THE UNITED REPUBLIC OF TANZANIA

NATIONAL EXAMINATIONS COUNCIL OF TANZANIA

CERTIFICATE OF SECONDARY EDUCATION EXAMINATION

074 CARPENTRY AND JOINERY

(For Both School and Private Candidates)

Time: 3 Hours **ANSWERS** **Year: 2010**

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.

1. (i) A continuous series of steps is known as
A. stair
B. balusters
C. staircase
D. flight
E. housing strip

The correct answer is C. A staircase consists of multiple steps arranged continuously to connect different levels of a building.

(ii) The bench hook is equipment used to
A. support the workpiece on the bench
B. support the workpiece while cutting shoulders of the tenon
C. hold glued pieces together
D. hold narrow pieces while drilling
E. determine the percentage of moisture content

The correct answer is A. A bench hook is a woodworking device used to hold the workpiece in place while cutting, ensuring stability and safety during operations.

(iii) The wood of hardwood trees is usually
A. resinous
B. non-resinous
C. aromatic
D. uneven
E. evergreen

The correct answer is B. Hardwood trees, which are mostly deciduous, do not contain resin, unlike softwoods, which are resinous and commonly found in conifers.

(iv) The following are un-trussed roofs:
A. Queen post roof
B. Couple roof
C. Mansard roof
D. Triple roof
E. Lean-to roof

The correct answer is B. A couple roof is an un-trussed roof structure that relies on two sloping rafters meeting at the ridge without the need for additional support from trusses.

(v) In order for the door frame to remain rigid during building operations, it should be
A. fixed into the ground
B. pinned with iron bars

C. framed with squaring strip
D. nailed
E. bulged

The correct answer is C. A squaring strip is used to keep a door frame in position during construction, preventing distortion and misalignment.

(vi) Mitre joints are popular in
A. right framing
B. cabinet work
C. flooring jointing
D. roof framing joint
E. fireplace

The correct answer is B. Mitre joints are widely used in cabinet work, picture frames, and moldings, where a neat and seamless connection between two pieces of wood is required.

(vii) The conspicuous irregularities in the direction of the fibers usually produce
A. very attractive figure
B. blister figure
C. burr figure
D. ribbon figure
E. bird's eye figure

The correct answer is E. Bird's eye figure is a unique wood grain pattern characterized by small circular patterns, commonly found in maple and used for decorative furniture and veneers.

(viii) Needle in a shoring structure means
A. a piece of timber or metal inserted into or through a wall, which transfers the load from the wall to the system
B. a load-spread beam of timber or metal on the floor or ground
C. a metal speed bed initially to anchor the wall plate to the wall
D. a vertical member providing support interchange for the strut in a flying shore
E. a straining beam provided to support rafters

The correct answer is A. A needle is a horizontal beam or timber inserted into a wall to transfer loads to the shoring structure, preventing collapse during excavation or alterations.

(ix) A framed, ledged, braced, and battened door is grouped under
A. flush doors
B. paneled doors
C. garage doors
D. toilet doors

E. matchboarded doors

The correct answer is E. Matchboarded doors consist of vertical boards held together with ledges, braces, and battens for extra strength and stability.

(x) A triangular part of a gable end is called
A. verge
B. valley
C. gable
D. pike
E. burr

The correct answer is C. A gable is the triangular portion of a wall located at the end of a pitched roof, formed by the meeting of two sloping roof sections.

2. Match the items in List A with responses in List B by writing the letter of the corresponding response beside the item number.

List A:
i. Glaring
ii. Spraying
iii. A member in one of the scaffolds
iv. Tool for smoothing curved surfaces
v. It is made from skins, bones, and tissue
vi. The correction of hinge bound fault
vii. Centering
viii. Raising shore
ix. Means of fixing door frames in position
x. Flooring of wood laid in alternating patterns to form various designs

List B:
A. Parquet flooring
B. Heart shake
C. Lipping
D. Sliding
E. Tiger saw
F. Fixing post
G. Jambs dowelled into floor, horns built in walls and nailed to jambs
H. A mitre gauge
I. An operation of cutting and fixing glass panels on windows
J. Temporary structure made from timber used to support arch construction
K. A circular sawing component

L. Animal glue
M. To pack up the housing with card, thus throwing the hinge into the correct position
N. Seasoning
O. Space shake
P. Inclined timber member placed against an unstable wall, top ends rest on walls, lower ends on ground
Q. Halving
R. A putlog
S. A method of applying wood finishes
T. Fixing the hinge in a reverse way

Answers:
i - S. A method of applying wood finishes
ii - T. Fixing the hinge in a reverse way
iii - R. A putlog
iv - E. Tiger saw
v - L. Animal glue
vi - M. To pack up the housing with card, thus throwing the hinge into the correct position
vii - J. Temporary structure made from timber used to support arch construction
viii - P. Inclined timber member placed against an unstable wall, top ends rest on walls, lower ends on ground
ix - G. Jambs dowelled into floor, horns built in walls and nailed to jambs
x - A. Parquet flooring

Section B (40 Marks)

3. Outline four importance of costing in both carpentry and joinery.

i. helps in budget planning – Proper costing allows carpenters to estimate expenses accurately and ensure projects stay within financial limits.
ii. reduces material wastage – By knowing the exact amount of materials required, wastage is minimized, saving costs.
iii. ensures fair pricing – Costing helps in determining the appropriate price for carpentry work to ensure profitability while remaining competitive.
iv. aids in profitability analysis – Understanding the total cost of a project helps determine profit margins and financial sustainability.

4. (a) Name three types of hammers used by a carpenter.

i. claw hammer – Used for driving and removing nails.
ii. mallet – Used for striking chisels and adjusting wood without damaging surfaces.
iii. ball-peen hammer – Used for shaping metal and general woodworking tasks.

(b) What type of bit tang (shank) is held by a ratchet brace?

i. square tang – Designed to fit into the chuck of a ratchet brace, providing a secure grip and efficient torque transfer.

5. (a) Which type of screw is suitable for fixing a thin metal plate to wood?
i. self-tapping screw – Designed to cut its own threads into metal and wood, ensuring a secure connection.

(b) Mention a suitable hinge for a garage door.

i. tee hinge – A strong and durable hinge designed to support the weight of large doors like those in garages and barns.

(c) Explain briefly the function of a scraper.
i. a scraper is used to smooth wooden surfaces by removing fine layers of material. It helps achieve a polished finish and removes imperfections such as glue residue and tool marks.

6. Mention four types of windows commonly used for roof lighting.

i. skylight window – Installed on the roof to allow natural light into an interior space.
ii. dormer window – A vertical window set into a sloping roof to provide additional lighting and ventilation.
iii. lantern window – A raised structure on the roof with glass panes on all sides to maximize light penetration.
iv. roof slope window – Installed at an angle on the roof slope to improve lighting and provide a clear view of the sky.

7. Sketch a tree trunk and show the following parts:

i. scotch
ii. trunk
iii. burr
iv. stamp or butt

8. List three areas where trimmers are used.

i. stair openings – Trimmers support the framing around staircases.
ii. roof openings – Used to frame skylights or chimney passages.
iii. floor openings – Provide structural support for access hatches and ventilation ducts.

9. With the aid of a neat sketch, show timbering to a trench for loose soils.

Timbering in loose soils involves using vertical boards (sheeting) supported by horizontal wailings and diagonal braces to prevent soil collapse.

10. (a) Explain briefly the function of a formwork.

i. formwork is a temporary structure used to mold and support wet concrete until it hardens into the desired shape. It ensures stability and accuracy in construction.

(b) Determine the span of a roof truss from the given data below:

i. rise = 1.5 m
ii. pitch = 30 degrees

Using the formula:
span = 2 x rise / tan(pitch)
span = 2 x 1.5 / tan(30)

11. (a) Define the term "striking".

i. striking refers to the process of removing formwork or scaffolding after the concrete has gained sufficient strength.

(b) Explain briefly the term "stud".

i. a stud is a vertical framing member in a wall or partition that supports sheathing, drywall, or other coverings.

12. State the methods used to preserve timber.

i. chemical treatment – Applying preservatives like creosote or boron to protect timber from pests and decay.
ii. seasoning – Reducing moisture content through air or kiln drying to prevent shrinkage and warping.
iii. painting or staining – Coating the timber surface to provide resistance against weather and moisture.
iv. pressure treatment – Forcing preservative chemicals deep into the wood under pressure for long-term protection.

14. (a) Define a stair.

A stair is a series of steps arranged to provide access between different levels of a building. It consists of treads and risers supported by stringers and often includes handrails for safety.

(b) List four requirements of stairs.

i. uniform riser height – All risers should have equal height to ensure comfort and safety while using the stairs.
ii. adequate width – The width of the staircase should be sufficient to allow easy movement.
iii. proper slope – The stair incline should be moderate to facilitate easy climbing and descending.
iv. handrails and balusters – Handrails should be provided to enhance safety, especially in public or commercial buildings.

(c) Sketch the following types of steps:

i. splayed – A step that is wider at one end and tapers towards the other, commonly used in curved or spiral staircases.
ii. commode – A decorative step design used in grand staircases, often featuring a curved or widened section.
iii. winders – Triangular steps used in turning staircases, allowing the staircase to change direction without a landing.

(d) A residential building 4.5 m long by 3 m has a height of 3.6 m between floors. If the entrance to the stair and its landing are 0.9 m apart and the step riser is to be 160 mm, calculate:

i. The number of steps in one flight.

The number of steps is determined by dividing the total rise by the riser height.

total rise = 3.6 m
riser height = 160 mm = 0.16 m

number of steps = total rise ÷ riser height
= 3.6 ÷ 0.16
= 22.5

Since a stair cannot have half steps, the number of steps should be rounded to 23.

ii. The number of treads in the flight.

The number of treads is one less than the number of risers.

number of treads = number of risers - 1
= 23 - 1
= 22

iii. The size of a tread.

The tread size is calculated using the total going divided by the number of treads.

total going = 4.5 m
number of treads = 22

tread size = total going ÷ number of treads
= 4.5 ÷ 22
= 0.204 m (204 mm)

15. (a) Categorize three types of arches as applied in carpentry and joinery.

i. segmental arch – An arch where the intrados (inner curve) forms a segment of a circle. It is commonly used in door and window openings.
ii. semicircular arch – A full half-circle arch widely used in classical architecture and joinery work.
iii. pointed arch – An arch with two curved sides meeting at a sharp point, commonly used in Gothic-style buildings.

(b) With the aid of sketches, define and describe fully the types of flush doors.

Flush doors are doors with a flat and smooth surface without visible frame projections. They can be classified into the following types:

i. solid core flush door – Constructed with a solid core of timber or particleboard, providing durability and sound insulation.
ii. hollow core flush door – Contains a lightweight core with internal supports, making it cost-effective and suitable for interior applications.
iii. laminated flush door – Features a decorative laminate finish, enhancing aesthetics and resistance to moisture.