

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

783

BUILDING CONSTRUCTION

Time: 3 Hour.

ANSWERS

Year: 2016

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.

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1. (a) State three advantages of using steel as a construction material in multi-storey buildings.

Steel is **lightweight yet very strong**, which allows for the construction of tall and slender buildings without excessive load on foundations. This structural efficiency makes it ideal for high-rise construction.

Another advantage is that steel provides **speed in construction**. Structural steel components are prefabricated off-site and assembled quickly on-site, reducing project duration significantly.

Steel is also **flexible and adaptable**, allowing for future modifications or extensions. Open spaces and long spans can be achieved without interior columns, improving architectural design and use of internal space.

(b) Workers must wear **appropriate personal protective equipment (PPE)** such as gloves, boots, helmets, and safety harnesses when working with steel elements, especially at height.

All **lifting and handling equipment** such as cranes and hoists must be inspected regularly to avoid mechanical failure or accidents.

Work areas must be kept **clean and free of tripping hazards**, especially when cutting, welding, or bolting steel members, to ensure the safety of personnel on site.

(c) If steel elements are not protected, **rusting or corrosion** can occur due to exposure to air and moisture, weakening the structure over time.

Corroded steel also loses its **bond with concrete**, which compromises the integrity of reinforced concrete members and can cause spalling.

Unprotected steel may lead to **frequent maintenance and repair costs**, shortening the lifespan of the building and increasing long-term expenses.

2. (a) Explain four factors to consider when selecting a roofing material for residential buildings.

Climate conditions should be considered; areas with heavy rainfall need waterproof and corrosion-resistant roofing like metal sheets, while hot climates may require materials with high thermal insulation.

Durability is another factor. Long-lasting materials such as aluminum, galvanized steel, or concrete tiles ensure fewer replacements and lower maintenance costs.

Cost and availability are essential. Locally available materials reduce transport costs and support timely completion of roofing works.

Aesthetic appearance matters for harmony with surrounding buildings and homeowner preference, especially in urban or estate settings.

(b) Clay tiles are **fragile and prone to breakage** during transport or installation, which increases wastage and costs.

They are **heavier than most roofing materials**, requiring a stronger roof structure and increasing the load on walls and foundations.

Clay tiles may allow **water seepage through gaps** if not properly installed, especially in areas with strong winds and rainstorms.

(c) **Regular cleaning** of roof surfaces and gutters helps prevent blockage and the buildup of dirt, which can cause water pooling.

Timely replacement of broken or missing tiles or sheets is essential to prevent leakage and internal water damage.

Application of **anti-corrosion paint or coatings**, especially on metal roofs, helps prolong the lifespan and maintain appearance.

3. (a) Describe the importance of site clearance before starting any construction work.

Site clearance is important to **prepare the ground** for excavation, leveling, and construction by removing trees, rocks, old structures, and debris.

It helps in **accessing the land layout properly**, making it easier to set out foundation lines and other structures accurately.

Clearing the site also ensures **safety and efficiency** during construction by removing hazards and obstacles that can delay work or cause accidents.

(b) **Removing vegetation and tree stumps** that may interfere with foundation layout or root systems that can damage underground structures.

Demolition of old structures, including buildings or fences that are no longer needed on the site.

Leveling and grading the land to provide a flat and stable working surface for construction.

Removing topsoil or unsuitable materials, especially if the soil is loose, clayey, or waterlogged, which may compromise foundation stability.

(c) Without proper site clearance, **accidents and injuries** may occur due to uneven ground, sharp debris, or hidden obstacles.

Improper clearance can lead to **foundation errors**, such as misaligned walls or weak base support due to buried roots or debris.

It may also cause **drainage issues**, as leftover vegetation and materials block water flow or interfere with planned drainage systems.

4. (a) Explain the functions of a retaining wall in building construction.

A retaining wall **holds back soil** on sloped terrain, preventing it from sliding or collapsing onto lower parts of the site or adjacent structures.

It helps **stabilize sloped land**, making it usable for construction by creating level platforms or terraces.

Retaining walls also assist in **managing surface runoff** by directing water flow and reducing soil erosion during heavy rains.

(b) **Gravity retaining walls** use their own weight to resist soil pressure and are usually made of stone or mass concrete.

Cantilever retaining walls are reinforced and use a base slab to counterbalance the horizontal force of the retained soil.

Counterfort retaining walls are similar to cantilever types but include additional vertical supports (counterforts) to strengthen the wall, used for higher loads or longer spans.

(c) Retaining walls are required where **buildings are constructed on hillsides**, and level surfaces must be created.

They are needed when **roadways or driveways are cut through sloped land**, preventing side slopes from collapsing onto the pavement.

Retaining walls are also essential in **basement construction**, where earth pressure must be held back to allow for below-ground structures.

5. (a) Define the term "load-bearing wall" and explain its role in structural stability.

A load-bearing wall is a **structural wall** that carries the weight of the roof, floor slabs, and other elements above it and transfers the load down to the foundation.

Its role in stability is crucial, as it helps **distribute vertical loads evenly** across the building, preventing collapse and ensuring overall balance and support.

(b) A load-bearing wall **carries structural loads**, while a partition wall is non-structural and only divides space.

Load-bearing walls are usually **thicker and constructed with strong materials** like reinforced concrete or masonry, while partition walls may use lighter materials like gypsum boards or timber panels.

Changes to load-bearing walls **require engineering approval**, while partition walls can often be altered without affecting the building's stability.

Load-bearing walls **extend continuously from foundation to roof**, while partition walls may rest on a single floor level or frame.

(c) Proper alignment ensures that **loads are transferred vertically and evenly** to the foundation, preventing structural stress or failure.

Misaligned walls may lead to **cracking or buckling** due to unequal load distribution, compromising the building's safety.

Accurate alignment is also important for **connecting structural components** such as beams, slabs, and roof trusses, maintaining the building's intended design integrity.