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: 2012**

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) Centres can be set by using one of the following except
A. Latter chords
B. Radius rod
C. Templated formwork
D. T-square

The correct answer is C. Templated formwork. Centre setting methods such as radius rods and latter chords are used in circular structures, whereas templated formwork is used for shaping concrete and not for setting centres.

(ii) In shoring, the component that penetrates into the wall and locates the top of the raker is called
A. Cleat
B. Needle
C. Wall hook
D. Wall piece
E. Wedge

The correct answer is B. Needle. A needle is a horizontal timber or steel member that penetrates the wall and supports the weight of the structure during shoring operations.

(iii) When an opening for the doorway is constructed, the joint used between the door head and jamb is
A. Fish plated
B. Housed
C. Mitred
D. Splayed dovetail
E. Tongue and groove

The correct answer is B. Housed. A housed joint is commonly used in door frames to provide a strong connection between the jamb and the head.

(iv) The type of roof that has the fewest number of different-size members is called
A. Gable
B. Gambrel
C. Hip
D. Mansard
E. Shed

The correct answer is E. Shed. A shed roof consists of a single sloping surface with uniform members, making it the simplest type of roof.

(v) The minimum size of going in a private stair is
A. 120 mm
B. 220 mm

C. 230 mm
D. 240 mm
E. 330 mm

The correct answer is C. 230 mm. The minimum going for a private stair ensures comfort and safety when stepping up and down.

(vi) The standard height for a dining table is
A. 71 cm to 74 cm
B. 71 cm to 76 cm
C. 76 cm to 80 cm
D. 90 cm to 96 cm
E. 95 cm to 100 cm

The correct answer is C. 76 cm to 80 cm. This height provides a comfortable seating position for most users.

(vii) Varnishes are applied to wood structures by
A. Brushes and spray guns
B. Pieces of cloth and brushes
C. Rollers and pieces of sponge
D. Rollers and spray guns
E. Spray compressor and air gun

The correct answer is A. Brushes and spray guns. These tools ensure an even application of varnish, enhancing the wood's appearance and protection.

(viii) Which of the following type of soil does not need timbering to trenches?
A. Firm soil
B. Hard soil
C. Organic soil
D. Peat soil
E. Waterlogged soil

The correct answer is A. Firm soil. Stable soils like firm soil can maintain their shape without requiring timber supports in excavation.

(ix) _____ refers to strong pieces of timber bolted around the column formwork to keep the panels in position whilst concrete is poured.
A. Ledges
B. Props
C. Struts
D. Wedges

E. Yokes

The correct answer is E. Yokes. Yokes hold the formwork in place, ensuring that it remains intact during concrete pouring.

(x) In timber partitions, the vertical members are known as
A. Jambs
B. Poles
C. Post
D. Stiles
E. Studs

The correct answer is E. Studs. Studs are the vertical framing members in timber partition walls.

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

List A
(i) Cuts angles of various degrees on finish lumber
(ii) Cuts large curves in fairly heavy timber
(iii) Cuts large diameter curves in thin wood
(iv) Cuts large joints, especially in softwood
(v) Cuts perpendicular to the grain of lumber
(vi) Cuts sharp curves in a thin board near to the edge
(vii) Cuts along the grain of lumber
(viii) Cuts small diameter holes and similar cuts started from a hole
(ix) Cuts metal
(x) Useful for cutting hardwood joints

List B
A. Bow saw
B. Circular saw
C. Coping saw
D. Dovetail saw
E. Fret saw
F. Hacksaw
G. Miter box saw
H. Pad saw
I. Panel saw
J. Pull saw
K. Rip saw
L. Tenon saw
M. Hole saw

N. Steel saw

Answers:
(i) G. Miter box saw
(ii) A. Bow saw
(iii) C. Coping saw
(iv) D. Dovetail saw
(v) E. Fret saw
(vi) F. Hacksaw
(vii) K. Rip saw
(viii) M. Hole saw
(ix) N. Steel saw
(x) L. Tenon saw

3. Name any four standard attachments that are supplied with the portable power drill and state the function of each.

i. Chuck key – Used to tighten or loosen the drill chuck to insert or remove drill bits.
ii. Drill bits – Used for making holes in various materials such as wood, metal, and plastic.
iii. Depth stop – Controls the drilling depth to ensure precision and avoid over-drilling.
iv. Auxiliary handle – Provides extra grip and stability when operating the drill for better control.

4. Make a neat pictorial drawing of a tree trunk and label its parts.

A tree trunk consists of the following parts:
i. Bark – The outer protective layer of the tree that prevents moisture loss and shields against pests.
ii. Cambium – The thin layer responsible for the growth of new wood and bark cells.
iii. Sapwood – The younger, lighter-colored wood that actively conducts water from roots to leaves.
iv. Heartwood – The older, darker, and denser inner part of the trunk that provides structural support.
v. Growth rings – Rings formed annually that indicate the age and growth conditions of the tree.

5. Explain the following glue terms.

i. Pot life – The usable duration of a glue mixture before it starts to set or become ineffective after being mixed.
ii. Shelf life – The length of time glue can be stored before it degrades or loses its adhesive properties.
iii. Clamping time – The period required for glued pieces to be held together under pressure for a strong bond.
iv. Setting time – The duration needed for the glue to harden sufficiently before handling the workpiece.

6. (a) With an example, name two types of abrasives used while finishing wood.

i. Sandpaper – Used for smoothing rough surfaces before staining or painting.
ii. Steel wool – Used for polishing and finishing fine wood surfaces to achieve a smooth texture.

(b) Explain why you would wish to apply wood filler to a piece of furniture you are making.

i. Wood filler is used to fill cracks, holes, or imperfections in the wood surface, creating a smooth and even finish.
ii. It enhances the appearance of the furniture by masking defects and making it look professionally crafted.
iii. It strengthens weak or damaged areas, preventing further deterioration.
iv. It provides a uniform surface for painting or staining, ensuring consistent color and texture.

7. Explain in brief the following terms in connection to formwork.

i. Decking – The flat horizontal platform that forms the base of the formwork and supports the weight of wet concrete.
ii. Distance piece – A spacer used to maintain uniform gaps between formwork panels, ensuring accurate concrete thickness.
iii. Form tape – A tape used to seal joints in formwork, preventing leakage of cement slurry during pouring.
iv. Double-headed nail – A nail with two heads, making it easy to remove after the concrete has set without damaging the formwork.

8. (a) What is the maximum and minimum height of a handrail from the line of nosing?

i. The maximum height is 1000 mm (1 meter).
ii. The minimum height is 900 mm (0.9 meters).

(b) What is the maximum and minimum pitch of a stair?

i. The maximum pitch is 42 degrees.
ii. The minimum pitch is 25 degrees.

(c) Distinguish between a newel post and a baluster.

i. A newel post is a large vertical post that supports the handrail at the top and bottom of a staircase.
ii. A baluster is a smaller, evenly spaced vertical post that supports the handrail along its length, forming the stair railing.

9. (a) What are the basic operations that a woodworker should be competent in?

i. Measuring and marking – Accurately marking out workpieces before cutting.
ii. Cutting – Using hand and power tools to shape wood according to the design.

iii. Joining – Assembling wood pieces using various joinery techniques.
iv. Finishing – Smoothing surfaces and applying protective coatings like varnish or paint.

(b) Explain briefly the method of squaring up a stock.

i. Identify the reference face and mark it as the face side.
ii. Plane the reference face to make it flat and smooth.
iii. Square one adjacent edge using a try square and plane it straight.
iv. Measure and mark the required dimensions on the remaining edges.
v. Plane and smooth the opposite face and edge, ensuring all angles are 90 degrees.

10. (a) Name four forms of mortise and tenon joints and give one example where each is used.

i. Through mortise and tenon – Used in heavy-duty furniture construction like tables.
ii. Haunched mortise and tenon – Used in door and window frames for added strength.
iii. Stub mortise and tenon – Used in cabinet-making where the joint is not visible.
iv. Wedged mortise and tenon – Used in framing structures that require extra reinforcement.

(b) What is the difference between a king post truss and a queen post truss?

i. A king post truss has a single vertical post in the center, used for short-span roofs.
ii. A queen post truss has two vertical posts, providing greater stability for longer spans.

11. (a) State four functions of a roof.

i. Provides shelter by protecting the building interior from weather elements.
ii. Helps regulate indoor temperature by providing insulation.
iii. Enhances the aesthetic appeal of a building.
iv. Supports additional structures such as solar panels, water tanks, or ventilation systems.

12. (a) State four reasons for providing ceilings in a building.

i. Conceals electrical wiring, pipes, and structural elements.
ii. Enhances thermal insulation by reducing heat loss.
iii. Improves acoustics by reducing noise and echo.
iv. Adds aesthetic value to the interior design.

(b) List down four materials used in ceiling finishes.

i. Gypsum board – Lightweight and fire-resistant, used for suspended ceilings.
ii. Plywood – Provides a wooden finish, commonly used in residential interiors.
iii. PVC panels – Water-resistant and durable, suitable for bathrooms and kitchens.
iv. Plaster – Traditional material that offers a smooth and elegant finish.

13. (a) Briefly describe the process of fixing a steel casement window frame in position.

i. Mark the window opening on the wall according to the frame size.
ii. Ensure the opening is clean and free of debris.
iii. Position the steel frame into the opening and check for alignment.
iv. Secure the frame using metal lugs or fixing bolts embedded in the wall.
v. Apply mortar around the frame edges to seal gaps.
vi. Allow the mortar to cure before installing the glass panels.

(b) Figure 1 shows a sketch of a window frame made up of Mninga timber. Prepare a cutting list for 13 window frames.

i. Measure the dimensions of each timber component in the window frame.
ii. Multiply the individual component dimensions by 13 to calculate the total required.
iii. Organize the cutting list to minimize material waste.
iv. List the frame components, including stiles, rails, and mullions, with their respective lengths.

(c) If the cost of Mninga timber used in 13 frames is 4500 per meter run, calculate the total cost of the timber required for making 13 window frames.

i. Calculate the total running meters required using the cutting list.
ii. Multiply the total running meters by the cost per meter run.
iii. The total cost = total running meters × 4500.

14. (a) Explain the sequences of operations involved in shaping a straight workpiece using a spindle moulder machine.

i. preparation of the workpiece – The workpiece should be inspected for any defects such as knots, warping, or cracks that might affect the shaping process. It must be properly dimensioned, ensuring it is flat and straight for accurate shaping.

ii. selection of cutter head – The appropriate cutter head must be chosen based on the required profile. Different cutter heads are available for shaping, chamfering, grooving, and rebating.

iii. setting up the spindle moulder – The cutter head is installed and securely fastened onto the spindle. The height and depth of the spindle must be adjusted according to the required cut.

iv. adjusting the guide fence – The fence helps in positioning the workpiece correctly and ensures precision during shaping. The fence must be parallel to the cutting tool to avoid inconsistencies.

v. feeding the workpiece – The workpiece is firmly held and pushed against the cutter head while following the fence. It should be fed in the opposite direction of the cutter's rotation to achieve a clean and smooth cut.

vi. making multiple passes – For deeper cuts, multiple shallow passes are made instead of a single deep cut to avoid tear-out and splintering. Each pass refines the shape gradually.

vii. final inspection – After shaping, the workpiece is checked for smoothness, accuracy, and uniformity. If necessary, minor adjustments are made before completing the process.

(b) Name any seven parts of a spindle moulder machine and explain the function of each.

i. spindle shaft – A rotating vertical shaft that holds and drives the cutter head. It determines the cutting height and depth.

ii. cutter head – A component that holds the cutting blades. Different cutter heads are used depending on the profile needed in shaping operations.

iii. guide fence – A moveable fence that provides support and guidance to the workpiece, ensuring accurate and straight cuts.

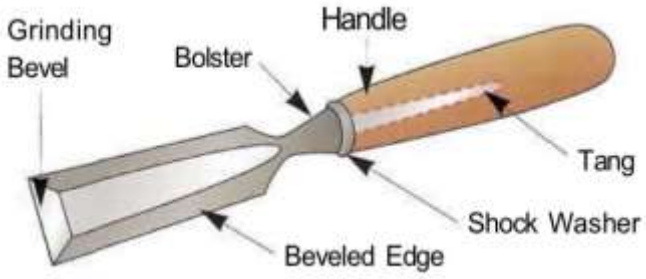
iv. table surface – A flat working area where the workpiece rests during machining. It ensures stability and precision while shaping.

v. depth adjustment mechanism – A control system that adjusts the spindle's height, allowing for different cutting depths.

vi. power switch and emergency stop – A safety feature that allows the operator to quickly turn the machine on or off in case of an emergency.

vii. dust extraction port – A connection point for dust collection systems that removes wood shavings and dust, keeping the workspace clean and safe.

(c) Draw a skew edge chisel and label its parts.



A skew edge chisel consists of the following parts:

i. blade – A sharpened cutting edge that is angled to make precise corner cuts. The skewed edge allows better access in tight spaces.

ii. bevel – A sloped surface on the blade that helps in creating a sharp cutting edge. It facilitates smooth and controlled cutting.

iii. handle – A wooden or plastic grip that allows the user to apply force and control the chisel. The handle should be comfortable to hold for better precision.

iv. ferrule – A metal ring at the base of the handle that prevents splitting and adds durability. It reinforces the handle and secures the tang of the chisel.

v. tang – A metal extension of the blade that is inserted into the handle. It provides structural integrity and ensures that the blade remains firmly attached to the handle.

15. (a) Enumerate the procedures for assembling a metal putlog scaffold.

i. site preparation – The ground must be leveled and cleared of any obstructions to provide a stable base for the scaffold.

ii. positioning base plates – Metal base plates or sole boards are placed under the vertical standards to distribute the load evenly and prevent sinking.

iii. erecting vertical standards – The upright poles (standards) are securely positioned at the correct intervals. They form the main supporting structure of the scaffold.

iv. attaching putlogs – Putlogs are horizontal beams that connect the scaffold to the structure. They are inserted into the wall or attached to ledgers to provide support.

v. installing guardrails and toe boards – Protective railings and toe boards are added to prevent workers from falling and to improve overall safety.

vi. checking stability – The scaffold is inspected for any misalignment, loose fittings, or structural weaknesses before it is used.

vii. final inspection and approval – A final safety check is conducted to ensure the scaffold meets construction safety regulations. It is then approved for use.

(b) With the aid of a sketch, explain six points that should be kept in mind while erecting flying shores.

i. proper alignment – The shores must be aligned correctly to provide even support. Misalignment can lead to instability and failure.

ii. secure fixing points – The shores should be firmly attached to the structure to prevent movement. Secure connections ensure stability.

iii. correct angle of support – The shores should be set at the correct angle to evenly distribute the load and prevent buckling.

iv. use of strong materials – High-quality timber or steel should be used for shores to ensure strength and durability. Weak materials can compromise structural integrity.

v. inspection before loading – All connections, braces, and fixing points should be inspected before applying any load. Weak points must be reinforced to prevent accidents.

vi. adequate bracing – Diagonal braces should be added to enhance stability and prevent lateral movement. Bracing ensures that the shores remain rigid and do not collapse under pressure.