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: 2005**

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. Choose the correct answer from among the given alternatives and write its letter beside the item number.

(i) When preparing timber for use, the first side to be planed is the
A. end side
B. edge side
C. face side
D. face edge
E. corner side

The first side to be planed when preparing timber is the face side because it provides a reference surface for further operations.
Correct answer: C

(ii) Safety is a combination of knowledge, skill, and awareness to prevent
A. injury to a person
B. damage to workshop equipment and materials
C. injury to a person and danger to materials
D. low income in production
E. damage and unwanted working place

Safety aims to prevent injury to a person and danger to materials, ensuring a secure work environment.
Correct answer: C

(iii) Temporary braces are usually introduced on a new door frame for the following reason
A. to be removed when the shutter is fixed
B. to be left to be part of a door frame
C. to be replaced by introduced lags
D. to maintain the required square
E. to control the height and width

Temporary braces ensure that the door frame remains square and properly aligned during installation.
Correct answer: D

(iv) A plane cutter is fitted in a grinding wheel for sharpening when it
A. has been used for a long period
B. has been left too long unused
C. has got rust
D. has been planed across pieces of metals
E. has dents

A plane cutter requires sharpening when it has dents to restore its cutting edge.
Correct answer: E

(v) The flap hinges are made to be fitted
A. externally and internally
B. internally only
C. windows only
D. in doors only
E. externally only

Flap hinges are suitable for both internal and external applications due to their flexibility.
Correct answer: A

(vi) Modern handsaws have brakes fitted to one or both wheels to
A. balance the saw which is always in high speed
B. start the machine
C. switch off the power
D. increase momentum of the machine
E. stop the saw in an emergency or after use

Brakes in modern handsaws stop the saw quickly in case of an emergency or after use.
Correct answer: E

(vii) In partition constructions, a stud joins the head by a _____ joint.
A. half check
B. mortise and tenon
C. cross halving
D. bare-face
E. webst

A half check joint is commonly used to join a stud to the head in partition constructions.
Correct answer: A

(viii) A short member provided to support highest areas is called
A. racker
B. rider
C. spanning piece
D. strut
E. wedge

A rider is used to support high areas in construction.
Correct answer: B

(ix) Carpentry is an art of
A. dealing with cutting, fitting and assembling wood or related materials in construction of buildings
B. construction of bridges

C. science in buildings
D. repairing wooden objects
E. manufacturing wooden furniture

Carpentry primarily involves cutting, fitting, and assembling wood for buildings.
Correct answer: A

(x) The last member to be striked off in a fitted framework is the
A. standard
B. cheeks
C. crucks
D. props
E. strips

The props are the last members to be removed in a fitted framework as they provide temporary support.
Correct answer: D

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

List A
(i) A process of slightly bending of teeth at their tips to give clearance in the kerf
(ii) Wood work designing principles
(iii) Cornices
(iv) Type of glue made from hide and skins and bones of animals
(v) A double nail without titles
(vi) Bees wax
(vii) Manufactured boards
(viii) The rounded edge of a wooden stair
(ix) Made from crushed plant gum, small particles, and applied on the supporting paper of cloth
(x) The toughest tree known all over the world

List B
A. Toe board
B. Setting
C. Scaffold
D. The most recently discovered
E. Timber movement consideration
F. A moulding for covering junctions between ceiling and the walls
G. Architects
H. Resin glue
I. Renewal of wedges
J. Couple roof

K. A joint formed by the common rafter at the wall plate
L. A type of finish obtained from living creatures
M. Topping
N. Fibreboard, chipboard, laminated and plywood
O. Clinker
P. Joints
Q. Nosing
R. Strips
S. Glass paper
T. Mahogany
Correct answers:
(i) B
(ii) E
(iii) F
(iv) H
(v) J
(vi) L
(vii) N
(viii) Q
(ix) S
(x) T

3. (a) Why are twin mortise and tenon joints used in construction?

Twin mortise and tenon joints are used in construction because they provide additional strength and durability. This joint consists of two tenons inserted into two corresponding mortises, doubling the bonding area and enhancing structural integrity. It is especially used in load-bearing frames, door structures, and furniture to prevent joint failure under stress.

4. (a) List down three reasons why timber is seasoned.

Timber seasoning is the process of reducing the moisture content in wood before it is used in construction and woodworking. This process is crucial for ensuring that the wood remains stable and durable over time.

- To reduce moisture content and prevent shrinkage: Freshly cut timber contains a high percentage of moisture, which can cause the wood to shrink and warp as it dries. Seasoning helps stabilize the dimensions of the wood.
- To increase strength and durability: Seasoned timber is stronger and more resistant to bending, cracking, and breaking, making it suitable for construction and furniture making.
- To prevent fungal and insect attacks: High moisture levels in wood create a suitable environment for fungi and insects like termites. Seasoning reduces this risk, increasing the lifespan of the wood.

5. (a) State a type of plane used for producing convex surfaces.

A compass plane is specifically designed for shaping convex surfaces. Unlike regular planes, which have a flat sole, a compass plane has an adjustable curved sole that allows it to cut rounded surfaces effectively. It is commonly used in shaping curved furniture components, such as chair backs and decorative moldings.

6. (a) Define the term "Door".

A door is a movable barrier used to allow or restrict access to an enclosed space. It is an essential part of buildings, providing security, ventilation, and privacy while also contributing to the aesthetics of a structure. Doors can be made of various materials, including wood, metal, and glass, depending on their intended function.

(b) State three functions of a door.

- Provides security and privacy: Doors help prevent unauthorized entry and provide privacy within rooms and buildings.
- Allows controlled access and exit: A door regulates entry and exit, ensuring safety and efficient movement within a building.
- Enhances ventilation and lighting: Some doors, especially those with glass panels or louvers, allow fresh air and natural light into a space, improving indoor comfort.

7. (a) Analyze two types of portable sanding machines.

Sanding machines are used to smooth surfaces by removing small amounts of material using abrasive belts or discs. Portable sanding machines are especially useful for on-site work and finishing tasks.

- Belt sander: A belt sander operates using a continuous loop of sandpaper, driven by two rollers. It is used for heavy material removal, leveling rough surfaces, and smoothing large flat areas in woodworking and metalworking.
- Orbital sander: An orbital sander uses a rotating disc with small oscillating movements to create a fine, even finish. It is ideal for finishing surfaces without leaving swirl marks and is commonly used in furniture making and car bodywork.

(b) List down two means of bending or setting the teeth of a saw.

The teeth of a saw must be set correctly to ensure smooth and efficient cutting. The process of bending saw teeth is called setting.

- Hammer setting: A traditional method where each tooth is struck with a small hammer against an anvil to bend it slightly outward.
- Pliers setting: A more modern technique where pliers are used to bend the teeth to the required angle.

8. (a) What does the term scaffold mean?

A scaffold is a temporary structure built to support workers and materials during construction, repair, or maintenance work on buildings and other structures. It consists of platforms, frames, and guardrails that ensure safety and accessibility at different heights.

(b) State three requirements of scaffolds.

- Must be strong and stable: Scaffolds should be made from durable materials like metal or treated wood to support workers and equipment safely.
- Must have safety railings and toe boards: To prevent falls and ensure the safety of workers, scaffolds must have railings at the edges and toe boards to stop tools from falling.
- Must be constructed with durable materials: The materials used should withstand weather conditions and heavy loads to prevent accidents.

9. (a) Analyze the factors determining the strength of glass.

The strength of glass depends on several factors, which influence its durability and resistance to breakage.

- Thickness of the glass: Thicker glass is more resistant to impact and pressure compared to thinner glass.
- Type of glass: Tempered glass is stronger than regular glass because it undergoes heat treatment to increase its toughness. Laminated glass, which has a plastic layer between two glass sheets, adds strength and safety.
- Method of installation and support: Proper framing and reinforcement reduce stress on the glass, preventing cracks and breakage.

(b) Explain the term sanding.

Sanding is the process of smoothing a surface by using abrasive materials like sandpaper, sanding blocks, or power sanders. It is commonly used in woodworking, metalworking, and finishing processes to remove rough spots and prepare surfaces for painting or polishing.

10. (a) What does the term stairs mean?

Stairs are a series of steps that connect different levels in a building, allowing vertical movement. They can be made of various materials, such as wood, concrete, or metal, depending on their structural and aesthetic requirements.

(b) Define the term flight.

A flight is a continuous set of steps between two landings in a staircase. It allows movement between different levels without interruption.

(c) What is the maximum height of a bedroom in stairs?

The standard height of a bedroom in relation to stairs is between 2.1 to 2.4 meters, depending on building codes and design specifications.

11. (a) Write four basic requirements of windows.

- Proper ventilation: Windows must allow fresh air circulation to maintain indoor air quality.
- Adequate natural lighting: Windows should provide sufficient daylight to reduce the need for artificial lighting.
- Structural stability: Windows must be strong enough to withstand environmental forces like wind and rain.
- Weather resistance: Windows should prevent water leakage and protect interiors from harsh weather.

(b) With specific examples, state two methods used in window openings.

- Sliding windows: These windows open horizontally by sliding along tracks, commonly used in modern buildings.
- Casement windows: Hinged at the sides, these windows swing open like a door, providing full ventilation.

12. (a) Explain the three primary functions of a roof.

- Protection from weather conditions: The roof shields the interior of a building from rain, sun, wind, and snow.
- Insulation against heat and cold: A well-designed roof reduces heat loss in winter and prevents overheating in summer.
- Structural support and stability: The roof helps maintain the overall integrity of a building by distributing weight evenly.

(b) Name two major classes of roofs.

- Pitched roofs
- Flat roofs

13. (a) What does the term "crowning" mean?

Crowning refers to the process of shaping a surface so that it is slightly convex or curved. This is commonly used in woodworking, construction, and road design to ensure proper water drainage and prevent pooling. In flooring or joinery, crowning helps in maintaining structural integrity and aesthetics.

(b) Define the following as applied in ceiling:

(i) Springing line

The springing line is the horizontal line where an arch or curved structure begins to rise from its supports. In ceiling construction, it refers to the baseline from which curved ceiling elements, such as vaults, originate.

(ii) Soffit

A soffit is the underside of an architectural structure, such as an arch, balcony, or roof overhang. In ceilings, it is the finished surface beneath beams or stairs, often used for aesthetic or functional purposes, such as housing ventilation ducts.

(c) What kind of hinge is used on a door that opens inwards and outwards?

A double-action hinge, also known as a swing hinge or saloon hinge, allows a door to open in both directions. These hinges are commonly used in commercial kitchens, restaurants, and areas with high traffic, allowing easy movement without manually closing the door.

(d) With the aid of a neat diagram, draw a door that opens by a revolving method.

A revolving door consists of multiple panels mounted on a central axis that rotate within a circular enclosure. This design allows continuous entry and exit while minimizing air exchange between interior and exterior spaces.

(e) List down two types of door frames.

- Casing door frame: A frame that encloses the door and is attached to the surrounding wall.
- Rebated door frame: A door frame with a groove or recess to accommodate the door, ensuring a secure and tight fit.

(f) Sketch a cross-section of a casing door frame and above the architrave.

A casing door frame consists of vertical side jambs, a horizontal head jamb, and an architrave, which is the decorative molding that covers the joint between the frame and the wall.

(g) What is a vestibule?

A vestibule is a small enclosed area between an exterior door and the interior of a building, serving as a buffer space to reduce heat loss and improve security. It is commonly found in commercial buildings and large residences.

(h) What is the relationship between the haunch depth and the tenon width?

The haunch depth is the portion of a tenon joint that extends into the mortise for additional strength. It is generally proportional to the tenon width, ensuring stability and reducing the risk of joint failure under load. The correct proportion enhances the overall strength of the joint in wooden structures.

(i) Sketch a diagram showing the last operation of joining wood using a slot screws joint.

A slot screws joint is a method of fastening wood using screws inserted into pre-drilled slots. This technique allows for minor adjustments in alignment while providing a secure connection.

14. Produce a sketch of a straight flight stair and hence illustrate the following members:

(i) Rise: The vertical height between two consecutive steps.
(ii) Going: The horizontal distance from the front edge of one step to the front edge of the next step.
(iii) Handrail: A railing that provides support and safety along the side of a staircase.
(iv) Nosing: The rounded or beveled edge of a step that extends slightly beyond the riser.
(v) Baluster: A vertical post that supports the handrail, commonly used in staircases.
(vi) Newel post: A large, sturdy post at the beginning or turning points of a staircase, supporting the handrail.
(vii) String: The inclined side supports that hold the treads and risers in place.
(viii) Scotia mould: A decorative molding used beneath the nosing to enhance appearance and provide additional support.
(ix) Tread: The horizontal surface of a step where the foot is placed when ascending or descending.

15. (a) Define the term "dry rot".

Dry rot is a type of fungal decay that affects wood, causing it to become brittle, cracked, and weak. It occurs in damp conditions where moisture levels are high but with poor ventilation, allowing the fungus to spread and break down the wood fibers.

(b) Name six measures used in preventing dry rot.

- Ensuring proper ventilation to reduce moisture buildup.
- Treating wood with fungicidal preservatives.
- Using well-seasoned or kiln-dried wood in construction.
- Repairing leaks in roofs, walls, and plumbing to prevent damp conditions.
- Installing damp-proof courses in buildings to block moisture from the ground.
- Regular inspections and maintenance of wooden structures to detect and treat early signs of decay.

(c) State the two types of internal fittings.

- Fixed fittings: These are permanently installed features, such as built-in wardrobes, kitchen cabinets, and shelving.
- Movable fittings: These are non-fixed elements, such as furniture, curtains, and decorative accessories that can be rearranged or replaced easily.