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: 2016**

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) Which table among the following must be completed with special timber and all classes of joints?
A. Conference table
B. Coffee table
C. Folding table
D. Office table
E. Studying table

The correct answer is A. Conference table. A conference table requires a strong and durable structure due to its large size and the weight it supports. It is typically constructed using high-quality timber and strong joints such as mortise and tenon or dovetail joints for stability.

(ii) The only tools used for pulling large nails and removing old materials during renovation work is
A. claw hammer
B. ball peen hammer
C. mallet hammer
D. adze hammer
E. wrecking bar

The correct answer is E. Wrecking bar. A wrecking bar, also known as a crowbar, is specifically designed for pulling large nails, prying apart materials, and demolishing old wooden structures during renovation. It provides the necessary leverage to remove stubborn fasteners effectively.

(iii) Timbering of deep trenches can be done with the help of the following methods except
A. vacuum method
B. sheet piling
C. stay bracing
D. box sheeting
E. vertical sheeting

The correct answer is A. Vacuum method. Timbering methods are used to support the walls of deep trenches to prevent collapse, and techniques like sheet piling, stay bracing, and vertical sheeting are commonly used. The vacuum method is not related to trench support systems.

(iv) The strong temporary structure which is used for centering construction is known as
A. heavy timber
B. thin timber
C. light timber
D. wide timber
E. long timber

The correct answer is C. Light timber. In construction, centering refers to temporary structures used to support arches and other components until they set properly. Light timber is commonly used because it is easy to handle and provides sufficient support.

(v) The butt joint can be used for construction of timber partitions but the joint must be nailed or
A. straight nailing
B. skew nailing
C. horizontal nailing
D. vertical nailing
E. toe nailing

The correct answer is E. Toe nailing. Toe nailing is a technique where nails are driven at an angle to join two pieces of wood securely. This method strengthens butt joints, which are otherwise weak if not reinforced.

(vi) When an opening for a doorway occurs, the specific joint needed is
A. wedge joint
B. housing joint
C. halving joint
D. dovetail joint
E. mortise and tenon joint

The correct answer is E. Mortise and tenon joint. The mortise and tenon joint is one of the strongest woodworking joints, making it suitable for doorway openings where structural strength is essential.

(vii) The vertical member (board) for supporting sides of the bench is known as
A. riser
B. braces
C. pulling board
D. hardwood
E. working board

The correct answer is B. Braces. Braces are structural supports that help reinforce benches by providing lateral stability, preventing movement and increasing strength.

(viii) Which type of the glue has special properties and must be soaked and heated before use?
A. Contact glue
B. Scotch glue
C. Casing glue
D. Urea formaldehyde
E. Aliphatic glue

The correct answer is B. Scotch glue. Scotch glue, also known as animal glue, requires soaking and heating before application. It is traditionally used in woodworking and musical instrument making.

(ix) Mould oil is used on formwork as
A. lubrication oil

B. waterproofing
C. rust inhibitor
D. resistance to bruises
E. release agent

The correct answer is E. Release agent. Mould oil is applied to formwork to prevent concrete from sticking, making it easier to remove the mould after the concrete has set.

(x) The lower shelf or base of a cupboard is known as
A. cornice
B. plinth
C. standard
D. pot board
E. end board

The correct answer is D. Pot board. A pot board is the lower shelf or base of a cupboard, often used for additional storage space.

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

List A
(i) Absorb mineral salts from the soil.
(ii) Coniferous trees.
(iii) Distribute sap towards the center.
(iv) Deciduous trees.
(v) Food of the tree.
(vi) Formation of cover on the outside of the tree.
(vii) Layer of wood where new cells are formed.
(viii) Support the crown.
(ix) The wood in the inner part of the tree usually darker in color and durable.
(x) The formation of a new layer each year.

List B
A. Annual rings
B. Bark
C. Branches
D. Cambium
E. Hard wood
F. Heart wood
G. Knots
H. Leaves
I. Medullary rays

J. Photosynthesis
K. Pith
L. Roots
M. Soft wood
N. Sapwood

Answers:
(i) L. Roots
(ii) M. Soft wood
(iii) I. Medullary rays
(iv) N. Sapwood
(v) K. Pith
(vi) B. Bark
(vii) D. Cambium
(viii) C. Branches
(ix) F. Heart wood
(x) A. Annual rings

3. Mention four personal protective equipment that can be used or worn to safeguard the body against entanglement.

i. Safety gloves – Protect hands from cuts, splinters, and injuries caused by sharp tools and machinery.
ii. Safety goggles – Prevent dust, wood chips, and debris from entering the eyes during cutting and sanding.
iii. Protective clothing – Reduces the risk of loose clothing getting caught in rotating machines, preventing entanglement.
iv. Safety boots – Protect feet from falling objects and provide a firm grip on slippery surfaces to prevent accidents.

4. List eight parts of a bench plane.

i. Handle – Provides grip and control while operating the plane.
ii. Sole – The flat bottom surface that glides over the wood.
iii. Mouth – The opening through which the cutting edge protrudes to shave wood.
iv. Blade (iron) – The cutting part of the plane that shaves off wood.
v. Lever cap – Holds the blade firmly in place.
vi. Frog – Adjusts the position of the blade for deeper or shallower cuts.
vii. Adjustment knob – Used to control the depth of cut.
viii. Cap iron – Reduces wood chipping and enhances the smoothness of the cut.

5. Illustrate with sketches, the two ways of setting a circular saw tooth to prevent binding.

Circular saw teeth can be set using two methods:
i. Alternate Top Bevel (ATB) – Involves setting alternate teeth to opposite sides, allowing smooth cutting with minimal resistance.
ii. Raker Set – Includes a raker tooth in between left and right set teeth to improve chip removal and reduce binding.

6. State the precautions which must be observed when using synthetic resin and rubber-based contact adhesives.

i. Use in a well-ventilated area – Prevents inhalation of harmful fumes.
ii. Avoid direct skin contact – Reduces the risk of irritation or allergic reactions.
iii. Store in a cool, dry place – Prevents the adhesive from deteriorating.
iv. Keep away from flames – Many adhesives are flammable and should not be exposed to fire.

7. Define the following terms:

i. Rafter – A sloping beam that supports the roof structure and runs from the ridge to the eaves.
ii. Verge – The outermost edge of a roof, where the roof meets the gable end of a building.
iii. Eaves – The lower part of a roof that overhangs beyond the walls to provide shade and protect walls from rainwater.
iv. Hip – The external angle formed where two roof slopes meet.

8. (a) Name two distortions that may occur during seasoning of timber.

i. Warping – Uneven drying that causes the wood to bend or twist.
ii. Splitting – Cracks that form due to rapid moisture loss.

(b) State the causes of defects in timber during seasoning.

i. Uneven drying – Results in warping and cracking.
ii. Exposure to direct sunlight – Causes excessive shrinkage.
iii. Poor stacking – Prevents uniform air circulation, leading to inconsistent drying.
iv. Presence of internal stresses – Leads to splitting and checking.

9. (a) Why fast-grown ring porous hardwoods are considered to be stronger than slow-grown ring porous hardwoods?

Fast-grown ring porous hardwoods develop dense and thicker earlywood and latewood, giving them higher strength compared to slow-grown hardwoods, which have thinner growth rings with weaker fibers.

(b) What is meant by the term "grain" in the timber industry?

Grain refers to the pattern, direction, and texture of wood fibers in a piece of timber. It influences the strength, appearance, and workability of the wood.

10. State the specific function of a portable hand router.

A portable hand router is used to hollow out or shape wood surfaces, create grooves, and cut decorative edges in carpentry and joinery work.

11. Mention four factors which govern the thickness of shavings and the smoothness of the finish when dressing a board.

i. Sharpness of the cutting blade – A sharp blade produces finer shavings and a smoother finish.
ii. Depth of cut setting – A deeper cut results in thicker shavings, while a shallow cut gives finer shavings.
iii. Feed rate – Moving the wood too quickly reduces smoothness, while a slower feed ensures better control.
iv. Wood grain direction – Cutting with the grain produces a smoother surface than cutting against it.

12. (a) Explain the term "Equilibrium Moisture Content".

Equilibrium Moisture Content (EMC) is the moisture level at which wood neither gains nor loses moisture when exposed to a specific environment, ensuring stability in its dimensions.

(b) Name four types of insects which are known to attack seasoned timber.

i. Termites – Cause severe damage by feeding on the cellulose in wood.
ii. Powderpost beetles – Bore small holes into timber and reduce it to fine powder.
iii. Carpenter ants – Create tunnels within wood structures without consuming the wood.
iv. Wood borers – Lay eggs inside timber, with larvae feeding on the wood fibers.

13. (a) List four harmful effects that can be caused by adhesives to your health.

i. Respiratory issues – Inhalation of adhesive fumes can cause breathing problems.
ii. Skin irritation – Some adhesives cause allergic reactions or chemical burns.
iii. Eye irritation – Contact with adhesives can cause redness and discomfort.
iv. Nervous system effects – Prolonged exposure to toxic adhesives can lead to headaches, dizziness, and nausea.

(b) State six precautions that should be taken to avoid harmful effects listed in 13(a).

i. Use adhesives in well-ventilated areas to minimize inhalation of fumes.
ii. Wear protective gloves to prevent skin contact.
iii. Use safety goggles to protect eyes from accidental splashes.
iv. Store adhesives in tightly sealed containers away from children.

v. Wash hands thoroughly after handling adhesives.
vi. Avoid prolonged exposure to adhesives containing toxic chemicals.

(c) Explain how you can use the handsaw properly.

i. Mark the cutting line clearly on the wood.
ii. Hold the saw at the correct angle, typically 45 degrees for crosscutting and 60 degrees for rip cutting.
iii. Use smooth, steady strokes without applying excessive force.
iv. Support the wood properly to prevent vibrations.
v. Keep the saw blade sharp for accurate and efficient cutting.

(d) Why widening joints are essential?

Widening joints allow for expansion and contraction of wood due to moisture changes, preventing warping and splitting. They also enhance the structural stability of wooden components.

(e) Sketch a section of a tongue and grooved joint.

A tongue and groove joint consists of one board with a projecting ridge (tongue) and another board with a matching groove that fits together snugly, providing a strong and seamless connection.

14. (a) Define a radial arm saw.

A radial arm saw is a circular saw mounted on a horizontal arm, which allows the saw to move in different directions for making crosscuts, rip cuts, and bevel cuts.

(b) State the main safety precautions to be observed when operating a radial arm saw.

i. Ensure the blade guard is in place before use.
ii. Keep hands at a safe distance from the cutting area.
iii. Secure the workpiece properly before cutting.
iv. Use the appropriate blade for the material being cut.
v. Wear protective gear such as safety glasses and gloves.

15. (a) Name three types of sanding machines and state the major application of each type.

i. Belt sander – Used for heavy stock removal and smoothing large surfaces.
ii. Orbital sander – Used for fine finishing and preparing surfaces for painting.
iii. Disc sander – Used for shaping and smoothing edges of wooden pieces.

(b) State the basic differences between hardwood and softwood.

i. Hardwood comes from deciduous trees, while softwood comes from coniferous trees.
ii. Hardwood is denser and more durable than softwood.
iii. Softwood grows faster and is more widely available.

16. (a) Define the term cutting list.

A cutting list is a detailed document that specifies the dimensions, types, and quantities of wood pieces required for a woodworking project.

(b) State four purposes of a cutting list.

i. Ensures accurate material estimation.
ii. Reduces material wastage.
iii. Improves efficiency in production.
iv. Helps in organizing and sequencing cutting operations.