THE UNITED REPUBLIC OF TANZANIA
NATIONAL EXAMINATION COUNCIL
DIPLOMA IN TECHNICAL EDUCATION EXAMINATION

784 **BRICKWORK AND MASONRY**

Time: 3 Hours. **SOLUTIONS** **Year: 2019**

Instructions

1. This paper consists of **six (6)** questions.
2. Answer question number **one (1)** and any other **four (4)** questions.
4. Mathematical tables and non-programmable calculators may be used
4. Cellular phones are **not** allowed inside the examination room.
5. Write your **Examination Number** on every page of your answer booklet

1.(a) What is meant by septic tank?

A septic tank is an underground watertight chamber constructed to collect and treat wastewater from toilets and household drains in areas where there is no centralized sewer system. It works by allowing solid waste to settle at the bottom where anaerobic bacteria partially decompose it, while liquid effluent flows out to a soak pit or drain field for further natural filtration.

(b) Draw a longitudinal section of a septic tank and show five important parts.

A longitudinal section of a septic tank shows the internal arrangement along its length. The important parts include the inlet pipe, which allows sewage to enter the tank from the house. Another part is the outlet pipe, which conveys partially treated effluent out of the tank. The partition wall or baffle wall is shown separating the chambers and controlling flow. The sludge layer at the bottom represents settled solids, while the scum layer at the top represents floating waste such as grease. The access cover is also shown to allow inspection and desludging.

(c) With the aid of sketches, explain the following tools as used in construction works.

(i) Wooden float

A wooden float is a hand tool made of flat smooth wood used during plastering works. It is mainly used to spread, level, and smooth freshly applied plaster or mortar on wall and floor surfaces. The float helps to close small holes and bring fine particles to the surface, producing a uniform and even finish.

(ii) Laying trowel

A laying trowel is a steel tool with a flat triangular blade and a handle. It is used by masons to pick up, spread, and shape mortar when laying bricks or blocks. The trowel also helps in cutting excess mortar and ensuring proper bonding between masonry units.

(iii) Bat and closer gauge

A bat and closer gauge is a measuring tool used in brickwork to check the correct sizes of brick bats and closers. It helps ensure that cut bricks used at corners and ends maintain correct dimensions so that brick bonding remains accurate and courses remain level.

2.(a) With the aid of sketches, differentiate between traditional strip foundation and deep strip foundation.

A traditional strip foundation is a shallow foundation constructed at a relatively small depth below ground level. It spreads the load of walls over a wider area of soil close to the surface and is used where the soil has good bearing capacity near ground level. A deep strip foundation is constructed at a greater depth below ground level, often reaching stronger soil strata. It is used where surface soil is weak or expansive. The deeper excavation increases stability and reduces the risk of settlement, especially for heavier structures.

(b) Mention five causes of accidents in the construction works.

One cause of accidents is poor housekeeping on site, such as scattered materials and debris, which can lead to slips and trips. Another cause is lack of personal protective equipment, exposing workers to injuries. Faulty or poorly maintained tools and machines also contribute to accidents. Inadequate training of workers leads to misuse of equipment. Working at heights without proper scaffolding or safety measures is another major cause.

(c) How can the accidents be prevented?

Accidents can be prevented by maintaining good site housekeeping and keeping walkways clear. Providing and enforcing the use of personal protective equipment reduces injury risks. Regular inspection and maintenance of tools and machinery improve safety. Training workers on safe working practices enhances awareness.

Proper supervision and use of safety structures such as guardrails and scaffolds also reduce accidents.

3.(a) Elaborate four requirements of scaffolds.

A scaffold must be strong enough to safely support workers, materials, and tools without risk of collapse. It must be stable, properly braced, and firmly supported on the ground to prevent movement or overturning. The scaffold should provide safe access through ladders or stairways. It must also have guardrails and toe boards to protect workers from falling.

(b) Use sketches to show how independent and dependent scaffolds are erected.

An independent scaffold consists of two rows of standards, one near the wall and one further away, connected by ledgers and transoms. It does not rely on the building for support and is commonly used for stone masonry.

A dependent scaffold, also known as a single scaffold, has one row of standards and is supported partly by the wall through putlogs inserted into the masonry. It relies on the structure for stability and is commonly used for brickwork.

4.(a) What is the function of stairs?

The main function of stairs is to provide safe and convenient vertical movement between different floors or levels in a building. Stairs also serve as an important means of escape during emergencies such as fires.

(b) Use sketch to show elevation of stair and label all parts.

The elevation of a stair shows components such as treads, which are the horizontal parts stepped on, and risers, which are the vertical faces between treads. It also shows the stringers that support the steps, the landing that provides rest between flights, and the handrail for safety and support.

(c) Draw the plan views of the following stairs.

(i) Straight flight

A straight flight stair plan shows steps arranged in a single straight line without change in direction. It is simple in design and easy to construct.

(ii) Dog leg

A dog leg stair plan shows two flights running in opposite directions with a landing between them and no open well. It is compact and commonly used in residential buildings.

(iii) Quarter turn

A quarter turn stair plan shows a change in direction of 90 degrees between flights, usually with a landing. It is used where space constraints require a change in direction.

5.(a) What are the advantages of constructing flat roofs in buildings?

Flat roofs are easy to construct and require less formwork compared to pitched roofs. They provide usable space for activities such as drying clothes or installing water tanks and solar panels. Flat roofs are economical in urban areas where buildings may be extended vertically in the future. They also offer easier access for maintenance.

(b) State four requirements of a good solid floor surface finishes.

A good floor finish should be hard wearing to resist abrasion and heavy use. It should be smooth but not slippery to ensure safety. The surface must be durable and resistant to moisture and chemicals. It should also be easy to clean and maintain for hygiene purposes.

(c) Draw a sketch of a framed ledged and battened door.

A framed ledged and battened door consists of vertical battens fixed together, supported by horizontal ledges and enclosed within a surrounding frame. The frame provides strength and stability, while the ledges prevent warping.

6.(a)(i) Define the term workshop as applied in the construction industry.

A workshop in the construction industry is a designated place where construction components are fabricated, repaired, or assembled before being used on site. It houses tools, machines, and skilled workers who carry out specialized tasks.

(ii) Mention two major types of workshops and state its four differences.

The two major types are site workshops and central workshops. A site workshop is located within or near the construction site, while a central workshop is located away from the site. Site workshops handle minor repairs and fabrication, while central workshops handle large scale production. Site workshops are temporary, while central workshops are permanent. Site workshops use lighter tools, while central workshops use heavy machinery.

(b) With the aid of diagrams, explain the different types of pointing.

Flush pointing involves filling mortar flush with the wall surface to give a flat appearance. Recessed pointing has mortar pressed back slightly from the surface to create shadow lines. Weathered pointing slopes outward to shed water and improve durability. Struck pointing is finished with a slanted edge to enhance water runoff and appearance.

(c)(i) What is the meaning of concrete as applied in building construction?

Concrete is a composite building material made by mixing cement, fine aggregates, coarse aggregates, and water in correct proportions. When hardened, it forms a strong mass capable of carrying heavy loads.

(ii) Mention four factors which influence the strength of concrete.

The strength of concrete is influenced by the water cement ratio, as excess water reduces strength. The quality and grading of aggregates affect bonding and load resistance. Proper mixing and compaction ensure uniformity and reduce voids. Curing conditions such as time, moisture, and temperature greatly affect the final strength of concrete.