masonry work.

Temperature, humidity, wind, and rainfall are key factors affecting curing.

(b) Discuss how each factor may influence the quality of mortar and structural performance of the wall.

High temperatures can cause rapid water evaporation, leading to weak mortar. Low humidity slows curing, delaying strength gain. Strong wind can dry out mortar unevenly, causing cracks. Heavy rainfall can wash out mortar joints, reducing durability.

(c) Suggest proper site practices to manage these environmental conditions effectively.

Cover masonry with damp cloths or plastic sheets in hot or windy conditions. Avoid construction during heavy rainfall, or protect the work with temporary shelters. Maintain optimal moisture levels during curing and monitor progress to ensure uniform strength development.

5. (a) What is a lintel in masonry construction?

A lintel is a horizontal structural element placed above an opening, such as a door or window, to support the load from the wall above.

(b) State three purposes of using lintels in wall construction.

Lintels carry the weight of the wall over openings. They prevent cracks in masonry due to unsupported spans. They also provide a level surface for installing doors or windows.

(c) With the aid of a sketch, describe the construction of a reinforced concrete lintel over a window opening.

Construct temporary timber formwork across the opening. Place steel reinforcement bars according to design, typically longitudinal bars with stirrups. Pour concrete to fully cover the reinforcement, ensuring it fills all voids. After curing, usually for 7–14 days, remove the formwork. The reinforced concrete lintel now supports the load above the window opening effectively.

6. (a) Define the term “cavity wall” in masonry.

A cavity wall consists of two parallel walls (leaves) separated by a hollow space or cavity, which may contain insulation material. The two leaves are tied together using metal wall ties.

(b) State three advantages of constructing cavity walls in buildings.

Cavity walls provide thermal insulation, helping regulate indoor temperatures. They reduce damp penetration from rainwater. They also improve sound insulation compared to solid walls.

(c) Explain the procedure for installing cavity wall insulation during construction.

After constructing the inner and outer leaves up to the insulation level, insulation boards or foam are cut to fit the cavity width. They are positioned against the inner or outer leaf, ensuring no gaps. Wall ties are placed to secure both leaves together without compressing the insulation. The cavity is then filled carefully without damaging the insulation, and brickwork continues above the insulated section.