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: 2001**

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. one function of a window sill is to

a. allow free air circulation
b. serve as a decoration to a house
c. shed away the rainwater from the window
d. serve as an aid during an emergency exit
e. serve as a shelter to the window

c. shed away the rainwater from the window
a window sill helps direct rainwater away from the wall below the window, preventing water damage and improving durability.

ii. the following are reasons for providing openings in a building wall except

a. provide vision outside
b. allow space for door and window
c. provide access to the occupants
d. act as a decoration
e. allow free air circulation

d. act as a decoration
openings in walls serve functional purposes such as ventilation, lighting, and accessibility, while decoration is not a primary reason for creating openings.

iii. the function of a baffle wall in a septic tank is to
a. prevent the sewage solids from passing through and direct it back to the bottom of the tank to be broken into liquid and sludge
b. allow the wastewater liquids to pass through the tank and control the flow of effluent to the soakaways
c. prevent the sewage solids from passing through and direct it to the bottom of the tank to be broken into liquid and sludge and to control the flow of effluent to the soakaways
d. prevent the flow of effluent from passing straight to the soakaways
e. allow the sewage solids to pass through and direct it back to the bottom of the tank to be broken into liquid and sludge

c. prevent the sewage solids from passing through and direct it to the bottom of the tank to be broken into liquid and sludge and to control the flow of effluent to the soakaways
baffle walls slow down the flow of sewage in a septic tank, ensuring solids settle at the bottom while allowing only treated liquid to move to the soakaway system.

iv. the main reason for providing throat air slots on top of the fireback is to
a. allow the volume of heated air to escape through the flue
b. allow the volume of heated air to enter through the flue
c. prevent the volume of cold air from escaping through the flue

d. allow the volume of cold air to enter through the flue
e. prevent the volume of heated air from escaping through the flue

a. allow the volume of heated air to escape through the flue
throat air slots help direct heated air efficiently toward the flue, improving combustion and preventing smoke from escaping into the room.

v. an inclined surface for foot or vehicular traffic used in buildings where steps would be dangerous is
a. ramp
b. nosing
c. flight
d. baluster
e. handrail

a. ramp
a ramp provides a gradual slope for accessibility, making it easier for wheelchairs, carts, and pedestrians to move between levels without using stairs.

vi. the difference between columns and beams is that
a. columns support all loads above and transmit them to beams, which in turn take these loads down to the foundation
b. columns support all loads under them and transmit them (the loads) to the beams which in turn take them up to the foundation
c. beams support all loads above and transmit them to the columns, which in turn take them down to the foundation
d. beams support all loads under them and transmit them (the loads) to columns which take them to the foundation for supporting
e. beams transmit all loads to the foundation and support columns which carry dead and imposed loads from the foundation

c. beams support all loads above and transmit them to the columns, which in turn take them down to the foundation
beams provide horizontal support, transferring loads to vertical columns, which then transmit the loads safely to the foundation.

vii. the following metals are used as roof covering materials except

a. lead
b. copper

c. zinc
d. iron
e. aluminium

a. lead
lead is not commonly used for roof covering due to its toxicity and environmental concerns, whereas materials like copper, zinc, iron, and aluminium are widely used for their durability and corrosion resistance.

viii. a gutter is a device fixed to the

a. ends of roof eaves, for the purpose of draining out rainwater from dropping directly to the roof surface
b. ends of windows for the purpose of removing rainwater from dropping directly to the window sill
c. inside of the window for the purpose of directing light inside the building
d. the end of roof eaves for the objective of draining rainwater from dropping directly to the wall surface
e. the top of the door for the purpose of draining rainwater from entering the building

d. the end of roof eaves for the objective of draining rainwater from dropping directly to the wall surface
gutters are installed along the edges of the roof eaves to channel rainwater away from the building walls and foundation, preventing erosion and water damage.

ix. the suitable materials for making fireback for the construction of fireplaces are
a. reflective aluminium plates of very small thickness
b. clays containing low proportions of sand with alumina
c. clays containing high proportions of sand and silica
d. reflective aluminium plates coated with iron
e. clays containing high proportions of sand and alumina

e. clays containing high proportions of sand and alumina
firebacks are made from heat-resistant materials like clay bricks with high sand and alumina content to withstand high temperatures and prevent heat damage to surrounding structures.

x. what is the difference between architrave and door lining
a. architrave is a decorative moulding fixed or cut around doors and windows to emphasize and decorate the opening, while the door lining is a timber board 25 mm or 32 mm thick and is as wide as the reveal of the opening in which the door is hung
b. architrave is a decorative moulding fixed to windows only for decoration of windows, while door lining is a timber board for supporting the door frame
c. architrave is a supporting wedge at the window frame placed during construction for strength, while door lining is a decorative feature fixed on the door surface
d. architrave is a supporting device for casement windows, while door lining is the top part of a flush door
e. architrave is a decorative device for doors only, which is placed at the top face of the door, while door lining is a supporting device for a door for friction reduction during opening

a. architrave is a decorative moulding fixed or cut around doors and windows to emphasize and decorate the opening, while the door lining is a timber board 25 mm or 32 mm thick and is as wide as the reveal of the opening in which the door is hung
architraves are primarily used for aesthetic purposes, framing doors and windows, while door linings provide structural support and ensure a smooth fit for doors within openings.

2. Matching items
List A

i. contractor
ii. lean-mix concrete
iii. a factor to be considered when determining the size of a fireplace
iv. dewatering
v. the process of covering the outside of the frame to provide a base for the exterior finish
vi. function of wall plate
vii. ground water table
viii. roof covering materials
ix. extrados
x. glazing

List B

a. level at which water occurs naturally below the ground
b. type of fuel to be burnt
c. process of removing or adding water to the excavation for construction works to proceed smoothly
d. forms a firm level surface on which timber joist can bear and spreads the point load from joist uniformly along the wall length below it
e. the placing of mirrors in the prepared places like baths and bedrooms for dressing purposes
f. the external curve of the arch
g. a person whose role is to carry out the design and supervision work
h. type of fuel to be heated
i. panelling
j. forms a level surface on which gutters can rest and assist the gutter to take rainwater to the discharge pipe
k. level at which water stays after pumping the spring water to the excavated trench for construction purposes
l. the securing of glass in prepared openings like doors, windows, and partitions
m. the wedge-shaped bricks or blocks which comprise an arch
n. a person whose role is to carry out construction work
o. tiles, slates, and ceiling boards
p. materials used for road construction works, especially in road base where bituminous surfacing is to be used
q. sheathing
r. material used for filling of roof joints especially in places where bituminous materials are preferred

s. process of removing or excluding water from the excavation for the construction works to proceed with less inconvenience
t. thatch covering, shingles, and tiles

Answers

i - n
ii - c
iii - b
iv - s
v - i
vi - d
vii - a
viii - t
ix - f
x - l

3. write down four functions of upper floors

a. provide additional usable space for residential, commercial, or office purposes
b. distribute load evenly to lower structural elements such as walls and columns
c. separate different functions within a building, such as bedrooms above and living spaces below
d. provide insulation and soundproofing between floors to enhance comfort

4. list four purposes of thermal insulation of walls

a. reduce heat transfer between the interior and exterior to maintain comfortable indoor temperatures
b. minimize energy consumption for heating and cooling, improving efficiency
c. prevent condensation and moisture buildup inside walls, reducing the risk of mold growth
d. enhance sound insulation, reducing external noise penetration into the building

5. define four of the following terms as used in stairs

a. tread – the horizontal part of a step where the foot is placed when ascending or descending
b. riser – the vertical part of a step that connects two consecutive treads, determining step height
c. rise – the total vertical distance a staircase covers from one floor level to another
d. string – the inclined structural member supporting the treads and risers in a staircase
e. balustrade – a protective barrier consisting of balusters and a handrail, provided along open staircases for safety

6. mention four requirements of a good roof

a. durability – it should withstand weather conditions such as rain, wind, and sun exposure
b. proper drainage – it should have an efficient slope or gutter system to drain rainwater effectively
c. insulation – it should provide thermal resistance to maintain comfortable indoor temperatures
d. structural stability – it should be strong enough to bear imposed loads like snow, wind, and maintenance work

7. explain briefly what you understand by dampness due to structural causes

dampness due to structural causes occurs when moisture enters a building through faulty design, poor construction, or material defects. common causes include cracks in walls, poor drainage systems, and inadequate waterproofing.

8. what are the four disadvantages of using tubular steel scaffolding for temporary staging, posts, and bracings to support heavier loads?

a. high cost – tubular steel scaffolding is more expensive compared to wooden scaffolding
b. corrosion – steel requires protective coatings to prevent rust and deterioration over time
c. weight – steel scaffolding is heavier and requires more effort for assembly and transport
d. electrical conductivity – steel scaffolding poses a risk of electrical hazards if it comes into contact with power lines

9. a. what is a foundation?

a foundation is the structural base of a building that transfers loads from the structure to the ground safely, ensuring stability and preventing settlement.

b. write short notes on concrete piles as applied to pile foundations

concrete piles are long, slender columns driven deep into the ground to support structures where soil conditions are weak. they transfer building loads to stronger soil or rock layers beneath, improving stability and preventing settlement.

10. give two reasons why external doors are fixed to open outwards

a. safety – outward-opening doors facilitate quick evacuation during emergencies like fires
b. weatherproofing – outward-opening doors prevent wind pressure from forcing them open and reduce water infiltration during heavy rains

11. list two site clearance activities for the construction of a large spanned building

a. removal of vegetation, debris, and obstructions to create a level construction site
b. excavation and grading to prepare the ground for foundation work

12. a. what is the main purpose of an intercepting trap in a drainage system?

an intercepting trap prevents foul gases from the main sewer from entering a building's drainage system, improving hygiene and reducing odor issues.

b. what is the disadvantage of an intercepting trap in a drainage system?

a major disadvantage is that intercepting traps can become clogged with debris, leading to blockages and requiring frequent maintenance to ensure proper drainage flow.
13.

a. The mix ratio of reinforced concrete meant for foundation works is 1:2:4. If 5 bags of cement, each weighing 50 kg, are used but during unloading of cement bags a wastage of 20% occurs, calculate:

i. The amount of water needed in liters given that the water/cement ratio is 0.4 and 1 liter of water = 1 kg

- Total cement used = 5 bags × 50 kg = 250 kg
- Wastage of cement = 20% of 250 kg = 50 kg
- Effective cement used = 250 kg - 50 kg = 200 kg
- Water required = 0.4 × 200 kg = 80 liters

ii. The amount of sand needed for the work which needs the amount of water computed in (i) above

- Mix ratio is 1:2:4 (cement : sand : aggregate)
- Sand required = 2 × Cement used = 2 × 200 kg = 400 kg

iii. The amount of aggregate for the work

- Aggregate required = 4 × Cement used = 4 × 200 kg = 800 kg

b. List five places along the drainage system where inspection chambers must be placed.

i. At the junction where two or more drains meet
ii. At every change of direction in a drain
iii. At changes in gradient of the drainage system
iv. At regular intervals along long straight drain runs
v. At the connection between a private drain and the public sewer

14.a. Explain briefly two methods of ensuring safety when working in trenches.

i. Shoring - Using timber, steel, or hydraulic supports to prevent trench walls from collapsing.
ii. Sloping or benching - Cutting the sides of the trench at an angle to prevent cave-ins.

b. Describe the main operations of R.C.C. (Reinforced Cement Concrete) column construction.

i. Site preparation - Marking the position of the columns according to structural plans.
ii. Formwork installation - Erecting molds to shape the column.
iii. Reinforcement placement - Placing steel bars within the formwork to enhance strength.
iv. Concrete pouring - Mixing and placing concrete into the column mold.
v. Curing - Keeping the column moist for several days to allow proper strength development.

c. Mention five advantages of steel roof trusses over timber roof trusses.
i. Higher strength - Steel trusses can carry heavier loads than timber.
ii. Longer lifespan - Steel is resistant to rot, termites, and warping.
iii. Fire resistance - Unlike timber, steel does not burn.
iv. Lighter weight - Steel trusses are lightweight yet strong, reducing overall structural load.
v. Eco-friendly - Steel trusses can be recycled, making them a sustainable building option.

15. a. List the chief ways through which moisture gets into the walls of a building.
i. Rising damp - Moisture from the ground rises through porous wall materials.
ii. Penetrating damp - Rainwater seeps through cracks or porous external walls.
iii. Condensation - Moisture in warm indoor air condenses on cooler surfaces.
iv. Leakages - Water enters through plumbing defects or roof leaks.

b. Explain briefly two types of settlement of a building foundation.
i. Uniform settlement - The entire foundation sinks evenly due to soil compaction.
ii. Differential settlement - Different parts of the foundation sink at different rates, causing structural cracks.

c. Mention five factors that determine the size of gutters and downpipes.
i. Roof area - Larger roofs require bigger gutters to handle rainwater.
ii. Rainfall intensity - Higher rainfall requires larger gutters and downpipes.
iii. Roof slope - Steeper roofs shed water faster, affecting drainage capacity.
iv. Material of gutters - Different materials have different flow capacities.
v. Number of downpipes - More downpipes reduce the load on individual sections of the gutter system.