**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: 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.

1. (i) The cut formed by a saw is called
A. fillet
B. kerf
C. architrave
D. riven
E. cornice

The correct answer is B. Kerf. A kerf is the groove or slit created in the material when a saw blade cuts through it.

(ii) Casein glue is manufactured from
A. animal hoofs
B. plant products
C. artificial manufactured products
D. cow skimmed milk
E. combination of animal hoofs and plant products

The correct answer is D. Cow skimmed milk. Casein glue is derived from milk proteins, specifically casein, which is processed to create a strong adhesive.

(iii) An instrument used to measure moisture content in kiln plants is called
A. barometer
B. photometer
C. electric moisture meter
D. speed meter
E. gallometer

The correct answer is C. Electric moisture meter. This device is used to measure the moisture content in wood, ensuring proper drying and reducing defects in kiln-dried timber.

(iv) An architrave is
A. fixed between walls and ceilings
B. fixed at the foot of the wall
C. fixed to cover the joint between door frames, window casings, and plaster around them
D. fixed between muntin and panels
E. fixed between the finishing floor level and the wall

The correct answer is C. Fixed to cover the joint between door frames, window casings, and plaster around them. Architraves provide a decorative and functional trim to cover gaps between frames and walls.

(v) The suitable hinge for hanging matchboarded doors is
A. the butt hinge
B. the back flap hinge

C. the tee hinge
D. the strap hinge
E. the rising hinge

The correct answer is C. The tee hinge. Tee hinges are commonly used for lightweight doors like matchboarded doors, providing strength and durability.

(vi) Texture, figure, and grain signify
A. the appearance of a cut surface of timber structure
B. the arrangement of the grain
C. sawn timber
D. finger tests of a cut timber
E. age of trees

The correct answer is B. The arrangement of the grain. The texture, figure, and grain of timber describe the way wood fibers are arranged, influencing its appearance and workability.

(vii) A bay window with a 45° or 60° return angle is the
A. square bay
B. patent bay
C. arched bay
D. cat bay
E. elliptical bay

The correct answer is A. Square bay. Square bay windows have defined return angles, typically 45° or 60°, providing an extended view and additional space.

(viii) Why must the trimming timbers of a floor be sound, straight-grained, and free from large knots?
A. To maintain its appearance and attraction
B. To maintain its strength since it is load-bearing timbers
C. To maintain it non-load-bearing
D. Because they are usually softwoods
E. Because they are produced from very long pieces of timber

The correct answer is B. To maintain its strength since it is load-bearing timbers. Trimming timbers support the floor structure and must be strong to handle loads and prevent failure.

(ix) To cut the corner joints of a picture frame use
A. try square
B. sliding bevel
C. mitre square
D. T-square
E. set square

The correct answer is C. Mitre square. A mitre square is used for marking and cutting accurate 45° or 90° angles, essential for fitting picture frames.

(x) The following is the window lighting for a flat roof
A. Dormer roof light
B. Sky light
C. Lantern lights
D. Patent glazing
E. Casement

The correct answer is B. Sky light. Skylights are installed on flat or sloped roofs to allow natural light into a building, improving illumination in interior spaces.

2. Match the correct response in List B with the given items in List A by writing a letter of the correct response beside the item number.

List A

i. Scarf joint, dovetail joint, and tongue and grooved joint
ii. An operation of lowering a centre
iii. A door for sheds
iv. Decorative mould around doors and windows to emphasize and decorate openings
v. Longitudinal curvature that rises from end to end of a piece of timber
vi. It has a jagged end to set up a strong bursting pressure against resistance
vii. Refers to one of the factors used in calculating the percentage of moisture content of timber
viii. They are cone-bearing trees with needle-like leaves whose seeds are produced naked
ix. It is used for preparing edge-to-edge joints for gluing
x. A machine for cutting logs into reasonable lengths

List B

A. Easing
B. Mahogany
C. Classes of joints used in woodworks
D. Bridle joint
E. Extricating cuts of saw
F. Panel door
G. Dry weight
H. Skirting
I. Matchboarded door
J. Twisting
K. Trying plane

L. Honeycomb
M. Architrave
N. Barometer
O. Conifers
P. Jack plane
Q. Wedge
R. Band saw
S. Bowing
T. Floor boards

Answers:

i - C
ii - A
iii - F
iv - M
v - S
vi - Q
vii - G
viii - O
ix - K
x - R

Section B (40 marks)

3. Name four types of marking gauges.

i. Mortise gauge – Used to mark two parallel lines for mortise and tenon joints.
ii. Cutting gauge – Used for cutting thin sheets of veneer or marking on hard surfaces.
iii. Panel gauge – Used for marking wide boards accurately.
iv. Standard marking gauge – Used for marking lines parallel to an edge using a single-point spur.

4. List four wood boring insects.

i. Termites – Feed on wood and weaken its structure.
ii. Powderpost beetles – Infest hardwoods and reduce them to powder-like dust.
iii. Carpenter ants – Bore into damp or decaying wood to create nests.
iv. Wood wasps – Lay eggs in wood, and larvae bore holes as they develop.

5. (a) Write down the formula for calculating the pitch and rise of a roof.

Pitch = (Rise / Span) x 100
Rise is the vertical height from the base to the highest point, while span is the total horizontal distance covered by the roof.

(b) Briefly explain the following terminologies as used in the field of carpentry and joinery.

i. Run – The horizontal distance from the outer wall to the ridge of a roof.
ii. Pike – The pointed or sloping end of a structure, such as the upper portion of a gable.

6. Analyze four areas to be observed when considering safety precautions.

i. Use of protective gear – Workers must wear gloves, goggles, and safety shoes.
ii. Proper tool handling – Tools should be used correctly and stored safely after use.
iii. Safe working environment – Workspaces should be well-lit and free of hazards.
iv. Emergency preparedness – Workers should be trained on how to respond to accidents.

7. (a) State three important reasons for timbering in trenches.

i. To prevent trench walls from collapsing and ensure worker safety.
ii. To provide a stable foundation for structures built within the trench.
iii. To reduce soil erosion and maintain trench stability.

(b) Give the name of a bottom part of formwork.

The bottom part of formwork is called the soffit. It is the horizontal surface that forms the underside of a structure, such as a slab or beam.

8. Derive the formula for calculating the moisture content of timber and then determine the dry weight of a sample if the wet weight was found to be 40 grams and moisture content is 50%.

Moisture Content (MC) = [(Wet Weight - Dry Weight) / Dry Weight] x 100

Rearranging the formula to find the dry weight:

Dry Weight = Wet Weight / (1 + MC/100)
Dry Weight = 40 / (1 + 50/100)
Dry Weight = 40 / 1.5
Dry Weight = 26.67 grams

9. Define the following terms:

(a) Paint – A liquid or semi-solid substance applied to surfaces to provide protection, decoration, or both. It consists of pigments, binders, and solvents.

(b) Varnish – A transparent or semi-transparent coating applied to wood to enhance appearance and provide protection against moisture and wear.

10. Differentiate a stair from a staircase.

A stair refers to an individual step in a flight, while a staircase is the complete structure consisting of multiple steps, handrails, and balustrades.

11. (a) List four warping forms of timber.

i. Bowing – A curvature along the length of the wood.
ii. Cupping – A curve across the width, forming a concave or convex shape.
iii. Twisting – A spiral distortion that occurs along the wood grain.
iv. Kinking – A localized bend in a section of the timber.

(b) Differentiate a straining beam from a tie beam.

i. Straining beam – A horizontal timber used to resist outward thrust in trusses.
ii. Tie beam – A horizontal beam that connects two opposite rafters at their lower ends to prevent roof spread.

12. (a) Name two types of timber partitions.

i. Stud partition – A lightweight, non-load-bearing wall constructed with timber studs and covered with panels.
ii. Lath and plaster partition – Consists of timber laths covered with plaster for smooth finishing.

(b) Mention two methods used in timber conversion.

i. Through and through sawing – Cutting logs into planks in a straight manner to minimize waste.
ii. Quarter sawing – Cutting logs perpendicular to the growth rings to improve strength and stability.

13. (a) (i) Describe the saying "safety first," as applied to carpentry and joinery.

Safety first in carpentry and joinery emphasizes the importance of prioritizing safety measures to prevent accidents and injuries in the workshop. It involves wearing appropriate protective gear, using tools properly, maintaining a clean workspace, and being aware of potential hazards. Ensuring safety first enhances productivity and reduces risks associated with woodworking tasks.

(ii) List six workshop safety habits.

i. Always wear appropriate personal protective equipment (PPE) such as safety goggles, gloves, and dust masks.
ii. Keep the workshop clean and free of clutter to prevent tripping hazards.
iii. Use tools and machines according to their intended purpose and follow safety guidelines.
iv. Ensure all electrical equipment is properly grounded and inspected before use.
v. Never leave sharp tools or machinery unattended while in operation.
vi. Store flammable materials safely and ensure good ventilation in the workspace.

(iii) Analyze two classes of safety on hand tools.

i. Preventive safety – This involves maintaining hand tools in good condition, such as sharpening blades, checking for cracks, and storing them properly to avoid damage.
ii. Operational safety – This focuses on the correct handling and use of hand tools, including using firm grips, cutting away from the body, and ensuring a stable work surface.

(iv) Mention three possible sources of accidents when using machines and portable power tools.

i. Improper handling of tools, such as using high-speed machines without proper control, leading to injuries.
ii. Lack of maintenance, such as worn-out blades, faulty electrical connections, or loose parts in machines, which can cause malfunctions.
iii. Poor workspace organization, including working in poorly lit or overcrowded areas, increasing the likelihood of accidents.

(b) Briefly explain the following:

(i) Pitch of a roof – The pitch of a roof is the angle or slope at which the roof inclines, usually expressed as a ratio of rise to span or in degrees. It affects water drainage, structural stability, and aesthetic appeal.

(ii) Dragon tie – A diagonal timber member used in hipped roofs to strengthen and stabilize the roof structure, helping to resist lateral movement and improve rigidity.

(iii) Hip face – The inclined surface or slope of a hipped roof that extends from the ridge to the eaves, forming the external face of the roof structure.

(iv) Fascia board – A horizontal board fixed along the lower edge of a roof to cover and protect the ends of rafters, support the gutter system, and improve the building's aesthetics.

14. (a) Define the term "floor."

A floor is the lower horizontal surface of a building, designed to provide a stable platform for occupants, furniture, and equipment. It can be constructed using various materials, such as timber, concrete, or tiles.

(b) Classify timber floors.

i. Ground timber floor – A timber floor laid directly on or near the ground, usually supported by concrete or brick piers.
ii. Suspended timber floor – A floor raised above the ground level, supported by joists and beams, allowing for ventilation underneath.
iii. Upper timber floor – A timber floor used in multi-story buildings, supported by beams, girders, and columns.

(c) Explain the term "strutting" as used in timber floor construction.

Strutting is the process of adding diagonal or horizontal timber supports between floor joists to prevent movement, enhance stability, and reduce deflection under load. It strengthens the floor and minimizes noise caused by vibrations.

(d) Sketch a timber floor pattern and illustrate the following:

(i) Floor boards – The horizontal planks or sheets that form the walking surface of a timber floor.
(ii) Floor joists – Horizontal structural members supporting the floorboards, transferring loads to beams or walls.
(iii) Girder – A large horizontal beam that supports multiple joists, distributing loads evenly.
(iv) Binder – A secondary beam that provides additional support to joists and maintains their spacing.
(v) Concrete base – A layer of concrete laid beneath the timber floor to provide a stable foundation and damp-proofing.

15. (a) Define the term "window."

A window is an opening in a wall or roof fitted with glass or other transparent materials, designed to allow light, ventilation, and visibility while providing protection from weather and external elements.

(b) Sketch a window frame and label the following parts:

(i) Head – The top horizontal member of the window frame that provides structural support.
(ii) Jamb – The vertical sides of the window frame that support the head and sill.
(iii) Transom – A horizontal member that divides the window into sections or supports glazing.
(iv) Mullion – A vertical member that separates two window panels, providing strength and rigidity.
(v) Fanlight – A small decorative window above a door or another window, often for ventilation and aesthetics.

(c) Enumerate three methods used in hanging window shutters.

i. Butt hinges – Hinges attached to the frame and the shutter, allowing smooth opening and closing.
ii. Pivot hinges – Hinges that allow the shutter to swing open from a central pivot point.
iii. Sliding mechanism – A rail and track system that enables the shutter to slide horizontally or vertically.

(d) Distinguish between dormer window and bay window.

i. Dormer window – A vertically positioned window projecting from a sloped roof, used to increase headroom and allow natural light into attic spaces.
ii. Bay window – A window that extends outward from the main wall of a building, creating additional space and enhancing natural lighting.