THE UNITED REPUBLIC OF TANZANIA

NATIONAL EXAMINATIONS COUNCIL OF TANZANIA

FORM TWO NATIONAL ASSESSMENT

071 BUILDING CONSTRUCTIONS

Time: 2:30 Hours **ANSWERS** **Year: 2022**

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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8		
9		
10		
TOTAL		
CHECKER'S INITIALS		

Prepared by: Maria Marco for TETEA

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) While investigating the site, a thick layer of fairly firm clay over a deep layer of soft clay is encountered. Which type of foundation will you suggest to be used in this situation?

A. Pile foundation

B. Raft foundation

C. Grillage foundation

D. Strip foundation

Soft clay layers require a deep foundation to transfer the load to a more stable stratum. A pile foundation, which extends deep into the ground, is suitable for such conditions.

Answer: A

ii) A client wants to make reinforced cement concrete. Which type of steel is best to use?

A. Stainless steel

B. High carbon steel

C. Mild steel

D. Wrought iron

Mild steel is commonly used in reinforced cement concrete (RCC) due to its good tensile strength, ductility, and cost-effectiveness. It also bonds well with concrete.

Answer: C

iii) Which part of a building is constructed above the plinth level?

A. Substructure

B. Basement

C. Foundation

D. Superstructure

The superstructure is the part of a building constructed above the plinth level, including walls, floors, and the roof. Substructure, foundation, and basement are below the plinth.

Answer: D

iv) Suppose you are involved in setting a level of a residential building foundation trench. Which tool is required for the work?

A. Ranging rod

B. Steel tape

C. Leveling staff

D. Boning rod

A boning rod is used to set and check the level of foundation trenches, ensuring uniformity in depth and alignment.

Answer: D

v) Which type of wall is constructed to divide the space within an office building?

A. Boundary

B. Fender

C. Party

D. Partition

A partition wall is used to divide space within a building, such as in an office, for functional separation.

Answer: D

vi) What type of an arch is used for high class buildings where appearance is of prime importance?

A. Ashlar

B. Rubble

C. Gauged brick

D. Axed brick

A gauged brick arch uses precisely cut bricks for a smooth, aesthetically pleasing finish, ideal for high-class buildings where appearance matters.

Answer: C

vii) Which one are essential sets of Personal Protective Equipment (PPE) for a technical secondary school workshop?

A. Goggles, sneakers, masks and overcoat

B. Short pants, overall, goggle and face shield

C. Face shield, goggles, overcoat, and sandals

D. Face shield, goggles, gloves and overcoats

Essential PPE for a workshop includes face shields, goggles, gloves, and overcoats to protect against hazards. Sneakers, short pants, and sandals are not suitable for safety.

Answer: D

viii) Suppose a concrete ratio of 1:3:6 is used for constructing a ground floor slab. Calculate the percentage of fine aggregate?

A. 100

B. 60

C. 30

D. 10

Concrete ratio 1:3:6 means 1 part cement, 3 parts fine aggregate (sand), and 6 parts coarse aggregate (gravel). Total parts = 1 + 3 + 6 = 10.

Percentage of fine aggregate = (3/10) × 100 = 30%.

Answer: C

ix) Identify the chemicals that are added to plastics during production so as to make it soft, flexible, and improve their toughness.

A. Powder fillers

B. Plasticizers

C. Lubricants

D. Binders

Plasticizers are chemicals added to plastics to increase softness, flexibility, and toughness by reducing the rigidity of the polymer chains.

Answer: B

x) Suppose the intermediate building between party walls of two buildings has to be demolished or rebuilt. What is the temporary support to be used?

A. Underpinning

B. Dead shore

C. Flying shore

D. Scaffolding

A flying shore is used as temporary support between two buildings to provide lateral stability during demolition or rebuilding of an intermediate structure.

Answer: C

2. Match the meaning of the brick walls bonds in List A with the corresponding technical term in List B by writing the letter of the correct answer in the table provided.

LIST A	LIST B
i) The bond having headers and stretchers laid at alternate courses and every course started with ¾ brick-bat	A. Heading bond
ii) The bond having all the bricks laid as stretchers in every course	B. Flemish bond
iii) The bond having all the bricks laid as headers in every course	C. Dutch bond
iv) The bond having headers and stretchers laid alternately in the same course	D. Zig Zag bond
v) The bond having headers and stretchers laid alternate course	E. Facing bond
	F. Raking bond
	G. English bond
	H. Stretching bond

i) Headers and stretchers in alternate courses, starting with ¾ brick-bat → C (Dutch bond)

ii) All bricks as stretchers in every course → H (Stretching bond, also known as Stretcher bond)

iii) All bricks as headers in every course → A (Heading bond)

iv) Headers and stretchers alternately in the same course → B (Flemish bond)

v) Headers and stretchers in alternate courses → G (English bond)

SECTION B (70 Marks)

Answer all questions from this section

3. Normally a big team of personnel are involved in constructions of big building projects. Why is it necessary to have the following team members?

a) Client

The client provides the project vision, funding, and requirements, ensuring the project meets their needs and expectations.

b) Contract Manager

The contract manager oversees the project's legal and financial aspects, ensuring compliance with contracts, budgets, and timelines.

c) Quantity Surveyor

The quantity surveyor manages costs, prepares bills of quantities, and ensures the project stays within budget.

d) General Foreman

The general foreman supervises on-site workers, coordinates daily activities, and ensures work progresses safely and efficiently.

4. Describe the use of following tools to a concrete block manufacturer:

a) Wheelbarrow

Used to transport raw materials like sand, cement, and gravel to the mixing area and to move finished blocks to the curing area.

b) Plates

Plates (likely referring to mold plates) are used to shape the concrete mixture into uniform blocks within the block-making machine.

c) Shovels

Shovels are used to mix cement, sand, and gravel manually or to load materials into the block-making machine.

d) Head Pans

Head pans are used to carry small quantities of mixed concrete or raw materials to the block-making machine or molds.

e) Trowels

Trowels are used to smooth the surface of freshly molded blocks, ensuring a neat finish and removing excess material.

5. Suppose an architect decides to use glass as a building material for the newly designed building.

a) What are the three advantages and three disadvantages of using glass as a building material?

Advantages

(i) Aesthetic Appeal: Glass provides a modern, transparent look and allows natural light to enter, enhancing the building's appearance.

(ii) Energy Efficiency: Glass can be designed (e.g., double-glazed) to improve thermal insulation, reducing energy costs.

(iii) Versatility: Glass can be used for windows, facades, and partitions, offering design flexibility.

Disadvantages

(i) Fragility: Glass is brittle and can break easily under impact or stress.

(ii) High Cost: High-quality glass (e.g., tempered or insulated) can be expensive to install and maintain.

(iii) Heat Transmission: Glass can transmit heat, leading to higher cooling costs unless treated.

b) Mention four building components which are made of glass.

(i) Windows: Glass panes for natural light and ventilation.

(ii) Doors: Glass doors for aesthetic entryways.

(iii) Partitions: Glass panels to divide interior spaces.

(iv) Skylights: Glass roofing elements to allow overhead light.

6. With the aid of single elevation, sketch the following parts of the brick wall which is under construction:

i) Header

ii) Stretcher

iii) Bed joints

iv) Vertical joints

v) Perpends

vi) Backing band

vii) Queen closer

Descriptions:

Header: The short end of a brick visible in the wall elevation, typically in a header course.

Stretcher: The long side of a brick visible in the wall elevation, typically in a stretcher course.

Bed Joints: Horizontal mortar layers between brick courses.

Vertical Joints: Vertical mortar joints between adjacent bricks in the same course (also called perpends).

Perpends: The vertical alignment of joints between bricks in consecutive courses, ensuring structural integrity.

Backing Band: Likely a typo; may mean "backing bond," referring to the inner part of a wall (e.g., in a cavity wall), often in a simpler bond like stretcher bond.

Queen Closer: A brick cut lengthwise to half its width, used to adjust the bond pattern and maintain alignment at wall ends or corners.

7. (a) Suppose a construction has stopped because of missing details of cavity wall. Provide detailed section sketch at the following areas of a cavity wall so that the construction can proceed:

i) At lintel

ii) At sill

i) At Lintel:

A cavity wall at the lintel includes two leaves (inner and outer) with a cavity. A lintel (concrete or steel) spans the opening, supported on both leaves. A damp-proof course (DPC) is placed above the lintel to prevent moisture penetration. The cavity is closed above the lintel with a cavity tray to direct water out via weep holes.

ii) At Sill:

At the window sill, the outer leaf slopes downward to shed water, and a DPC is placed under the sill to prevent moisture rising. The cavity is maintained, with weep holes at the base to drain any water that enters the cavity. The inner leaf supports the window frame.

(b) Briefly describe each of the following types of wall:

iii) Separating Wall

A separating wall divides two adjacent buildings or units (e.g., in terraced houses), providing fire resistance and sound insulation.

iv) A Curtain Wall

A curtain wall is a non-load-bearing wall, typically made of glass or metal, attached to the building's structural frame to enclose the exterior, providing weather protection and aesthetics.

v) Composite Wall

A composite wall combines different materials (e.g., brick outer leaf, concrete block inner leaf) to achieve strength, insulation, or aesthetic benefits.

8. (a) The construction cannot start until site clearance. Justify the statement by giving three advantages of site explorations:

i) Identify Soil Conditions: Determines soil type and bearing capacity for foundation design.

ii) Locate Utilities: Identifies underground utilities (e.g., water pipes, cables) to avoid damage.

iii) Assess Hazards: Detects potential hazards like groundwater or unstable slopes.

(b) Describe four operations involved during site clearance:

i) Removing Vegetation: Clearing trees, shrubs, and grass from the site.

ii) Excavating Topsoil: Removing the top layer of soil to reach stable ground.

iii) Demolishing Structures: Removing existing structures or debris if present.

iv) Leveling the Ground: Grading the site to ensure a flat surface for construction.

(c) What precautions should be observed during the site clearance operations? Give two precautions.

i) Safety Measures: Ensure workers wear PPE and use safe equipment to prevent accidents.

ii) Protect Utilities: Mark and protect underground utilities to avoid damage during clearance.

9. (a) Why seasoning of timber is recommended before use? Give six reasons:

i) Reduces Moisture Content: Prevents shrinkage and warping after construction.

ii) Increases Strength: Dry timber is stronger and more durable.

iii) Prevents Decay: Reduces the risk of fungal growth and rot.

iv) Improves Workability: Dry timber is easier to cut and shape.

v) Enhances Finish: Seasoned timber accepts paints and finishes better.

vi) Reduces Weight: Makes timber lighter for handling and transport.

(b) Briefly describe two methods to season timber:

i) Natural Seasoning: Timber is stacked in open air with spacers for ventilation, allowing it to dry naturally over months or years, protected from rain but exposed to air circulation.

ii) Kiln Seasoning: Timber is placed in a controlled kiln where heat and humidity are regulated to dry the timber quickly (in days or weeks), ensuring uniform drying.

SECTION C (15 Marks)

Answer all questions

10. (a) What are the three methods that can be adopted while digging foundation trenches in waterlogged sites?

i) Dewatering: Using pumps to remove water from the trench to keep it dry during excavation.

ii) Sheet Piling: Installing steel or timber sheets around the trench to hold back water and soil.

iii) Well Points: Installing a series of small wells around the site to lower the groundwater level.

(b) With aid of neat and labeled diagram, explain timbering to trenches in the following types of soil:

i) Firm soil

ii) Moderately firm soil

iii) Loose and waterlogged soil

i) Firm Soil:

Vertical timber planks (poling boards) are placed against the trench sides, held by horizontal walings and supported by vertical struts across the trench. Minimal support is needed due to soil stability.

ii) Moderately Firm Soil:

Poling boards are placed closer together, supported by multiple walings and struts. Additional diagonal braces may be used to prevent soil movement.

iii) Loose and Waterlogged Soil:

Continuous poling boards are used, tightly packed, with strong walings and closely spaced struts. Sheet piling may be integrated to hold back water, and wedges secure the timbering tightly.