THE UNITED REPUBLIC OF TANZANIA

NATIONAL EXAMINATIONS COUNCIL OF TANZANIA

CERTIFICATE OF SECONDARY EDUCATION EXAMINATION

071 BUILDING CONSTRUCTION

(For Both School and Private Candidates)

Time: 3 Hours **ANSWERS** **Year: 2007**

Instructions

1. This paper consists of sections A, B and C with total of fifteen questions

2. Answer all questions in section A and B, and two questions in section C.

i. The main poles used in a putlog scaffold are
A. flying raker, brace, putlog, standard
B. brace, putlog, walling board, standard
C. standard, putlog, braces, ledger
D. putlog, pole board, false work, standard
E. transom, rolling board, brace, putlog

the correct answer is c. in a putlog scaffold, standard vertical poles, putlog horizontal members, braces for lateral support, and ledgers for horizontal stability are the main components. these elements work together to provide a strong and stable scaffold structure.

ii. The client's representative on construction sites who records the daily activities at the site is known as
A. quantity surveyor
B. clerk of works
C. site foreman
D. site agent
E. sub-contractor

the correct answer is b. the clerk of works is responsible for overseeing construction progress, maintaining records, and ensuring work is done according to specifications and quality standards.

iii. The timber framework which is inserted into an opening of a wall where the door shutter is hung is
A. stiles
B. jamb
C. arch
D. door lining
E. transom

the correct answer is d. door lining is a framework that fits into a wall opening to support the door shutter, providing a mounting surface for hinges and securing the door in place.

iv. The type of bond that consists of alternate bricks laid as headers and stretchers in each course is called
A. flemish bond
B. english bond
C. stretcher bond
D. english garden wall bond
E. flemish garden wall bond

the correct answer is a. flemish bond consists of alternating headers and stretchers in every course, creating a strong and visually appealing brickwork pattern.

v. The type of single pitched roof consisting of a pair of rafters sloping down in two directions from the ridge and their feet supported on wall plate is known as

A. closed couple roof
B. double roof
C. collar roof
D. couple roof
E. mono-pitch roof

the correct answer is d. a couple roof consists of two inclined rafters meeting at the ridge, supported at their feet by a wall plate. this is a simple and traditional roofing system.

vi. The brickwork structure that carries the flue above the roof is called
A. chimney breast
B. throat
C. flue
D. chimney
E. hearth

the correct answer is d. a chimney is the structure that encloses and supports the flue, allowing smoke and gases to exit safely above the roof.

vii. Timber binders or steel beams are commonly used in
A. double floors in timber
B. upper floors
C. solid ground floor
D. raised timber ground floors
E. any floor

the correct answer is d. timber binders or steel beams are commonly used in raised timber ground floors to provide structural support and distribute loads evenly.

viii. Concrete sets to rock-like mass due to the chemical reaction which takes place between
A. fine aggregates and water
B. coarse aggregates and cement
C. water and cement
D. cement and fine aggregates
E. water and coarse aggregates

the correct answer is c. the hydration reaction between water and cement causes concrete to harden, forming a rock-like mass.

ix. The first task to be accomplished when setting out foundation on a building site is to
A. obtain a datum level
B. establish the building line
C. set profile boards

D. set right angles
E. measure the size of the building

the correct answer is b. establishing the building line ensures that the foundation and structure are positioned correctly according to design plans.

x. In order to prevent loss of water seal by induced siphonage
A. provide trap to the fittings
B. install a resealing trap to the fittings
C. fit an anti-siphon pipe 76mm from the crown of the trap
D. clean the traps to remove any material lodged in the trap which could cause loss of seal
E. both B and C are correct

the correct answer is e. installing a resealing trap and fitting an anti-siphon pipe help prevent loss of water seal due to siphonage, maintaining effective drainage and odor prevention.

2. match the items in list a with the responses in list b by writing the letter of the correct response beside the item number.

list a

i) a joint used between the rafters and wall plates in roof construction
ii) the vertical timber member used to support horizontal boards in timbering to trenches
iii) the sanitary fittings installed in buildings to collect the waste/ablutionary water and discharge to drain
iv) a structure constructed of voussoirs cut to wedge shape
v) one of disadvantages of using lime mortar
vi) in order to prevent smoke through the chimney as well as seal possible cracks in the chimney brick/block joints
vii) particle size and shape of aggregates
viii) the main role of the client
ix) the difference between a mortise lock and a rim lock
x) nosing

list b

a) sewer
b) it has low setting time thus allowing enough time to work on it
c) tongue and grooved joint
d) the former is fixed on the internal surface of the wall while the latter is fitted in a hole cut into the edge of the door
e) bird's mouth

f) waste fittings
g) segregation placing and compacting
h) the part of tread that projects beyond the riser
i) walling board
j) the internal face of the chimney should be lined with suitable flue liners
k) to estimate the cost of the project
l) rough arches
m) soil fittings
n) the former is fitted in a hole cut into the edge of the door while the latter is fixed on the internal surface of the door
o) poling board
p) gauged arch
q) the internal face of the chimney should be pointed
r) to finance the project
s) the part of stair that supports the balustrade
t) elements affecting the workability of concrete

correct answers

i) e
ii) o
iii) f
iv) p
v) b
vi) q
vii) g
viii) r
ix) d
x) h

3. a) define foundation.

a foundation is the lower structural part of a building that transfers the load from the structure to the ground, ensuring stability and support. foundations are designed based on soil conditions and load requirements.

b) state two factors upon which the choice of a type of foundation depends.

i) soil bearing capacity – the ability of the soil to support the weight of the building determines the type of foundation required.
ii) structural load – the type and magnitude of the load from the building influence whether a shallow or deep foundation is suitable.

4. a) what are cavity walls?

cavity walls are walls consisting of two parallel masonry layers (inner and outer leaves) separated by an air gap or insulation material. they help improve thermal insulation and prevent moisture penetration into buildings.

b) list two advantages of cavity walls in construction.

i) thermal insulation – the air gap or insulation material between the two wall leaves reduces heat transfer, keeping interiors cooler in summer and warmer in winter.
ii) moisture resistance – cavity walls prevent dampness from penetrating through the outer leaf into the inner structure, enhancing building durability.
5. a) why is the topsoil removed before digging the foundations?

topsoil is removed because it contains organic matter that decomposes over time, causing settlement and instability in the foundation. removing it ensures a stable, compact soil layer for structural support.

b) when does it become necessary to perform dewatering when excavating foundation trenches?

dewatering is necessary when groundwater or accumulated water in the excavation area threatens the stability of the trench. it is required in waterlogged soils or during the rainy season to prevent soil collapse and ensure proper foundation construction.

6. list four principal roof covering materials to pitched roofs.

i) corrugated metal sheets
ii) clay or concrete tiles
iii) thatch roofing
iv) slate roofing

7. a) what is portable water?
portable water is clean, treated water that is safe for human consumption. it is free from contaminants, bacteria, and harmful chemicals.

b) who carries out the taping of main pipes and laying the communication pipe when installing service pipes to buildings?
the installation and connection of service pipes to buildings are carried out by licensed plumbers or water supply authorities. they ensure proper tapping and secure installation of pipes.

8. explain briefly the difference between a common stairway and a private stairway.

a common stairway is used by multiple occupants within a building, such as in apartments and commercial buildings. it is designed for public access and follows safety regulations.

a private stairway is intended for use by a specific household or restricted individuals, commonly found in single-family homes or private offices.

9.what is meant by the following terms?

a) fine aggregates – sand or crushed stones smaller than 4.75mm in diameter used in concrete and mortar to provide smooth finishing.
b) coarse aggregates – larger particles, usually between 4.75mm and 20mm, used in concrete to provide bulk and strength.
c) all-in aggregates – a mixture of both fine and coarse aggregates used directly without grading.
d) clearing the site – the removal of vegetation, debris, and obstacles to prepare land for construction.

10.define the following terms:

a) angle of repose – the maximum natural slope at which loose material, such as soil or sand, remains stable without sliding.
b) glazing – the process of fitting glass into window frames, doors, or walls to allow natural light and visibility.

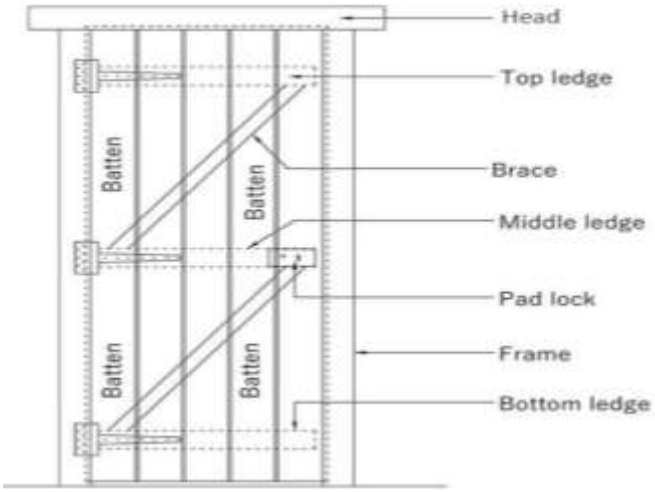
11.a) what is meant by in-situ floor finishes?

in-situ floor finishes are flooring materials that are applied and finished on-site rather than being prefabricated or installed as separate units.

b) give two examples of in-situ floor finishes.

i) terrazzo flooring
ii) polished concrete

12. sketch a framed, ledged, braced, and battened door and label any two parts.



13. a) differentiate between load-bearing walls and non-load-bearing walls and for each give two examples.

load-bearing walls support structural loads from floors and roofs and transfer them to the foundation. examples include brick masonry walls and reinforced concrete walls.
non-load-bearing walls only serve as partitions and do not carry structural loads. examples include drywall partitions and wooden stud walls.

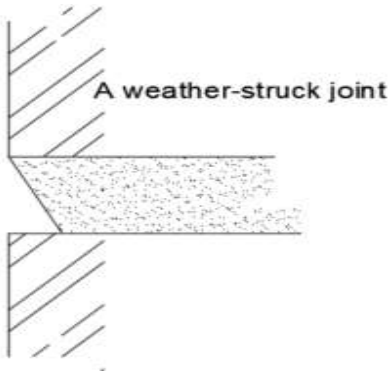
b) what is the difference between an arch and a lintel?

an arch is a curved structure that spans an opening and transfers loads to supports on either side, commonly used in traditional masonry.
a lintel is a horizontal beam placed across an opening to support the load above, typically made of concrete, steel, or wood.

c) describe the procedure of laying terrazzo floor finish.

i) prepare the subfloor by cleaning and leveling the surface.
ii) apply a base layer of cement mortar.
iii) mix and pour the terrazzo material (marble chips, granite, and cement).
iv) compact and level the mixture using rollers.
v) allow it to cure, then grind the surface to achieve a smooth, polished finish.
vi) apply sealant for durability and protection.

d) sketch weather struck joints as used in pointing.



Key Features of Weather Struck Pointing:

- Angled Surface: The mortar is applied with a downward slope, typically at a 45-degree angle, ensuring efficient water shedding.
- Enhanced Durability: The sloped design minimizes water penetration, reducing the risk of frost damage and prolonging the lifespan of the masonry.
- Aesthetic Appeal: This pointing style provides a clean, sharp appearance, emphasizing the horizontal lines of the brickwork.

14. a) define the following terms:

i) architrave – a decorative molding that surrounds a door or window opening.
ii) skirting – a strip of material fitted at the bottom of an interior wall to cover gaps between the wall and floor.
iii) building line – an imaginary boundary on a site plan that defines the permitted area for constructing a building.
iv) strutting – temporary or permanent supports used to prevent the lateral movement of structural elements.
v) stair – a structure consisting of steps that provide vertical movement between different levels in a building.

b) where are intercepting traps used?

intercepting traps are used in drainage systems to prevent foul gases from sewers from entering a building by creating a water seal.

15. a) describe briefly the following types of stairs:

i) straight flight stairs – stairs with no turns or landings, consisting of a single continuous flight.
ii) dog-legged stairs – stairs with two flights connected by a landing at a right angle.
iii) newel post stairs – stairs with a central newel post around which treads and risers are arranged, typically found in spiral or circular staircases.

b) differentiate between strip foundation and deep strip foundation.

strip foundation:
- a strip foundation is a continuous strip of concrete laid below load-bearing walls to distribute the weight evenly over a larger surface area.
- it is typically used in buildings with shallow soil layers that can support the load.
- the depth of a strip foundation is usually between 600mm to 1.5m, depending on soil conditions and load requirements.
- it is economical and easy to construct for low-rise buildings.

deep strip foundation:
- a deep strip foundation is an extended version of the strip foundation used when the top soil is weak or unstable.
- it is deeper than a normal strip foundation, usually extending beyond 1.5m to reach stronger soil layers.
- reinforcement is often added to increase strength and prevent settlement.
- it is used in cases where there are high loads or where soil conditions require a deeper foundation for stability.

c) explain where the following failures are likely to occur when a simply supported beam is loaded from the top.

i) maximum bending failure

- maximum bending failure occurs at the mid-span of the beam, where the bending moment is highest.
- when a simply supported beam is subjected to a uniform or concentrated load, the bending moment increases towards the center and reaches its peak at mid-span.
- the tensile stress at the bottom fiber and compressive stress at the top fiber exceed the beam's material strength, leading to failure.
- this type of failure usually manifests as cracking or breaking in the middle portion of the beam.

ii) maximum shear failure

- maximum shear failure occurs near the supports of the beam, where shear forces are highest.
- in a simply supported beam, shear forces are greatest at the points where the beam meets the supports, decreasing towards the mid-span.
- shear failure typically appears as diagonal cracks near the supports due to excessive shear stress exceeding the material's shear strength.
- this type of failure can cause the beam to split or collapse at the ends if not properly reinforced.