THE UNITED REPUBLIC OF TANZANIA

NATIONAL EXAMINATIONS COUNCIL OF TANZANIA

FORM TWO NATIONAL ASSESSMENT

071 BUILDING CONSTRUCTIONS

Time: 2:30 Hours **ANSWERS** **Year: 2023**

Instructions

1. This paper consists of Section **A, B** and **C** with a total of **ten (10)** questions
2. Answer **al**l questions.
3. Section **A** and **C** carry **fifteen (15)** marks each and section **B** carries **seventy (70)** marks
4. Cellular phones and unauthorized materials are not allowed in the assessment room
5. Write your **Assessment Number** at the top right-hand corner of every page.

FOR ASSESSOR'S USE ONLY

QUESTION NUMBER	SCORE	ASSESSOR'S INITIALS
1		
2		
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TOTAL		
CHECKER'S INITIALS		

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SECTION A (15 Marks)

Answer all questions in this section

1. Choose the correct answer from the given alternatives and write its letter in the box provided.

(i) Suppose a client have finished preparing building drawings, specifications and bills of quantities. Whom is to enter into contract with for the constructions?

A. General contractor

B. Main contractor

C. Sub-contractors

D. Labourers

The client enters into a contract with the main contractor, who oversees the entire construction project.

Answer: B

(ii) What is the disadvantages of using tubular scaffolding in construction of building?

A. Takes less space when stored

B. It is more rapidly erected

C. Has high initial cost

D. It is used for multi-storey building.

Tubular scaffolding, often made of steel or aluminum, has a high initial cost due to the materials and manufacturing process. The other options are advantages.

Answer: C

(iii) A village committee chose to use plastic pipes for constructions of a water supply system. Why do you think they made the best choice to use plastic pipes?

A. They are durable than metal

B. They are not affected with hard water

C. They are heavy in weight

D. They can be installed with ordinary tools.

Plastic pipes are resistant to corrosion from hard water, unlike metal pipes, making them a good choice for water supply systems. They are lightweight and easy to install, but the key reason here is their resistance to hard water.

Answer: B

(iv) You have been requested to prepare cost valuations and bill of quantities for the construction of students' toilet at your school. Which profession are you supposed to possess for the work?

A. Quantity surveying

B. Accountancy

C. Structural engineering

D. Architecture

Preparing cost valuations and bills of quantities is the role of a quantity surveyor, who specializes in construction costs and contracts.

Answer: A

(v) A hospital building is to be constructed in a black cotton soil. Which set of deep foundation should be used?

A. Raft and mat foundation

B. Mat and spread footing foundation

C. Combined footing and strap footing foundation.

D. Pile and pier foundation.

Black cotton soil is expansive and unstable, requiring deep foundations like pile or pier foundations to transfer the load to deeper, more stable soil layers. Raft and mat are shallow foundations, unsuitable for such soil.

Answer: D

(vi) What is the lower half portion between the crown and skew back of a circular arch used to bridge a door opening?

A. Haunch

B. Spandril

C. Rise

D. Centre of an arch

The haunch is the lower half portion of an arch between the crown (top) and the skew back (where the arch meets the support).

Answer: A

(vii) What is the mortar mix ratio recommended to be used for making blocks for fence wall constructions?

A. 1:1½

B. 1:4

C. 1:6

D. 1:9

For fence wall blocks, a mortar mix ratio of 1:4 (1 part cement to 4 parts sand) is commonly recommended, providing adequate strength and workability.

Answer: B

(viii) Which terminologies stands for the termination of a wall in a stepped fashion?

A. Toothing

B. Perpend

C. Racking back

D. Frog

Racking back refers to terminating a wall in a stepped fashion, often used during construction to allow for future continuation of the wall.

Answer: C

(ix) What makes the timbering system stable in deep foundation trench?

A. Screwing members together

B. Nailing the members together

C. Using wedges to secure the members

D. Placing timbers in position to the sides of trenches.

Using wedges to secure the timber members ensures stability in deep foundation trenches by tightly holding the timbers in place against the trench walls.

Answer: C

(x) Which tool is used in bricks laying for lifting, spreading mortar and forming joint?

A. Scratch

B. Square

C. Bolster

D. Trowel

A trowel is the tool used in bricklaying for lifting and spreading mortar and forming joints.

Answer: D

2. Match the items (i-v) in List A with the corresponding correct response in List B by writing a letter of the correct response in the table provided.

LIST A	LIST B
(i) Poles fixed diagonally to stiffen the scaffold by forming a triangle.	A. Base boards
(ii) Cross pieces that have one end built into the wall of building.	B. Bridles
(iii) Horizontal pole that are fixed above the working platform to stop workers falling off.	C. Ledgers
(iv) The horizontal poles that connect the standard and are parallel to the building.	D. Base plate
(v) Timber boards that support the base plate on soft or uneven ground.	E. Guard rails
	F. Standards
	G. Put logs
	H. Brace

(i) Poles fixed diagonally to stiffen scaffold → H (Brace)

(ii) Cross pieces built into the wall → G (Put logs)

(iii) Horizontal pole above platform to prevent falls → E (Guard rails)

(iv) Horizontal poles connecting standards, parallel to building → C (Ledgers)

(v) Timber boards supporting base plate on soft ground → A (Base boards)

SECTION B (70 Marks)

Answer all questions from this section

3. (a) Why is it necessary to conduct site analysis before starting constructions?

(i) Soil Conditions: To determine the soil type and bearing capacity for foundation design.

(ii) Topography: To assess the land's slope and elevation for proper site layout and drainage.

(iii) Environmental Factors: To identify potential hazards like flooding or erosion risks.

(iv) Access and Utilities: To ensure access to roads, water, electricity, and other utilities for construction.

(b) An open excavation is used for the site analysis and the results obtained were as indicated in Figure 1. If the area of a trial pit is 1.2 m × 1.2 m, determine the excavated volume of each layer of the soil.

(Note: Figure 1 is not provided in the document, so I'll assume typical soil layers with hypothetical depths for calculation purposes: Layer 1: 0.5 m, Layer 2: 0.8 m, Layer 3: 1.0 m.)

Area of trial pit = 1.2 m × 1.2 m = 1.44 m^2

Volume = Area × Depth

Layer 1: 1.44 m^2 × 0.5 m = 0.72 m^3

Layer 2: 1.44 m^2 × 0.8 m = 1.152 m^3

Layer 3: 1.44 m^2 × 1.0 m = 1.44 m^3

4. (a) Suppose you are planning to visit a plastic pipe manufacturing industry: what are the five raw materials you expect to observe during preparation of moulding composition of plastic?

(i) Polymer Resin: The base material (e.g., PVC, polyethylene) for forming the plastic.

(ii) Plasticizers: Additives to increase flexibility and workability of the plastic.

(iii) Stabilizers: To prevent degradation from heat or UV light during processing.

(iv) Fillers: Materials like calcium carbonate to reduce cost and improve strength.

(v) Colorants: Pigments or dyes to give the plastic pipes desired colors.

(b) Identify materials made from plastic that can be used in the following building components:

(i) Floor: Vinyl tiles or PVC flooring sheets.

(ii) Furniture: Plastic chairs or tables.

(iii) Roof: Polycarbonate roofing sheets.

(iv) Decorations: Plastic moldings or trims.

(v) Fittings and Fixtures: PVC pipes and fittings for plumbing.

5. Suppose you are appointed to be a supervisor of the cement mortar plastering work of a newly constructed residential building:

(a) Identify two tools that can be used for the work.

(i) Plastering Trowel: For applying and smoothing the plaster.

(ii) Hawk: To hold and carry plaster while applying it to the wall.

(b) Briefly describe the procedures that will be followed in doing the work.

Surface Preparation: Clean the wall to remove dust, debris, and loose particles; wet the surface to prevent rapid drying.

Mixing Mortar: Prepare cement mortar (e.g., 1:4 ratio) to a workable consistency.

Applying Base Coat: Use a trowel to apply the first coat (scratch coat) evenly, about 10-15 mm thick.

Scratching: Scratch the surface with a tool to provide a key for the next coat.

Applying Finishing Coat: After the base coat sets, apply a thinner finishing coat (5-10 mm) and smooth it with a trowel.

Curing: Keep the plaster moist for 7-14 days to ensure proper hardening.

(c) Identify two defects that might occur in the finished work.

(i) Cracking: Due to rapid drying or improper curing.

(ii) Blistering: Caused by trapped moisture or applying plaster on a wet surface.

6. (a) Suppose you have been assigned to inspect a formwork of one storey building slab, what are the key issues you will observe before allowing pouring of the concrete to proceed?

(i) Strength and Stability: Ensure the formwork can support the weight of wet concrete without deformation.

(ii) Alignment and Leveling: Check that the formwork is properly aligned and level to achieve the correct slab dimensions.

(iii) Tightness of Joints: Verify that joints are sealed to prevent concrete leakage.

(iv) Bracing and Supports: Confirm that props and braces are secure to prevent collapse.

(v) Cleanliness: Ensure the formwork is free of debris, water, or oil that could affect concrete quality.

(vi) Reinforcement Placement: Check that steel reinforcement is correctly placed and secured within the formwork.

(b) Examine four types of loads that may be carried out by the formwork.

(i) Dead Load: The weight of the formwork itself and the wet concrete.

(ii) Live Load: The weight of workers, tools, and equipment during pouring.

(iii) Impact Load: Sudden forces from concrete pouring or equipment movement.

(iv) Wind Load: Lateral forces from wind, especially in exposed areas.

7. With the aid of an elevation sketch, briefly describe the given brick bonds:

(a) Stretcher Bond:

Description: All bricks are laid as stretchers (long side visible) with each course offset by half a brick length. Commonly used for single-brick-thick walls (e.g., partition walls).

(b) Header Bond:

Description: All bricks are laid as headers (short end visible) with each course offset to align joints. Used for curved walls or decorative purposes.

(c) English Bond:

Description: Alternating courses of stretchers and headers, with headers centered over the stretchers below. Provides strong bonding for load-bearing walls.

(d) Single Flemish Bond:

Description: Each course alternates stretchers and headers within the same row, with the back of the wall in English bond. Used for aesthetic purposes on the outer face.

(d) Single Flemish Bond: Alternating stretchers and headers in each course.

8. Suppose the village infrastructure committee plans to use timber as a main construction material for all public structures in the village:

(a) Support their idea by explaining five usefulness of timber in construction industry.

(i) Versatility: Timber can be used for structural elements, roofing, flooring, and furniture.

(ii) Aesthetic Appeal: It provides a natural, warm appearance for buildings.

(iii) Ease of Work: Timber is easy to cut, shape, and join with basic tools.

(iv) Sustainability: It's a renewable resource if sourced responsibly.

(v) Insulation Properties: Timber offers good thermal and acoustic insulation.

(b) What are the five obstacles that they might encounter for their choice of using timber?

(i) Durability Issues: Timber is susceptible to rot, insect attack, and weathering if not treated.

(ii) Fire Risk: Timber is flammable and poses a fire hazard.

(iii) Maintenance Needs: Requires regular treatment and maintenance to prevent decay.

(iv) Limited Strength: Not as strong as concrete or steel for heavy load-bearing structures.

(v) Availability and Cost: High-quality timber may be scarce or expensive in some regions.

9. (a) What are the five indicators that show the improper curing of concrete?

(i) Cracking: Surface cracks due to rapid drying and shrinkage.

(ii) Low Strength: Concrete fails to achieve design strength due to insufficient hydration.

(iii) Dusting: Powdery surface from weak concrete due to lack of moisture.

(iv) Discoloration: Uneven color patches from inconsistent curing.

(v) Spalling: Flaking or peeling of the surface due to moisture loss.

(b) With examples, give five properties of a hardened concrete.

(i) Compressive Strength: Ability to withstand compressive loads (e.g., 25 MPa for residential slabs).

(ii) Durability: Resistance to weathering and chemical attack (e.g., resists sulfate attack in foundations).

(iii) Impermeability: Resistance to water penetration (e.g., used in water tanks).

(iv) Tensile Strength: Limited ability to resist tension (e.g., reinforced with steel to improve).

(v) Workability (post-hardening context): Refers to how well it maintains shape after hardening (e.g., smooth finish on walls).

SECTION C (15 Marks)

Answer all questions from this section

10. (a) Differentiate rendering from stucco as used in finishing a block work partition wall.

(i) Composition: Rendering is a thin layer of cement-sand mortar applied to walls for smoothness, while stucco is a decorative plaster often made with cement, lime, and sand, sometimes with additives for texture.

(ii) Purpose: Rendering is primarily for protection and smoothness, while stucco is for decorative finishing with textured patterns.

(b) Give three importance of a wall for house.

(i) Structural Support: Walls provide support for the roof and upper floors.

(ii) Protection: They protect against weather elements like rain and wind.

(iii) Privacy and Security: Walls ensure privacy and enhance security by acting as a barrier.

(c) With aid of labeled sketches, differentiate the following types of load-bearing walls:

(i) Solid and Cavity Wall:

Solid Wall: A single, continuous wall made of brick or concrete blocks, providing strength but poor insulation.

Cavity Wall: Two parallel walls (leaves) with a gap (cavity) between them, often filled with insulation, offering better thermal and sound insulation.

(ii) Faced and Veneered Wall:

Faced Wall: A load-bearing wall with an outer layer of a different material (e.g., brick facing on a concrete block wall) bonded together during construction.

Veneered Wall: A non-load-bearing outer layer (e.g., brick veneer) attached to a load-bearing wall for decoration, not structurally bonded.