THE UNITED REPUBLIC OF TANZANIA

NATIONAL EXAMINATION COUNCIL

DIPLOMA IN TECHNICAL EDUCATION EXAMINATION

783 **BUILDING CONSTRUCTION**

Time: 3 Hour. **ANSWERS** **Year: 2006**

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 "building services" and give two examples.

Building services refer to the mechanical, electrical, and plumbing systems installed in a building to ensure functionality, comfort, and safety for the occupants. These services are integrated into the structure and operate throughout the building's lifespan.

Examples of building services include electrical wiring and lighting systems and water supply and drainage systems.

(b) (i) Explain two reasons why building services are important in modern construction.

Building services provide comfort and livability by enabling heating, cooling, water, and ventilation systems essential for daily use.

They also ensure safety and building functionality, such as fire alarms, emergency lighting, and communication systems that support health and emergency operations.

(ii) List two professionals involved in the design or installation of building services.

A mechanical engineer is responsible for HVAC systems, water supply, and drainage design.
An electrical engineer handles lighting, power supply systems, and backup generators.

(c) Describe three challenges commonly encountered when installing building services on site.

Coordination issues may arise between different contractors, leading to overlapping or conflicting pipe and cable routes.

Limited space for service runs can make installation difficult in tight or already constructed areas.

Design changes or on-site modifications often require re-routing, causing delays or extra costs if not planned from the start.

2. (a) What is concrete segregation?

Concrete segregation is the separation of coarse aggregates from the cement paste or finer particles during mixing, transporting, or placing of concrete. This results in uneven distribution of materials within the mix.

(b) (i) State three causes of segregation during mixing or placing of concrete.

Over-vibration during compaction can cause heavier aggregates to settle at the bottom.
Dropping concrete from excessive height without chutes or tremie pipes causes materials to separate.
Using a mix with too much water can make the paste run off, leaving aggregates behind.

(ii) Mention two effects of concrete segregation on structural integrity.

It causes weak zones within the concrete, leading to lower compressive strength and possible structural failure.
Segregated concrete can result in honeycombing, making the surface porous and prone to water ingress and corrosion.

(c) Give three methods of preventing segregation during concrete work.

Use well-designed mix proportions with the correct water-cement ratio to maintain uniform consistency.
Ensure concrete is placed using proper techniques, such as using drop chutes for tall pours.
Limit vibration to recommended levels and distribute it evenly during compaction to avoid forcing materials apart.

3. (a) Explain the purpose of expansion joints in large buildings.

Expansion joints are used to allow controlled movement in building structures caused by temperature changes, moisture content variations, or structural settlement. They prevent the buildup of internal stresses that can lead to cracking or damage.

(b) (i) List three locations where expansion joints should be installed.

They should be installed in long walls, especially those over 30 meters.
They are used between adjacent building sections or wings that may move independently.
Expansion joints are placed in pavements or large floor slabs to accommodate shrinkage or thermal expansion.

(ii) State two materials commonly used in expansion joints.

Bitumen-impregnated fiberboard is used for its compressibility and resistance to weathering.
Neoprene rubber strips are flexible and durable, often used in joints requiring movement and sealing.

(c) Mention three consequences of omitting expansion joints in a concrete structure.

Cracks may develop in walls, floors, or ceilings due to uncontrolled thermal expansion or contraction.
Structural deformation may occur, where beams or slabs bulge, bend, or shift from their original alignment.
The building may suffer from water leakage or corrosion, especially where cracks open pathways for moisture intrusion.

4. (a) What is contract administration in a construction project?

Contract administration is the management and coordination of all contractual processes in a building project, including the supervision of terms, timelines, payments, and change orders to ensure the project is delivered according to agreement.

(b) (i) Identify three roles of a contract administrator.

They monitor contractor performance to ensure compliance with terms and specifications.
They handle documentation of variations, extensions of time, and site instructions.
They coordinate payments and valuation of work, ensuring accurate certification and approval.

(ii) State two documents typically managed under contract administration.

The main contract agreement, which outlines scope, terms, and obligations of the parties.
Site instructions and variation orders, used to record approved changes or clarifications during the project.

(c) Explain three risks that may arise from poor contract administration.

Mismanagement may lead to disputes over scope or payments, delaying project progress and increasing costs.
Poor documentation can cause legal and financial complications, especially if records of changes or approvals are missing.
Delays in approvals or payments may result in contractor claims, penalties, or project abandonment.

5. (a) Define the term "substructure" in building construction.

The substructure refers to the lower portion of a building that is built below ground level. Its main function is to transfer loads from the superstructure to the soil, providing stability and support for the entire structure.

(b) (i) List four components of a typical substructure.

Foundations such as pad, strip, or raft footings that distribute structural loads.
Plinth walls that rise from the footing to support ground floor walls.
Ground beams or tie beams to connect footings and control lateral movement.
Hardcore filling and concrete blinding used below slabs to prepare and stabilize the base.

(ii) State two reasons for waterproofing a substructure.

To prevent water seepage into the building, which can weaken materials and cause dampness.
To protect steel reinforcement and finishes from corrosion or damage caused by moisture and chemical infiltration.

(c) Describe three site conditions that may require special substructure design.

Sites with expansive clay soils require flexible or deep foundations to cope with swelling and shrinkage.
In waterlogged or flood-prone areas, waterproof membranes or elevated footing designs are necessary to resist water pressure.
Sloped or uneven terrain may require stepped or terraced foundations to ensure stability and level support.