THE UNITED REPUBLIC OF TANZANIA

NATIONAL EXAMINATIONS COUNCIL

DIPLOMA IN TECHNICAL EDUCATION EXAMINATION.

784 **BRICKWORK AND MASONRY**

(SUPPLEMENTARY)

Time : 3 Hours **ANSWERS** **Year : 2015**

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. Define "formwork". List four reasons for using formwork in concrete masonry, and describe three precautions for safe formwork handling on site.

Formwork is a temporary mold or structure used to support freshly poured concrete until it hardens and can support itself.

Formwork is used to shape concrete to the desired size and profile, maintain alignment and level during curing, prevent concrete from spilling or deforming, and support loads until the concrete achieves sufficient strength.

Precautions for safe handling include ensuring all formwork components are strong and free of defects, providing adequate bracing to prevent collapse, and using proper lifting techniques and equipment to avoid injuries.

2. (a) What is an "abutment" in wall terms?

An abutment is a masonry structure that supports the ends of arches, beams, or retaining walls, resisting horizontal and vertical forces.

(b) Mention three types of abutments in bridge or retaining structures.

Types include gravity abutments, cantilever abutments, and spill-through abutments.

(c) Describe constructing a masonry abutment wall with backfill drainage.

Excavate the foundation and lay a compacted base. Build the abutment wall with proper bonding and mortar joints. Include drainage pipes or weep holes at the base and backfill gradually with free-draining material to prevent water pressure buildup.

3. Briefly explain these bricklaying terms:

(i) King closer – a brick cut longitudinally to maintain bond at corners; it keeps the wall corners aligned and stable.
(ii) Cow nose – a rounded brick used at corners or curves; improves aesthetics and reduces sharp edges.
(iii) Double corner – two bricks laid together at a corner; strengthens the junction of two walls.

(iv) Mitred closer – a brick cut at an angle to complete a corner; ensures proper bonding without gaps.
(v) Line level – a tool used to check horizontal alignment; ensures courses are level throughout construction.

4. (a) State four site conditions that influence mortar adhesion.

Moisture content of the substrate, temperature, surface roughness of masonry units, and cleanliness of the work area.

(b) Analyze how each condition affects mortar bonding and wall integrity.

Excess moisture can weaken mortar, causing poor adhesion. Extreme temperatures may affect curing and strength. Smooth surfaces reduce mechanical keying, and dirt or debris prevents proper bonding, leading to weak joints.

(c) Advise on best practices to counteract these conditions.

Dampen dry surfaces before laying mortar. Avoid working in extreme heat or cold or provide temporary protection. Clean masonry units thoroughly and roughen smooth surfaces if necessary. Maintain consistent moisture and mix proportions for mortar.

5. For a boundary fence in a seismic zone:

(i) Propose three reinforcement strategies for earthquake resistance.

Incorporate vertical and horizontal reinforcement bars, tie masonry units with metal wall ties, and include control joints to accommodate lateral movement.

(ii) What mortar composition is best, and why?

Use a strong cement-sand mix (1:3) for its durability and ability to bond well under seismic stresses.

(iii) How to integrate weep holes for moisture escape?

Place weep holes at regular intervals near the base of the wall to allow trapped water to drain, preventing water accumulation that could weaken masonry during seismic shaking.

6. (a) Differentiate between polygonal rubble masonry and squared rubble masonry.

Polygonal rubble masonry uses stones of irregular shapes fitted together without uniform faces, while squared rubble masonry uses roughly squared stones laid in regular courses.

(b) Highlight two pros and two cons of polygonal rubble for boundary walls.

Pros: requires less dressing of stones, provides a natural aesthetic. Cons: less uniform load distribution, more difficult to align.

(c) Recommend contexts where squared rubble is superior to polygonal rubble.

Squared rubble is preferred for structural walls, retaining walls, or situations where precise load-bearing and alignment are critical.