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: 2006**

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. Fireplace recess for class 1 appliances shall have a constructional hearth of thickness of not
A. less than 65 mm
B. more than 80 mm
C. less than 100 mm
D. more than 120 mm
E. less than 125 mm

c. less than 100 mm
A constructional hearth is designed to provide fire resistance and insulation beneath heating appliances. The minimum thickness required ensures safety and structural integrity while allowing adequate heat dispersion. Less than 100 mm is typically the standard for class 1 appliances.

ii. Which of the following is in the group of match boarded (or battened) doors?
A. Panelled doors
B. Fully glazed doors
C. Flush doors
D. Ledged braced and battened doors
E. Half glazed doors

d. ledged braced and battened doors
Match boarded or battened doors are constructed using vertical timber battens joined together, sometimes with horizontal and diagonal braces for added strength. Ledged, braced, and battened doors fall under this category because they use battens reinforced by braces and ledges.

iii. An inclined surface for foot or vehicular traffic used in buildings where steps would be dangerous is known as
A. ramp
B. balustrade
C. handrail
D. nosing
E. stair

a. ramp
A ramp is an inclined plane designed to provide a smooth transition between different levels, especially for individuals with mobility impairments or where steps would pose a safety hazard.

iv. Slump test is used to measure
A. segregation of concrete
B. bulking of concrete
C. amount of water in concrete
D. workability of concrete
E. quality of concrete

d. workability of concrete

The slump test measures the consistency and workability of fresh concrete, indicating how easily it can be placed and compacted without segregation.

v. In most of construction sites, the actual setting out of buildings is carried out by the

A. contractor
B. trench excavator
C. clerk of works
D. general foreman
E. surveyor

e. surveyor

Setting out involves marking the positions of buildings and structures on-site according to plans. Surveyors specialize in precise measurements and mapping, ensuring correct positioning.

vi. The spacing of floor joists in timber upper floor depends on

A. size of joists
B. span of room where the floor is being constructed
C. the type of end support
D. both A and B are correct
E. both A and C are correct

d. both a and b are correct

The spacing of floor joists depends on their size and the span they cover. Larger joists can span longer distances, reducing the number of supports required, while the span of the room influences the necessary spacing to maintain structural integrity.

vii. The main reinforcement bars in a concrete beam are placed at the

A. top of the beam to resist compressive stress
B. bottom of the beam to resist tensile stress
C. centre of the beam to resist both the tensile and the compressive stresses
D. top of the beam to resist the tensile stresses
E. top and bottom of beam to prevent both buckling and shear

b. bottom of the beam to resist tensile stress

In a simply supported beam, the bottom portion is subjected to tensile stress due to bending. Since concrete is weak in tension, reinforcement bars are placed at the bottom to improve the beam's tensile strength.

viii. The wall separating adjoining buildings belonging to different owners is known as

A. party wall
B. partition wall
C. fender wall

D. serpentine wall
E. curtain wall

a. party wall
A party wall is a shared wall between two adjacent buildings owned by different parties. It serves as a boundary and structural support for both properties.

ix. The type of foundation suitably used in areas where the soil is very weak like on made-up grounds or grounds that is liable to subsidence is
A. pad foundation
B. deep strip foundation
C. wide strip foundation
D. stepped foundation
E. raft foundation

e. raft foundation
A raft foundation is a large continuous slab that spreads the load of a structure over a wide area, making it suitable for weak or compressible soils where differential settlement might occur.

x. The type of valve fitted in storage tanks to control automatically the flow of water into the tank is
A. screw down stopcock
B. ball valve
C. bib tap
D. ferrule valve
E. full-way gate valve

b. ball valve
A ball valve is used in storage tanks because it operates automatically by floating on the water surface, closing the inlet when the tank is full and opening it when the water level drops.

2. Matching List A with List B

List A
a. The application of paints on surfaces of elements.
b. The separate system of drainage.
c. Horizontal timber boards that support polings.
d. A large horizontal straight piece of timber, concrete, or metal that forms one of the main structural members of a building.
e. A wooden piece provided after the fender wall.
f. An increase of water in a concrete mix.
g. In order to obtain slope or fall in timber flat roof.
h. The removal of top vegetable soil to a depth of 150 mm prior to construction.

i. A membrane layer whose purpose is to prevent dampness entering the building through concrete floor slab.
j. Balustrading.

List B
A. Wall rendering.
B. Provides both visual and practical safety barrier to the side of the stair.
C. Jamb.
D. Newel post.
E. Walling.
F. Damp proof course.
G. To obtain a level surface where the building is to be constructed.
H. Trimming joist.
I. Provides a protective coating, which increases the durability to the surface it has been applied.
J. The soil and waste matter from building discharge through one common pipe whereas surface/rain water discharges through a separate pipe.
K. The joists are laid spanning across the shorter span.
L. Damp proof membrane.
M. Column.
N. Improve workability.
O. Strut.
P. Firing piece is laid over the bridging joists.
Q. Beam.
R. Trimmer.
S. It contains decayed vegetation matter, which can damage the building.
T. The soil matter from soil filaments discharge through one common pipe while the waste matter from waste filaments discharge through a separate pipe.

Answers
a. i
b. j
c. k
d. q
e. c
f. n
g. p
h. g
i. l
j. b

3. list four qualities of a good mortar

a. workability – good mortar should be easily mixed, placed, and spread without segregation or excessive water loss. this ensures smooth application and better bonding between bricks or stones.

b. strength – mortar should have sufficient compressive and bond strength to hold masonry units together and support structural loads effectively.

c. durability – a good mortar should be resistant to weathering, moisture penetration, and chemical attacks to ensure long-term structural integrity.

d. setting time – it should have an appropriate setting time that allows for proper adjustments during construction but also hardens within a reasonable period for stability.

4. differentiate between safe bearing capacity and ultimate bearing capacity of soil

safe bearing capacity is the maximum load per unit area that soil can support safely without the risk of excessive settlement or failure. it considers a safety factor to ensure the stability of the structure built on it.

ultimate bearing capacity is the absolute maximum load per unit area the soil can withstand before it undergoes shear failure. it represents the theoretical limit beyond which the soil collapses.

5. sketch a collar beam

a collar beam is a horizontal beam that joins opposing rafters at a high level, preventing them from spreading due to roof loads. it enhances structural stability in pitched roofs. the sketch should include rafters, collar beam, ridge board, and wall plates.

6. (a) at what particular place is an ash set constructed in fireplaces?

an ash pit is constructed directly below the fire grate in a fireplace. it is a recessed chamber designed to collect ashes and residue from burnt fuel, making cleaning and maintenance easier. the pit is often built using heat-resistant materials such as bricks or reinforced concrete.

(b) list two products of combustion while the fuel burns in a fireplace

a. carbon dioxide (co_2) – formed when carbon in the fuel reacts completely with oxygen, producing a colorless and odorless gas.
b. water vapor (h_2o) – generated when hydrogen in the fuel combines with oxygen during combustion, released as steam.

7. explain very briefly the difference between

(a) english bond and flemish bond

english bond consists of alternating courses of headers and stretchers. this bond provides high strength and is commonly used in load-bearing walls.

flemish bond is formed by alternating headers and stretchers in each course, giving a more aesthetic appearance but requiring greater skill to construct.

(b) english garden wall bond and flemish garden wall bond

english garden wall bond consists of three or more courses of stretchers between each course of headers, used mainly in non-load-bearing garden walls.

flemish garden wall bond follows the flemish bond pattern but incorporates decorative elements, making it more visually appealing for garden walls.

8. what are purlins?

purlins are horizontal structural members used in roof construction to support the roof covering and transfer loads to the main frame of the building. they are typically placed between rafters and the roof sheeting.

9. (a) define a scaffold

a scaffold is a temporary structure used in construction to provide workers with safe access to elevated areas. it consists of platforms supported by poles, frames, or brackets and is used for building, repairing, or maintaining structures.

(b) differentiate between bricklayer's scaffold and a mason's scaffold

a bricklayer’s scaffold is designed for brickwork construction and consists of narrow platforms that allow bricklayers to work efficiently along the length of a wall.

a mason’s scaffold is used for heavier masonry work, such as stone or concrete, and has wider platforms to accommodate the additional weight of materials and tools.

10. what are traps and why are they provided in drainage works?

traps are plumbing components designed to hold a small amount of water to prevent foul sewer gases from entering buildings.

they are provided in drainage systems to:

a. create a water seal that blocks the passage of harmful gases from sewers into living spaces.
b. prevent the entry of pests and insects through drainage pipes.
c. improve sanitation by preventing the backflow of waste and odors.

11. state two purposes of providing landings on stairs

a. to provide a resting space for users, especially in long staircases, making climbing easier and safer.
b. to allow a change in the direction of stairs in areas with limited space, improving accessibility in architectural designs.

12. sketch a raised timber ground floor and label any two parts

a raised timber ground floor consists of joists supported on bearers, elevated above the ground. the sketch should include:
a. joists – horizontal beams that support the floorboards.
b. bearers – structural members that transfer loads from the joists to supporting piers or walls.

13. (a) state the functions of ground floors

a. to provide a stable base for occupants and furniture.
b. to distribute loads evenly to the foundation.
c. to prevent moisture from rising into the building.
d. to provide insulation and comfort.

(b) explain the reasons for filling the space at the back of cavity wall with weak concrete mix except at window and door openings

a weak concrete mix is used in cavity walls to improve insulation and prevent moisture penetration. however, it is omitted at window and door openings to allow for easy installation of frames and to avoid excessive weight that may affect the structure's integrity.

(c) what are copings and what do they serve in walls?

copings are protective coverings placed on top of walls to prevent water penetration. they serve to:
a. protect walls from weather damage.
b. improve the durability of masonry walls.
c. provide an aesthetic finish to the structure.

14. (a) explain how to

(i) apply cement-sand plaster to walls

a. clean the wall surface and dampen it before applying plaster.

b. mix cement, sand, and water to form a consistent paste.
c. apply the first coat using a trowel, ensuring even thickness.
d. smooth the surface using a straight edge and wooden float.
e. allow the plaster to cure properly.

(ii) fix glass to window frames using putty

a. clean the window frame and apply a thin layer of putty to create a base.
b. place the glass into the frame and press it gently into the putty.
c. apply another layer of putty around the glass edges to secure it.
d. smooth the putty with a putty knife for a neat finish.
e. allow the putty to dry before painting or sealing.

(b) what is the purpose of d.p.c. in buildings?

damp proof course (d.p.c.) is a barrier inserted into walls and floors to prevent moisture from rising into the building structure. its purposes include:
a. preventing dampness in walls and floors.
b. protecting buildings from mold and structural damage.
c. increasing the longevity of construction materials.

(c) explain the tee hinge

a tee hinge is a type of hinge shaped like the letter "t," used for securing doors, gates, and shutters. the long strap of the hinge provides additional support and stability, making it suitable for heavy wooden doors and gates.

15. what is meant by the following terms and where are they used?

(i) shoring – temporary support provided to a structure to prevent collapse during repairs or excavation. used in buildings and trench work.

(ii) centering – temporary framework used to support arches or curved structures during construction. commonly used in bridge building.

(iii) formwork – molds used to shape and support wet concrete until it hardens. widely used in columns, beams, and slabs.

(iv) timbering to trenches – the use of timber planks and struts to prevent trench walls from collapsing. applied in excavation and underground utilities.

(b) explain the difference between separate and combined drainage systems

a separate drainage system has separate pipes for carrying stormwater and wastewater, preventing contamination and allowing rainwater to be directed into natural water bodies.

a combined drainage system uses a single pipe to carry both stormwater and wastewater, leading to a treatment plant. while cost-effective, it poses risks of overflow and pollution during heavy rains.