THE UNITED REPUBLIC OF TANZANIA

NATIONAL EXAMINATION COUNCIL

DIPLOMA IN TECHNICAL EDUCATION EXAMINATION

784 **BRICKWORK AND MASONRY**

Time: 3 Hour. **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. 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 "scaffolding". Give four reasons why scaffolding is necessary in brickwork construction, and explain three safety precautions that must be observed when erecting and using scaffolding on site.

Scaffolding is a temporary structure made from timber, steel pipes, or bamboo used to provide support and working platforms for workers and materials during the construction, maintenance, or repair of buildings.

Scaffolding is necessary to allow workers to reach high or inaccessible areas when building tall walls. It provides a stable and level platform for standing and moving tools and materials. It helps to reduce worker fatigue by allowing them to work at comfortable heights. It also minimizes construction errors by providing a steady base for accurate laying of bricks and blocks.

When erecting and using scaffolding, always ensure the base is level and firmly supported to prevent collapse or leaning. Guardrails and toe boards should be installed to prevent falls and falling tools. Scaffolding must be inspected regularly for damage, looseness, or displacement of members.

2. (a) What is meant by the term “parapet wall”? (b) Mention three types of parapet walls used in construction. (c) Describe the construction process of a solid parapet wall built on a flat roof slab.

A parapet wall is a low wall built along the edge of a roof, balcony, or terrace to provide protection and prevent falls. It also helps in directing rainwater and enclosing roof structures for safety and aesthetics.

Three types of parapet walls include solid parapet walls (made of bricks or blocks), perforated parapets (with decorative openings or patterns), and balustrade parapets (using pre-cast concrete or steel railings).

To construct a solid parapet wall, begin by marking the layout on the roof slab. Lay a damp-proof course (DPC) at the base to prevent moisture penetration. Construct the wall using solid blocks or bricks with proper bonding. Mortar joints should be well filled, and reinforcement bars can be included for stability. Once the desired height is reached, apply rendering or coping to protect the wall top from water ingress.

3. Briefly explain the following terms as used in bricklaying and state one practical importance for each in wall construction:

(i) *Raking back*: This refers to the stepped arrangement of bricks at the end of a wall left unfinished temporarily. It ensures bonding continuity when the wall is resumed later and avoids vertical joints.

(ii) *Frog*: A frog is the depression or indentation in the top surface of a brick. It increases mortar adhesion during laying, giving better bond strength and stability.

(iii) *Closer brick*: This is a brick cut along its length to complete a course in bonding. It helps in maintaining bonding patterns and reducing vertical joint alignment.

(iv) *Quoin closer*: A specific type of closer placed next to the quoin (corner) brick. It strengthens corners and helps interlock the corner with the next course of bricks.

(v) *Bedding plane*: This is the horizontal surface upon which bricks are laid. A level bedding plane ensures even load distribution and wall stability.

4. (a) State four environmental factors that can affect the curing of masonry work. (b) Discuss how each factor may influence the quality of mortar and structural performance of the wall. (c) Suggest proper site practices to manage these environmental conditions effectively.

High temperatures increase evaporation, causing the mortar to dry too fast before gaining proper strength. This leads to shrinkage cracks and weak bonding.

Excessive wind accelerates drying and can blow dust into joints, affecting adhesion. It may also cause deformation of thin walls before full setting.

Low temperatures slow down the chemical reaction in cement, delaying curing and weakening early strength development.

Rainwater dilutes fresh mortar, washing out cement content and weakening the set. It also causes uneven curing or staining on walls.

To manage these factors, walls should be kept moist using wet hessian cloth or sprinkling water to control fast drying. Temporary coverings like polythene sheets or canopies can shield from wind and rain. Work should be scheduled during favorable weather, especially in early morning or late afternoon in hot climates.

5. Consider a boundary wall being built in a flood-prone area:

(i) To improve durability, raise the wall's foundation above known flood levels using compacted hardcore or concrete bases. Use dense, water-resistant materials like solid concrete blocks or engineering bricks. Apply water-repellent coatings or renderings to exposed surfaces.

(ii) Use a 1:3 cement:sand mortar mix for strength and resistance to water penetration. Waterproofing additives can be included in the mix to reduce permeability.

(iii) Provide weep holes at the base of the wall to allow water to escape. Construct drainage channels along the backfill area to redirect runoff away from the wall. Ensure proper sloping of the ground surface to minimize water pooling.

6. (a) Differentiate between random rubble masonry and ashlar masonry. (b) Identify two advantages and two disadvantages of using random rubble masonry for retaining walls. (c) Suggest appropriate situations where ashlar masonry is more suitable than random rubble masonry.

Random rubble masonry uses undressed or roughly shaped stones arranged without a uniform pattern. The joints are irregular, and the appearance is rugged. Ashlar masonry uses finely dressed stones with smooth surfaces and regular shapes arranged in uniform courses with tight joints.

Advantages of random rubble masonry include low cost due to the use of locally available materials and its strong interlocking which makes it suitable for rough terrain. However, it has poor appearance for architectural finishes and requires skilled labor for proper fitting of irregular stones.

Ashlar masonry is more suitable in high-end buildings where aesthetics and uniformity are important, such as museums, government buildings, or monument facades. It is also appropriate where precision and minimum maintenance are required.