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: 2008**

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 two construction methods applied in the building industry are
A. modern and industrialized
B. traditional and conventional
C. modern and technology
D. conventional and modern
E. mud and conventional

The correct answer is A. Modern and industrialized construction methods involve the use of advanced technology, prefabrication, and mechanized techniques to improve efficiency, quality, and sustainability in the building industry.

ii. Which of the following mix represents plain concrete?
A. 1:2:4
B. 1:3:6
C. 1:1½:9
D. 1:4:8
E. 1½:3½:6

The correct answer is A. Plain concrete is commonly mixed in a ratio of 1:2:4, which means one part cement, two parts sand, and four parts aggregate. This mix provides adequate strength and workability for non-reinforced structural elements.

iii. Levelling in site preparation means
A. reduced level
B. cut level
C. fill up level
D. beat up level
E. sport level

The correct answer is B. Cut level refers to the process of removing soil to achieve the desired ground level before construction. It ensures a uniform surface for the foundation and helps in maintaining structural stability.

iv. Settlement is defined as downward
A. transfer of building loads
B. carried loads of the building
C. movement of the ground
D. passage of moisture
E. action of building loads

The correct answer is C. Settlement occurs when the ground beneath a structure compresses due to the weight of the building, leading to downward movement. It can result from soil compaction, poor foundation design, or groundwater depletion.

v. The tube which bears on the ground on an adjacent structure is called
A. bridles
B. sole plates
C. reveal ties
D. raker
E. standard

The correct answer is D. A raker is an inclined support or brace used in scaffolding and shoring systems to provide stability and transfer loads to the ground.

vi. One of the following is used to divide space within the building
A. fender wall
B. retaining wall
C. internal wall
D. parapet wall
E. external wall

The correct answer is C. Internal walls are non-load-bearing or load-bearing partitions used to separate different rooms and spaces within a building.

vii. Floor construction depends on
A. student gender-hood
B. purpose and materials
C. prevailing wind
D. uses only
E. soil bearing capacity

The correct answer is E. Soil bearing capacity is a crucial factor in floor construction, as it determines the type of foundation and flooring system required to support the structure without excessive settlement or failure.

viii. In roofing, a verge is defined as
A. a horizontal timber providing intermediate supports to spars
B. a structure formed by members framed together for supporting purlins
C. a small piece of wood to which tiles are secured
D. an edge of a roof which runs from eave to ridge at a gable
E. a line produced when three or more roof surfaces intersect to form an angle

The correct answer is D. The verge is the edge of a pitched roof at a gable end, running from the eaves to the ridge. It provides support to roof coverings and enhances aesthetics.

ix. Door set consists of
A. shutter plus frame and hinges

B. door plus shutter and locks
C. door plus hinges and screws
D. shutter plus hinges and wire nails
E. door plus frame and screws

The correct answer is A. A door set typically includes a shutter, frame, and hinges, ensuring proper installation and functionality of the door.

x. The total area of the ventilation opening must exceed ___ of the floor area of the room
A. 1/50
B. 1/40
C. 1/30
D. 1/20
E. 1/10
The correct answer is D. To ensure proper air circulation and indoor air quality, ventilation openings should be at least 1/20 of the floor area of a room.

2. Matching List A with List B

list a

i) the roof which is sloping in four directions of the building
ii) a sloping roof having glazing fixed on the steep sloping sides of it
iii) is the lower edges of the surface of a sloping roof
iv) one of the functions of purlins
v) roof finishing materials out of metal
vi) the basic structural shape in pitched roof construction
vii) heavy finishing which needs more timber to be put in place
viii) the main purpose of a flat roof having a gentle slope
ix) the members supporting the battens or boarding under the covering of a sloping roof
x) a wooden board fixed to the ends of the common rafters projecting beyond the gabled end of a sloping roof

list b

a) support roof covering material
b) to dispose rain water
c) corrugated asbestos sheets
d) to support mono pitched roof
e) barge
f) triangle
g) mansard truss roof

h) plain tiles
i) hipped roof
j) common rafter
k) corrugated galvanized iron sheets
l) to support wall plate
m) breaking the blowing winds
n) gable
o) jack rafter
p) saw tooth or north light roof
q) barge board
r) rectangular
s) eaves
t) interlock

correct answers

i) i
ii) d
iii) s
iv) a
v) h
vi) f
vii) k
viii) m
ix) o
x) q

3. a) define the term sewage.
sewage refers to wastewater and human excreta from residential, commercial, and industrial sources that flow through drainage and sewer systems. it includes liquid and solid waste from toilets, kitchens, and other sanitary facilities. proper treatment of sewage is essential to prevent pollution and maintain public health.

b) what is surface water?
surface water is water that collects on the ground or in natural bodies like rivers, lakes, and ponds as a result of precipitation, runoff, or overflow from underground sources. it can be affected by environmental factors such as evaporation, contamination, and seasonal variations.

4. list down the four types of ball valves.
i. float-operated ball valve – a valve controlled by a floating device, commonly used in water storage tanks to regulate water levels.
ii. full bore ball valve – a type of valve with an unrestricted flow path, allowing maximum fluid passage.
iii. reduced bore ball valve – a valve with a smaller internal diameter, controlling flow rates efficiently in pipelines.

iv. v-port ball valve – a specialized valve with a v-shaped ball opening that provides precise flow control.

5. label the parts of the open fireplace indicated in figure 1.
- i) chimney
- ii) smoke chamber
- iii) firebox
- iv) hearth
- v) mantel
- vi) lintel
- vii) ash pit
- viii) foundation

6. label the indicated parts of a stair in figure 2.
- a) tread
- b) riser
- c) going
- d) nosing
- e) handrail
- f) stringer
- g) pitch line
- h) landing

7. a) what is a screw?
a screw is a type of fastener with a helical thread around a cylindrical shaft, designed to be inserted into materials by rotating it. screws provide secure fastening by gripping materials and preventing movement or loosening.

b) how are screws classified?
screws are classified based on their head type, thread type, and application. the main classifications include wood screws, machine screws, self-tapping screws, drywall screws, and sheet metal screws.
c) mention two types of screws.
i. wood screws – designed for fastening wood materials, featuring a coarse thread and pointed tip.
ii. machine screws – used with nuts or threaded holes, having uniform threading along the shaft.

8. mention four factors to be considered during roof design.

i. load-bearing capacity – the roof should support its own weight, imposed loads such as snow, and external forces like wind.
ii. climate conditions – factors such as rainfall, wind speed, and temperature variations influence roof material selection.
iii. drainage – proper slope and gutter systems must be included to prevent water accumulation.
iv. durability and maintenance – the roof should be made from materials that resist weathering and require minimal maintenance.

9. a) list down the three headings to be considered during the construction of a solid ground floor.
i. sub-base preparation – involves leveling and compacting the soil to provide a stable foundation.
ii. damp-proofing – applying damp-proof membranes to prevent moisture from rising through the floor.
iii. finishing – installing surface layers such as tiles, concrete, or wooden flooring to enhance durability and aesthetics.

b) give two purposes of hardcore during floor construction.
i. provides a stable base – hardcore stabilizes the ground, preventing settlement and uneven flooring.
ii. improves drainage – it allows water to drain efficiently, preventing dampness and structural issues.

10. a) mention two loads transmitted by columns in building work.

i. dead load – the weight of permanent structural elements such as walls, floors, and roofs.
ii. live load – temporary or movable forces such as furniture, people, and equipment.

b) distinguish dead loads from live loads.

dead loads are constant and do not change over time, including the weight of structural components. live loads vary and change with use, such as occupancy, furniture, and environmental forces.

11. a) what factors lead to the selection of methods in arches construction?

i. span of the arch – wider spans require stronger construction methods.
ii. material availability – the choice of construction method depends on the type of materials available.
iii. structural requirements – different methods are needed based on load-bearing needs and building design.
iv. aesthetic considerations – some construction methods are chosen for their visual appeal.

b) outline four processes of constructing an arch.

i. preparing formwork – constructing a temporary support structure for the arch.
ii. laying the voussoirs – placing the wedge-shaped stones or bricks in position.
iii. installing the keystone – setting the central stone that locks the arch in place.
iv. removing formwork – after ensuring stability, the temporary supports are carefully removed.

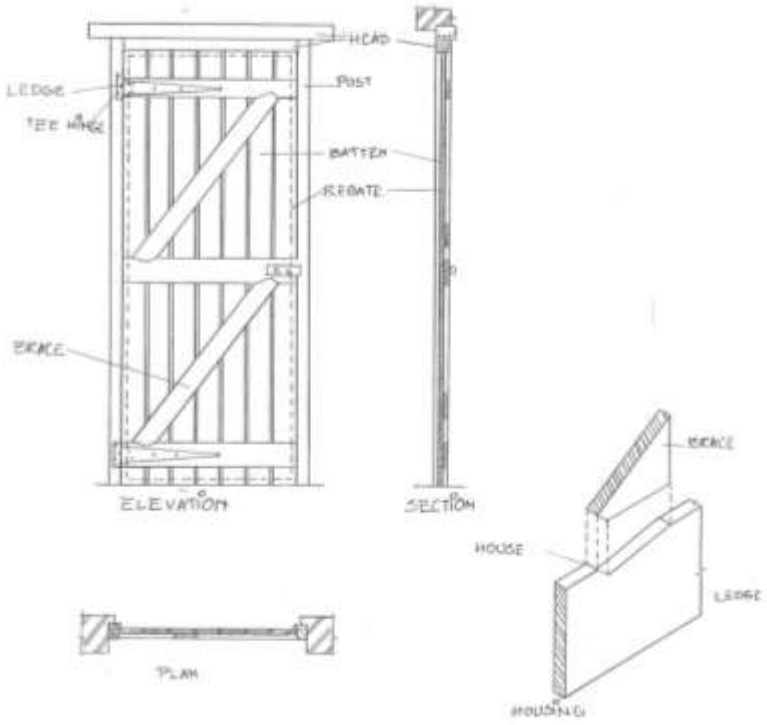
12. a) give two reasons for bonding the walls of a building.

i. to improve structural strength – bonding ensures that bricks or blocks interlock, increasing stability.
ii. to enhance load distribution – proper bonding evenly distributes loads, reducing stress on individual blocks.

b) what is a parapet wall in a building?

a parapet wall is a low protective wall extending above the roofline, balcony, or terrace of a building. it serves to enhance safety, prevent falls, and shield the roof from wind and rain.

13. a) make a neat and well-labeled rear elevation sketch of a ledged and battened door.



Key Components:

- Battens: Vertical wooden boards that form the main body of the door.
- Ledges: Horizontal members fixed across the battens to hold them together and provide structural support.
- Braces (optional): Diagonal supports that can be added between the ledges to prevent sagging and enhance rigidity.
- Frame: The outer structure that encloses the door, providing a surface for hinges and securing the door within the doorway.

b) define

i. half-turn stair – a staircase that turns 180 degrees at an intermediate landing, changing direction between two flights.
ii. headroom of a stair – the vertical space between the tread of a stair and the ceiling above, ensuring safe clearance.
iii. winder of a stair – a stair tread that is wider at one end and narrower at the other, used in curved or spiral staircases.

c) list down four materials for making windows.

i. timber
ii. aluminum
iii. steel
iv. pvc (polyvinyl chloride)

d) state the functions of the following items.

i. door bolts – provide additional security by locking the door from the inside.
ii. tee hinges – used for hanging and supporting heavy doors, allowing smooth movement.

14. a) explain

i. shallow foundation – a type of foundation that transfers building loads to the surface or near-surface soil layers, such as strip, raft, and pad foundations.
ii. deep foundation – a foundation that transfers loads to deeper soil layers or rock strata, including pile and pier foundations.

b) what is the advantage of having access to the site?

having site access allows for efficient transportation of materials, movement of workers, and proper site management, reducing delays and improving safety.

c) why are the ends of reinforcements cranked into hooks?
cranking reinforcement bars into hooks improves anchorage and bonding within concrete, preventing slipping and ensuring structural stability.
d) why is it important for the scaffolds to be stable and strong?

stable scaffolds provide safe working platforms for laborers, preventing falls and structural collapses during construction.

15. a) mention six principles of good drainage.

i. proper slope – ensures smooth water flow and prevents stagnation.
ii. adequate capacity – drainage systems should handle peak water flow without overflow.
iii. efficient discharge – drainage must lead to suitable disposal points like sewers or soakaways.
iv. debris protection – drainage should have screens or filters to prevent blockages.
v. durability – materials used should resist erosion and corrosion.
vi. accessibility – drainage systems should allow easy maintenance and cleaning.

b) i. list down four materials for constructing beams.

i. reinforced concrete
ii. structural steel
iii. timber
iv. prestressed concrete

ii. mention four shapes of reinforced concrete columns.

i. rectangular
ii. circular
iii. square
iv. hexagonal

c) identify four materials required to build a timber floor.

i. floor joists
ii. floorboards
iii. wall plates
iv. sleeper walls

d) i. what is the function of roofing felt?

roofing felt provides waterproofing, protecting the roof structure from moisture damage and leaks.

ii. name four materials used as roofing felt.

i. bitumen felt
ii. synthetic polymer sheets
iii. asphalt-saturated felt
iv. fiberglass-based felt