THE UNITED REPUBLIC OF TANZANIA

NATIONAL EXAMINATIONS COUNCIL

DIPLOMA IN TECHNICAL EDUCATION EXAMINATION.

784 **BRICKWORK AND MASONRY**

(SUPPLEMENTARY)

Time : 3 Hours **ANSWERS** **Year : 2011**

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 “construction joint” as used in masonry.

A construction joint is a planned interruption in the continuity of masonry work, provided when construction is stopped temporarily. It allows for the continuation of work at a later stage without compromising structural integrity.

(b) State three purposes of providing construction joints.

They allow staged construction, enabling workers to pause work and resume later. They prevent uncontrolled cracking due to shrinkage or settlement. They provide convenient points for aligning and bonding subsequent masonry work.

(c) With the help of a sketch, show the correct position and arrangement of a vertical construction joint in a long wall.

A vertical construction joint is placed at a straight line in the wall, usually at a location where the load distribution is not critical. Mortar is applied neatly to bond the new section with the old, and the joint is reinforced with metal ties if necessary to maintain stability.

2. (a) What is a pier foundation?

A pier foundation consists of vertical columns or piers constructed to support concentrated loads from a structure, transferring the load to deeper, stronger soil layers. It is commonly used for walls, beams, or columns where soil conditions require isolated support.

(b) State three situations where pier foundations are preferred over strip foundations.

They are suitable where soil has low bearing capacity at shallow depths. They are used in flood-prone areas to raise the structure above water levels. They are ideal for structures with widely spaced columns or heavy concentrated loads.

(c) With the aid of a sketch, describe the layout of a brick pier foundation under a load-bearing wall.

Excavate pits at the pier locations according to design dimensions. Lay a concrete or rubble base for each pier. Construct the brick pier with proper bonding and mortar, ensuring vertical alignment with a

plumb line. The piers are spaced according to wall or column load requirements and tied into the superstructure above.

3. (a) Define the term “wall rendering”.

Wall rendering is the application of a coat of mortar or plaster on masonry surfaces to provide a smooth, uniform finish. It protects the wall from weathering, improves appearance, and can provide water resistance.

(b) State three types of finishes that can be applied to rendered surfaces.

Smooth finish, which gives a polished surface. Textured or roughcast finish, which adds visual texture and slip resistance. Pebbledash finish, where small stones are embedded in the render for durability and aesthetics.

(c) Describe four precautions to take when rendering external walls.

Ensure the wall surface is clean and free of dust or loose particles. Apply a bonding coat or keying scratch to enhance adhesion. Keep the render moist during curing to prevent cracking. Avoid applying render in extreme temperatures, such as intense heat or heavy rain, to ensure proper setting.

4. (a) State four reasons for selecting clay bricks in wall construction.

Clay bricks are durable and resistant to weathering. They have good compressive strength for load-bearing walls. They provide thermal insulation and regulate indoor temperature. They offer a consistent size and shape, allowing for uniform wall construction.

(b) Explain the differences between first class and second class clay bricks.

First-class bricks are well-burnt, uniform, and free from defects, suitable for exposed walls and high-quality construction. Second-class bricks may have minor defects or slight size variations and are more suitable for internal walls or non-exposed masonry.

(c) Describe three methods used to test the quality of bricks on site.

Water absorption test, where bricks are soaked to check the percentage of water absorbed. Hardness test, by striking two bricks together or using a sharp tool to check resistance to chipping. Soundness test, by tapping bricks to listen for a clear ringing sound, which indicates good quality and uniformity.

5. (a) What is meant by the term “ashlar masonry”?

Ashlar masonry is a type of stone construction using finely dressed, cut, and squared stones laid in regular courses with thin mortar joints. It gives a smooth and aesthetically pleasing finish.

(b) State two advantages and two disadvantages of using ashlar masonry for building walls.

Advantages: It provides an elegant, uniform appearance and is highly durable. The precise fitting reduces the amount of mortar needed.
Disadvantages: It is expensive due to labor and stone dressing costs. It requires skilled workmanship and careful handling of stones.

(c) Suggest appropriate situations where ashlar masonry is more suitable than random rubble masonry.

Ashlar masonry is suitable for facades, monuments, high-quality public buildings, or any construction where aesthetics, precision, and durability are priorities. Random rubble masonry is more appropriate for less visible walls, retaining walls, or structures where cost is a key consideration.

6. (a) For a boundary wall in a flood-prone area, propose three special construction considerations to enhance its durability.

Raise the wall foundation above expected flood levels. Provide proper drainage behind the wall to reduce hydrostatic pressure. Use water-resistant materials such as concrete blocks or waterproof mortar to reduce water penetration.

(b) What kind of mortar mix would be ideal for such conditions, and why?

A cement-sand mortar mix in a ratio of 1:4 or 1:5 is ideal because it provides high compressive strength, low permeability, and good durability against water exposure.

(c) Explain how you would ensure effective water drainage behind the wall.

Install weep holes at regular intervals to allow water to escape. Include a gravel or rubble-filled drainage layer behind the wall. Ensure the ground behind the wall slopes away from the wall to facilitate natural water flow and reduce hydrostatic pressure.