THE UNITED REPUBLIC OF TANZANIA

NATIONAL EXAMINATION COUNCIL

DIPLOMA IN TECHNICAL EDUCATION EXAMINATION

784 **BRICKWORK AND MASONRY**

Time: 3 Hour. **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. 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. (a) Define the term “blockwork” in construction.

Blockwork is the construction of walls and other structural elements using large rectangular concrete or cement blocks. These blocks are larger than traditional bricks and are commonly used for both load-bearing and non-load-bearing walls.

Blockwork offers faster wall coverage due to the size of the units and is commonly seen in modern buildings for both internal partitions and external walls. It may include solid, hollow, or cellular concrete blocks.

(b) State four differences between blockwork and brickwork.

Blockwork uses larger units than brickwork. Concrete blocks are generally wider and taller, which speeds up construction.

Brickwork uses smaller clay or concrete bricks, while blockwork typically uses larger concrete blocks made from cement and aggregates.

Blockwork is more suitable for large-scale wall construction due to its size and speed, whereas brickwork is preferred where detailed bonding and aesthetics are important.

Blockwork offers better thermal and acoustic insulation compared to standard brickwork because of the thicker units and hollow cores.

(c) Mention four advantages of using concrete blocks in wall construction.

Concrete blocks cover a larger area, which reduces the construction time and labor cost.

They have good thermal and sound insulation properties due to their density and size.

Blocks can be made with hollow cores, reducing weight and allowing for service conduits such as electrical pipes.

Concrete blocks are more dimensionally uniform, resulting in smoother walls and less need for heavy plastering or rendering.

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

Wall finish refers to the final surface treatment applied to the internal or external face of a wall. It provides protection, decoration, and functional improvements such as moisture resistance or insulation.

Wall finishes may include plastering, painting, cladding, tiling, or the application of textured coatings. They enhance both the visual and performance qualities of masonry walls.

(b) State five types of wall finishes used in masonry construction.

Cement-sand plaster is a smooth or textured coating applied to internal or external walls for protection and aesthetics.

Paint is a colored or clear finish applied over plaster or bare masonry to improve appearance and weather resistance.

Wall tiles are ceramic or stone units applied with adhesive to provide a durable and washable finish, especially in kitchens and bathrooms.

Cladding uses materials like timber, metal, or PVC panels to cover the external surface of a wall for decoration and protection.

Textured coatings such as pebble dash or roughcast give the wall a rough finish and can hide surface imperfections.

(c) Describe the steps followed when applying a cement-sand screed finish to a masonry wall.

First, the wall surface is cleaned of dust, grease, and loose particles to ensure proper bonding of the screed.

The wall is lightly dampened with water to reduce suction and prevent the screed from drying too quickly.

A cement-sand mix is prepared, usually in a ratio of 1:3 or 1:4 depending on required strength and smoothness.

Using trowels and straight edges, the screed is applied evenly over the surface, working from bottom to top in strips or bays.

The surface is leveled and finished using a float to achieve a smooth texture. After application, the wall is cured by dampening for at least 7 days.

3. (a) Define the term “movement joint” in masonry.

A movement joint is a gap or flexible joint inserted in masonry construction to allow for expansion, contraction, or settlement due to temperature changes or structural movement.

These joints prevent cracks by absorbing movement between different parts of a wall or between a wall and another structure. They are filled with flexible sealant or compressible material.

(b) Give three reasons for providing movement joints in brickwork.

Thermal expansion and contraction of masonry units can cause cracks. Movement joints absorb this change and reduce stress.

Differential settlement between different sections of a building can cause structural issues. Movement joints help absorb and distribute these shifts.

Long or continuous walls without breaks are more susceptible to cracking. Movement joints divide such walls into manageable sections and prevent structural damage.

(c) With the aid of a sketch, show the location and structure of a vertical movement joint in a long wall.

In a long wall, a vertical movement joint is typically located every 6 to 12 meters depending on the material and climate.

It is formed by leaving a vertical gap about 10 to 20 mm wide between sections of brickwork. The gap is filled with a compressible material like foam or bitumen-based filler.

The joint is sealed on the outer face with a weatherproof sealant to keep out water while still allowing movement.

4. (a) State four functional requirements of a good wall in a building.

A good wall must provide adequate structural strength to support the loads from floors, roofs, and its own weight without failing.

It must offer thermal insulation to reduce heat loss or gain and keep the internal environment comfortable.

The wall should be weather-resistant, protecting the building from wind, rain, and external moisture.

It must provide security and privacy by acting as a barrier against intrusion and noise.

(b) Explain how bonding affects the structural performance of a wall.

Bonding refers to the arrangement of bricks or blocks in a pattern that overlaps joints between courses. Good bonding ensures uniform distribution of loads and minimizes weak points.

Proper bonding interlocks the units effectively, increasing resistance to lateral forces such as wind or vibration. It also improves wall stability and prevents cracking.

Poor bonding can lead to vertical cracks, instability, and even collapse of the wall under heavy loads or environmental stress.

(c) State four methods used to strengthen long brick walls.

Inserting piers or buttresses at intervals strengthens the wall by providing lateral support.

Using reinforced concrete columns or beams within the wall adds tensile strength and reduces deformation.

Incorporating horizontal reinforcement such as steel bars within the mortar joints increases resistance to cracking.

Introducing movement joints at suitable intervals controls expansion and contraction, reducing stress buildup in the wall.

5. (a) Explain the importance of providing openings in walls during building construction.

Openings such as doors and windows are essential for access, ventilation, lighting, and usability of internal spaces.

They allow for natural light to enter the building, reducing the need for artificial lighting and improving living conditions.

Openings enable cross-ventilation, which improves indoor air quality and thermal comfort.

They also allow for movement of people and materials within the building and provide views to the outside.

(b) With the aid of sketches, describe the difference between a door and a window opening.

A door opening extends from the floor level upward and is large enough to allow the passage of people or equipment. It typically includes a frame and shutter.

A window opening is positioned above floor level and may vary in size, intended primarily for light and ventilation. Windows often include glazing and sills.

While both require lintels or arches for support, the dimensions, height, and function clearly differentiate doors from windows.

(c) State the factors to consider when choosing the location of a door in a wall.

The door should be located to provide direct and easy access between rooms or from outside to inside.

It must not interfere with the arrangement of furniture or circulation within the space.

Structural considerations must be taken into account; the door should not weaken load-bearing areas of the wall.

Environmental factors like wind direction, sunlight, and privacy should also be considered to ensure comfort and efficiency.

6. (a) (i) Define the term "superstructure".

The superstructure is the part of a building that is constructed above the ground level and includes all components from the ground floor slab upwards.

It includes walls, floors, doors, windows, beams, columns, stairs, and the roof. It rests on the substructure or foundation and supports all live and dead loads.

(ii) List three components of a building's superstructure.

Walls are vertical elements that enclose and divide spaces and carry loads to the foundation.

Columns are vertical supports that bear the weight of beams and slabs and transfer it downward.

The roof is the top covering of a building, protecting it from weather and completing the structure.

(b) With the help of a sketch, describe how a wall footing is constructed.

A wall footing is a widened base at the bottom of a wall that spreads the load over a larger area. It starts with excavation to the required depth and width.

The bottom is compacted and leveled, then a concrete strip is poured to form the footing base. After curing, the wall is built on top of this strip using bricks or blocks.

The width of the footing is usually 2 to 3 times the thickness of the wall, and reinforcement may be added in some cases.

(c) State four precautions to take when constructing a footing during rainy conditions.

Excavated trenches should be protected from water ingress using polythene sheets or temporary covers.

Water accumulated in the trench must be pumped out before placing concrete to ensure a clean base.

The concrete should be placed and compacted immediately to avoid washout or segregation due to rain.

Construction should be planned during dry periods or the footing area enclosed to avoid delays and quality issues due to excessive moisture.