THE UNITED REPUBLIC OF TANZANIA

NATIONAL EXAMINATION COUNCIL

DIPLOMA IN TECHNICAL EDUCATION EXAMINATION

783 **BUILDING CONSTRUCTION**

Time: 3 Hour. **ANSWERS** **Year: 2014**

Instructions

1. This paper consists of sections **five (5)** questions.
2. Answer all questions.
3. Each question carries **twenty (20)** marks.
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 "foundation" and explain two reasons why it is necessary in building construction.

A foundation is the **lowest part of a building structure**, designed to safely transfer the load of the building to the ground. It supports the entire structure and provides stability.

One reason for a foundation is to **distribute the building load evenly** to the underlying soil, preventing structural failure or uneven settlement.

Another reason is to **anchor the building firmly** to the ground, helping it resist external forces such as wind, floods, or earthquakes, and maintaining structural integrity.

(b) A **pad foundation** is a shallow foundation used to support individual columns. It is suitable where the soil has good bearing capacity and loads are concentrated in specific points.

A **strip foundation** is used for load-bearing walls. It is ideal in buildings where the loads are spread along a continuous line, such as in brick or block masonry walls.

A **raft foundation** covers a large area and supports multiple walls or columns. It is used in areas with weak soils to distribute the load over a wide base and reduce settlement.

(c) One consequence of building on weak soil is **uneven settlement**, which causes cracks in walls, misaligned doors or windows, and even partial collapse.

Weak soil may lead to **foundation failure**, where the footing sinks or tilts, making the building unsafe for occupancy.

It may also result in **excessive maintenance costs**, as frequent repairs are required to correct structural and aesthetic issues caused by movement or cracks.

2. (a) Explain the importance of curing in concrete works and give two common methods used.

Curing is essential because it **maintains adequate moisture and temperature** in freshly placed concrete to allow proper hydration of cement. This process is critical for the development of strength and durability.

One common method is **ponding**, where water is retained on horizontal concrete surfaces like slabs to ensure continuous moisture.

Another method is **wet covering**, where concrete is covered with wet sacks, hessian cloth, or mats to keep the surface moist during curing.

(b) Poor curing leads to **reduced strength** in the final concrete, making it more likely to crack or collapse under load.

It causes **surface shrinkage cracks**, which not only affect appearance but also allow moisture and chemicals to penetrate the structure.

It also increases **porosity and lowers durability**, making the concrete susceptible to freeze-thaw damage, corrosion of reinforcement, and weathering.

(c)
In **hot and dry climates**, evaporation is faster, requiring longer curing to maintain moisture and prevent cracking.

On **windy sites**, the surface dries quickly, which may cause shrinkage unless prolonged curing is provided.

In **large structural elements** like thick columns or slabs, internal hydration takes longer, so extended curing ensures full strength development.

3. (a) Define the term "building maintenance" and explain two reasons why it is essential in building management.

Building maintenance refers to the **routine inspection, repair, and servicing** of building components and systems to keep them in functional and safe condition.

It is essential because it **extends the life of the building**, preventing deterioration and costly replacements.

Another reason is that maintenance ensures **health and safety** of occupants by fixing hazards such as loose wiring, roof leaks, or cracked walls before they cause harm.

(b) **Preventive maintenance** involves regular servicing and inspections to avoid breakdowns, such as checking plumbing and roof systems to stop leaks before they occur.

Corrective maintenance is done after a fault is detected, such as repairing a broken window or leaking pipe.

Emergency maintenance addresses urgent issues like electrical faults, burst water lines, or storm damage that need immediate action to prevent accidents or further damage.

(c) One challenge is **inadequate funding**, especially in public institutions where maintenance budgets are limited or misallocated.

Another challenge is **lack of skilled personnel**, resulting in poor-quality repairs or prolonged periods before issues are fixed.

Additionally, **neglect or delayed reporting** of problems by users leads to worsening of minor defects, increasing repair costs and safety risks.

4. (a) State four functions of a good roof in a residential building.

A good roof **protects the interior** from weather elements such as rain, sun, wind, and dust, ensuring comfort and safety.

It provides **structural support** for ceilings, insulation, and sometimes roof tanks or solar panels.

A roof contributes to the **thermal insulation** of the building, reducing heat gain or loss and improving energy efficiency.

It also enhances the **aesthetic appearance** and architectural character of the building, contributing to its overall value and visual appeal.

(b) One common cause of roof failure is **poor workmanship**, including improper installation of trusses or coverings that leads to leaks and structural weakness.

Another cause is the **use of substandard materials** that degrade quickly when exposed to weather, such as ungalvanized iron sheets or untreated timber.

Lack of proper **roof maintenance**, such as not clearing blocked gutters or fixing damaged flashings, causes water buildup and eventual failure.

(c) To repair leaking roofs, the first measure is to **identify and seal all visible holes or cracks**, using appropriate sealants or roofing patches.

The second is to **replace damaged or missing sheets or tiles** to restore the waterproof barrier and prevent future leaks.

The third is to **install or repair flashing and gutters**, ensuring that water is directed away from joints, chimneys, and walls where it may penetrate.

5. (a) Describe three ways in which fire resistance can be incorporated into a building during design and construction.

Using **fire-resistant materials** such as reinforced concrete, fire-rated bricks, or gypsum boards in walls and floors reduces the spread of flames and heat.

Providing **fire doors and partitions** that can withstand fire for a specific period helps isolate affected areas and allow safe evacuation.

Installing **fire detection and suppression systems**, such as alarms, sprinklers, and extinguishers, helps detect and control fire early before it spreads.

(b) **Concrete** is highly fire-resistant and is commonly used in floors, beams, and columns for both structural support and safety.

Glass blocks provide fire resistance while allowing natural light; they are used in stairwells or corridor partitions.

Gypsum board is used for ceilings and walls; it resists fire due to the water content in its composition, which slows down heat transfer during a fire.

(c) Fire escape routes must be marked to ensure **quick and safe evacuation** during emergencies, reducing confusion and saving lives.

They must remain **unobstructed and accessible** at all times, ensuring that occupants can reach safety without delay or injury.

Clear markings and lighting also help **emergency responders locate and navigate** the building faster during rescue or firefighting operations.