THE UNITED REPUBLIC OF TANZANIA

NATIONAL EXAMINATIONS COUNCIL

DIPLOMA IN TECHNICAL EDUCATION EXAMINATION.

784 **BRICKWORK AND MASONRY**

(SUPPLEMENTARY)

Time : 3 Hours **ANSWERS** **Year : 2003**

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 “arch in masonry”.

An arch in masonry is a curved structure built above an opening such as a door, window, or passage to support the weight of the wall or roof above it. It transfers the load to the side supports or abutments and allows the opening to remain stable without collapse.

(b) Mention four types of arches.

The four common types of arches are: semicircular arch, where the curve forms a perfect half-circle; segmental arch, with a curve less than a semicircle; flat arch, which is almost horizontal with slight rise; and pointed or Gothic arch, which has two curves meeting at a sharp apex.

(c) With sketches, explain the construction of a segmental arch.

A segmental arch is constructed by first setting up a temporary timber centering or formwork shaped according to the desired curve. Bricks or stones are then laid along the curve, starting from the abutments and progressing symmetrically towards the center. Each brick is positioned with its wider face along the curve and slightly tilted to fit snugly. The keystone is placed at the apex to lock all bricks in position. Once the mortar has set, the centering is removed, leaving a self-supporting arch.

2. (a) What is meant by the term “coping stone”?

A coping stone is a protective top layer placed on the top of a wall to prevent water from penetrating into the masonry. It also provides a finished appearance to the wall.

(b) State three reasons for providing copings.

Copings prevent rainwater from entering the wall, reducing dampness and erosion of the mortar. They also protect the masonry from frost damage in colder climates. Additionally, copings improve the aesthetic appearance of the wall, giving it a neat and finished look.

3. (a) State four causes of dampness in walls.

Dampness can be caused by rising damp from groundwater, leaking roofs or gutters, cracks in walls allowing rainwater ingress, and condensation due to poor ventilation inside buildings.

(i) Explain two effects of dampness.

Dampness can weaken the structural integrity of walls by deteriorating mortar and bricks over time. It can also cause health problems, as wet walls encourage mold growth, which affects indoor air quality.

(ii) Suggest two methods for controlling dampness.

Rising damp can be controlled by installing a damp-proof course at the base of walls. Rainwater ingress can be prevented by properly maintaining roofs, gutters, and downpipes to divert water away from walls.

4. (a) Define “reinforced brickwork”.

Reinforced brickwork is brick masonry that incorporates steel reinforcement to increase its tensile strength, ductility, and load-carrying capacity. It is commonly used in areas subject to lateral loads or in taller structures.

(b) Mention two advantages and two disadvantages of reinforced brickwork.

Advantages include enhanced strength and resistance to cracking, and the ability to construct taller or longer walls safely. Disadvantages include higher construction costs due to reinforcement materials and skilled labor requirements, and more complex construction techniques compared to ordinary brickwork.

(c) Describe the method of inserting reinforcement in a half-brick thick wall.

In a half-brick thick wall, grooves or channels are left horizontally at certain courses, or vertical sleeves are provided. Steel bars are placed in these channels and fixed securely. The grooves are then filled with mortar or grout to cover and protect the reinforcement. The reinforcement helps the wall resist tensile stresses while the masonry carries compressive loads.

5. (a) What is a sill in construction?

A sill is the horizontal member located at the base of a window or door opening that supports the frame and directs water away from the wall.

(b) With a sketch, describe the construction of a stone sill.

A stone sill is typically made of a single dressed stone or multiple stones, slightly projecting beyond the face of the wall. It is laid with a slight slope away from the window or door to prevent water from running into the wall. The sill is embedded in mortar and sometimes bedded on a damp-proof course to avoid moisture penetration.

6. (a) Differentiate between rubble masonry and coursed rubble masonry.

Rubble masonry uses irregular, undressed stones of various sizes, placed randomly in a wall, usually bonded with mortar. Coursed rubble masonry, in contrast, arranges stones in approximate horizontal layers (courses), providing a more uniform and aesthetically pleasing appearance.

(b) State two applications of rubble masonry.

Rubble masonry is commonly used for boundary walls and retaining walls in rural or less formal construction. Coursed rubble masonry is suitable for foundations and walls where a neat appearance is desired along with structural stability.