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BUGESERA DISTRICT

Marking guide

TSS 2nd TERM DISTRICT COMPREHENSIVE ASSESSMENT SCHOOL YEAR: 2024-2025

SECTOR: Construction and building services

.../100 MARKS

TRADE: Building construction

RQF LEVEL: 3

MODULE CODE AND TITLE: OPENING FIXATION

DURATION: 3hours

DATE: / / 2025

INSTRUCTIONS TO CANDIDATE:

- ✓ **This exam has three sections.**
- ✓ **Maximum marks... / Marks**
- ✓ **Attempt all Questions in A**
- ✓ **Choose only two questions in section B.**
- ✓ **Choose only one question in section C.**

**TSS 2nd TERM DISTRICT COMPREHENSIVE ASSESSMENT
SCHOOL YEAR: 2024-2025**

SECTION A: Attempt all Questions /55marks

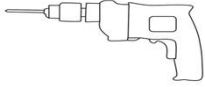
Q1.What do you understand the following terms:/5marks

- a. Door
- b. Door shutter
- c. Window frame
- d. Chisel
- e. Steel float

ANSWER: Here are the definitions of the given terms:

- a. Door** – A movable structure used to open and close an entrance to a building, room, or passageway. It provides access, security, and privacy.
- b. Door shutter** – The actual panel or leaf of the door that swings, slides, or folds to open or close the doorway. It is the movable part of a door assembly.
- c. Window frame** – The structural support that holds the window in place. It consists of vertical and horizontal members that provide stability and facilitate the installation of glass panes or shutters.
- d. Chisel** – A hand tool with a sharp cutting edge at one end, used for carving, shaping, or cutting wood, metal, or stone. It is often struck with a hammer or mallet.
- e. Steel float** – A flat tool made of steel, used in plastering and concrete work to smooth and level surfaces. It helps achieve a uniform and polished finish.

Q2. List the names of following tools and equipment used in opening fixation and its function for each. /5marks



a).....



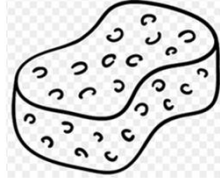
b).....



c).....



d).....



e).....

ANSWER:

a. Hand drill b. Nail Princh c. Pincer d. Claw bar e. Sponge

Q3. With clear sketch show any four (4) types of signpost. /4marks

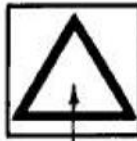
ANSWER:

PROHIBITION



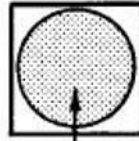
Red

WARNING



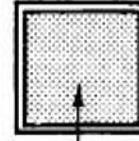
Yellow

MANDATORY



Blue

SAFE CONDITION



Green

Q4. Answer True or False. /4marks

- Personal protective equipment (PPE) for opening fixation includes only gloves and masks, as no other protection is necessary.
- Coarse aggregate makes solid and hard mass of concrete with cement and sand.
- Water is only the ingredient that reacts chemically with cement and thus setting and hardening takes place.
- The main function of door is to maintain privacy and safety inside the room or house when it is opened.

ANSWER:

- a.** False – Personal protective equipment (PPE) for opening fixation includes more than just gloves and masks; other protective gear like safety glasses, helmets, and boots may also be necessary.
- b.** True – Coarse aggregate, along with cement and sand, contributes to the strength and hardness of concrete, forming a solid mass.
- c.** True – Water is the only ingredient that chemically reacts with cement (hydration process), leading to setting and hardening of concrete.
- d.** False – The main function of a door is to provide access, security, privacy, and protection when it is **closed**, not when it is opened.

Q5. Why do we need to revise drawing plan before performing opening fixation? Any five (5) reasons. **/5marks**

ANSWER: Revising the drawing plan before performing opening fixation is crucial for ensuring accuracy and efficiency in construction. Here are five reasons why it is necessary:

1. **Accuracy of Dimensions** – Verifying the drawing ensures that all measurements for doors, windows, and other openings are correct, preventing installation errors.
2. **Proper Alignment** – Ensures that the openings are correctly positioned according to the design, avoiding misalignment that could affect the functionality and aesthetics of the structure.
3. **Compliance with Design Specifications** – Helps confirm that the fixation follows architectural and structural requirements, ensuring the final construction matches the intended design.
4. **Avoiding Structural Issues** – Ensures that the placement of openings does not weaken walls or interfere with load-bearing elements, preventing potential structural failures.
5. **Cost and Time Efficiency** – Detecting and correcting errors in the plan before installation prevents costly modifications, material wastage, and delays in the construction process.

Q6. The materials used in the construction of Engineering Structures such as buildings, bridges and roads are called Engineering Materials or Building Materials. Outline any four (4) mechanical properties of building materials. /4marks

ANSWER:

Mechanical properties of building materials determine their strength, durability, and performance under different forces. Here are four important mechanical properties:

1. **Strength** – The ability of a material to withstand applied loads without breaking or failing. This includes tensile, compressive, and shear strength.
2. **Hardness** – The resistance of a material to surface wear, abrasion, or indentation. Hard materials, like concrete and steel, are more durable in construction.
3. **Elasticity** – The ability of a material to return to its original shape after being deformed by an external force. For example, steel exhibits good elasticity.
4. **Toughness** – The ability of a material to absorb energy and resist impact or shock without fracturing. Tough materials, like structural steel, are used in load-bearing structures.

Q7.a. Mention any three (3) the factors needed for selecting the size, shape, location and number of windows in a room. / 3marks

ANSWER:

The selection of size, shape, location and number of windows in a room depends upon the following:

- ▲ Size of the room;
- ▲ Location of the room;
- ▲ Utility of the room;
- ▲ Direction of the wall;
- ▲ Direction of wind;
- ▲ Climate conditions, such as humidity, temperature, etc.
- ▲ Required exterior view;
- ▲ Architectural treatment to the exterior of the building.

b. State any four (4) types of doors based on the method or manner of construction? /2marks

ANSWER:

Doors can be classified based on their method or manner of construction. Here are four types:

1. **Panel Door** – Made of vertical and horizontal wooden panels, often used in traditional homes due to its strong and decorative design.
2. **Flush Door** – A smooth, flat-surfaced door with a solid or hollow core, commonly used in modern buildings for its simplicity and affordability.
3. **Glazed Door** – A door that has glass panels either partially or fully, allowing light to pass through while maintaining separation between spaces.
4. **Louvered Door** – Designed with horizontal slats (louvers) that allow ventilation while maintaining privacy, often used in bathrooms or utility rooms.

Q8. Provide the name of following symbols below: / **5marks**



a).....



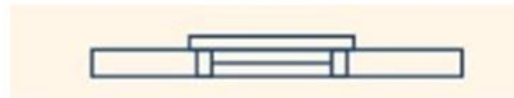
b).....



c).....



d).....



e).....

ANSWER:

a) single door b) double door c) Fixed window d) horizontal sliding window
e) double hung window

Q9. What are features and characteristics of framed and panelled doors? / **4marks**

ANSWER:

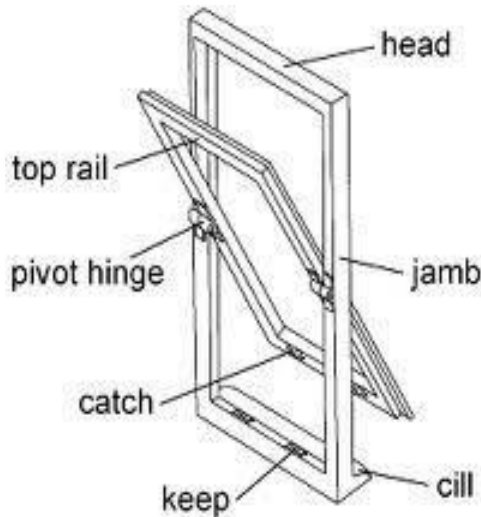
These types of doors have the following features and characteristics:

- ✓ The styles are continuous from top to the bottom. (they are in single piece)
- ✓ Various rails are joined to the styles at both ends. (Top rails, bottom rails...) are connected to the styles.
- ✓ The bottom and lock rails are made wider than top rails.

- ✓ The entire frame is grooved on all the inside faces to receive the panels.
- ✓ The minimum width of the styles will be kept 100mm.

Q10. Draw pivoted window and fill the following parts: head, jamb, top rail, cill, keep, catch, pivot hinge. **/5marks**

ANSWER:



Q11. Outline any four (4) merits of flush doors. **/4marks**

ANSWER:

Merits of Flush Doors:

1. **Smooth and Elegant Appearance** – Flush doors have a plain and sleek surface, giving a modern and stylish look to interiors.
2. **Lightweight and Easy to Handle** – Compared to solid wooden doors, flush doors are lighter, making installation and operation easier.
3. **Cost-Effective** – They are more affordable than traditional panel doors due to the use of economical materials like plywood, MDF, or laminated board.
4. **Durability and Low Maintenance** – Flush doors are resistant to warping, cracking, and termite attacks, requiring minimal maintenance over time.

Q12. Describes any four (4) reasons of wearing PPE in the work place during opening fixation works. **/4marks**

ANSWER:

Reasons for Wearing PPE in the Workplace During Opening Fixation Works:

1. **Protection from Injuries** – PPE such as safety gloves, helmets, and safety boots protect workers from cuts, bruises, and head injuries caused by falling objects or sharp tools.
2. **Prevention of Dust and Chemical Exposure** – Wearing masks and safety goggles helps protect workers from inhaling dust, fumes, or harmful chemicals released during drilling, cutting, or fixing openings.
3. **Enhanced Grip and Control** – Safety gloves improve grip while handling tools and materials, reducing the risk of slipping and accidental injuries.
4. **Compliance with Safety Regulations** – Using PPE ensures adherence to workplace safety standards and legal requirements, reducing the risk of fines or work stoppages due to non-compliance.

SECTION B: Attempt any two (2) questions / 30marks

Q13.I. A house have five (5) doors of size $1\text{m} \times 2.1\text{m}$ each and six (6) windows of size $1.2\text{m} \times 1.5\text{m}$ each, if the mortar used for fixing is 1:4 and the average mortar thickness is 20mm, determine. / **10marks**

- a. The total volume of mortar.
- b. The total cement requirements in bags.
- c. The total sand quantity.

ANSWER:

Given:

- **Door size:** 1 m × 2.1 m (5 doors)
- **Window size:** 1.2 m × 1.5 m (6 windows)
- **Mortar ratio:** 1:4 (Cement: Sand)
- **Mortar thickness:** 20 mm = 0.02 m
- **Assumed factor for total volume:** 1.33 (this could be the volume factor for any wastage or rounding)

Step 1: Calculate the Total Area for Doors and Windows

- **Area of one door** = 1 m × 2.1 m = 2.1 m²
For 5 doors:
 $5 \times 2.1 \text{ m}^2 = 10.5 \text{ m}^2$
- **Area of one window** = 1.2 m × 1.5 m = 1.8 m²
For 6 windows:
 $6 \times 1.8 \text{ m}^2 = 10.8 \text{ m}^2$
- **Total area of doors and windows:**
 $10.5 \text{ m}^2 + 10.8 \text{ m}^2 = 21.3 \text{ m}^2$

Step 2: Calculate the Volume of Mortar

The volume of mortar is determined by multiplying the total area by the mortar thickness.

- **Volume of mortar** = Total Area × Mortar Thickness
Volume of mortar = 21.3 m² × 0.02 m
Volume of mortar = 0.426 m³

Now, applying the assumed factor of 1.33 to account for wastage or other adjustments:

$$\text{Adjusted Volume of Mortar} = 0.426 \text{ m}^3 \times 1.33 = 0.567 \text{ m}^3$$

Step 3: Calculate the Cement and Sand Requirements

Since the mortar ratio is 1:4, the total parts are 5 (1 part cement and 4 parts sand).

- **Cement volume** = $\frac{1}{5} \times \text{Total Volume of Mortar}$
Cement volume = $\frac{1}{5} \times 0.567 \text{ m}^3 = 0.1134 \text{ m}^3$
- **Sand volume** = $\frac{4}{5} \times \text{Total Volume of Mortar}$
Sand volume = $\frac{4}{5} \times 0.567 \text{ m}^3 = 0.4536 \text{ m}^3$

Step 4: Convert Volumes into Bags and Quantities

- **Cement:** 1 cubic meter of cement weighs approximately 1440 kg.
Cement weight = $0.1134 \text{ m}^3 \times 1440 \text{ kg/m}^3 = 163.1 \text{ kg}$
Since one bag of cement weighs 50 kg,
Cement bags = $\frac{163.1 \text{ kg}}{50 \text{ kg/bag}} = 3.26 \text{ bags}$
So, approximately **3.3 bags** of cement are required.
- **Sand:** 1 cubic meter of sand weighs approximately 1600 kg.
Sand weight = $0.4536 \text{ m}^3 \times 1600 \text{ kg/m}^3 = 725.76 \text{ kg}$
So, approximately **726 kg** of sand is required.

Summary of Results:

- a. The total volume of mortar = 0.567 m^3 (after applying the factor of 1.33)
- b. The total cement requirements = 3.3 bags
- c. The total sand quantity = 726 kg

II. State any two (2) types of rolling shutters. /5marks

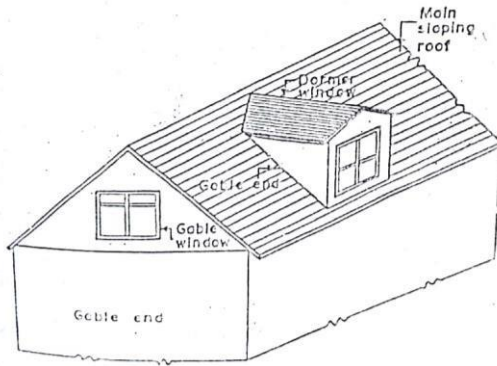
ANSWER:

Rolling shutters are of two types:

- i) Push-pull type shutters and
- ii) Mechanical gear type shutters

Q14. I. With aid neat sketch differentiate dormer window from gable window. / **5marks**

ANSWER:



II. What are advantages of using steel windows and doors over timber? / **10marks**

ANSWER:

Steel windows have following advantages over timber windows:

1. Steel windows are generally manufactured in factories, with greater precision and better quality control.
2. They exhibit elegant appearance and stream lined-finishing.
3. Steel windows are stronger and more durable than wooden windows.
4. There is no contraction or expansion due to weather effects in the steel windows. Wooden windows have this effect.
5. They are rot proof and termite proof.
6. They are highly fire resistant.
7. Since steel windows are fabricated from thin sections, they provide more effective area for light and ventilation.
8. They grant better facilities for providing different types of openable parts.
9. They are easy to maintain, and the cost of maintenance is almost negligible.

Q15. I. The width of the door should be such that two persons can pass through it walking shoulder by shoulder, Compare the classification of doors based on arrangement of components and Based on how they are constructed (especially construction materials). / **10marks**

^ **Based on the arrangement of components; doors can be classified into:**

1. Battened and ledged door;
2. Battened; ledged; and braced door;
3. Battened; ledged; and framed doors;
Battened; ledged; braced; and framed doors

▲ **Based on how they are constructed (especially construction materials):**

1. Mild steel sheet doors;
2. Corrugated steel sheet doors;
3. Hollow metal doors;
4. Metal covered plywood doors

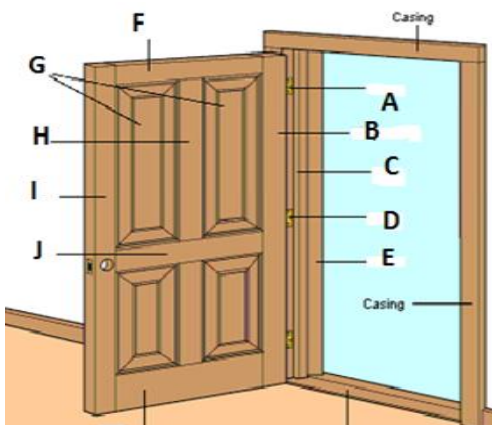
II. Give the sizes of doors for the following residential buildings: **/5marks**

- a. Garage for cars.
- b. Doors for bathrooms and water closets.

ANSWER:

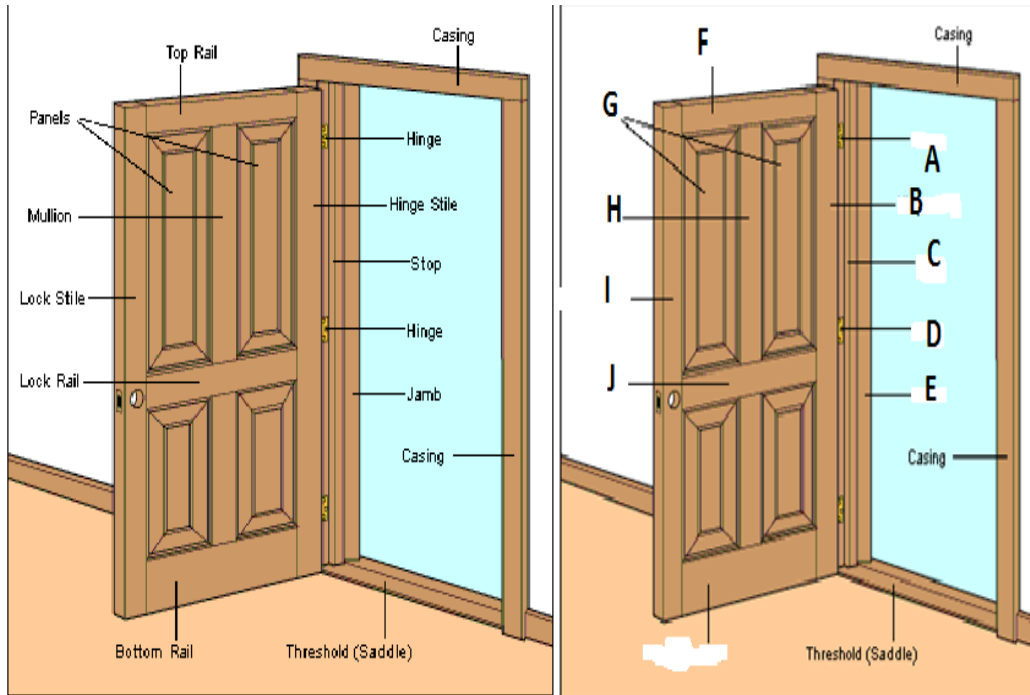
- a **Garage for cars:** 2.25m(height) × 2.25m(width) to 2.25m(height) × 2.4m(width)
- b **Doors for bathrooms and water closets:** (0.7×2) m to (0.8×2) m

Q16. Name the parts of doors and its function for each parts (A, B, C, D, E, F, G, H, I, J). **/15marks**



ANSWER:

A: Hinge B: Hinge stile C: Stop D: Hinge E: Jamb F: Top rail G: Panels H: Mullion I: Lock stile J: Lock rail



SECTION C: Attempt only one (1) question 15marks

Q17.After defining the term hinges, explain clearly ten (10) types of hinges used in opening fixation. / **15marks**

ANSWER:

Hinges are of the following types:

1. **Back flap hinges:** These hinges are used where the shutters are thin. These are fixed to the back side of the shutter and the frame.

2. **Butt hinges:** These types of hinges are commonly used for fixing door and window shutters to the frame.

The flanges of hinge are made of cast iron, malleable iron or steel, with countersunk holes.

One flange of hinge is screwed to the edge of the shutter while the other is screwed to the rebate of the frame.

3. **Counter-flap hinge:** This hinge is formed in three parts and has two centres. Hence the two leaves can be folded back to back.

4. Garnet hinge: This type of hinge, also known as T-shutter, has a long arm which is screwed to the shutter, and a short arm or plate which is screwed to the door frame. The hinge is used for ledged and battened doors, ledged and braced doors, etc.

5. Nar-madi hinge: This is used for heavy doors.

The flange or strap of the hinge is fixed to the door shutter while the pin on which the strap rotates is fixed to the frame.

6. Parliamentary hinge: These hinges permit the door shutters, when open, to rest parallel to the wall.

Hence these hinges are used when the opening is narrow and when it is required to keep the opening free from obstruction due to door shutters.

7. Pin hinge: This is also used for heavy door shutters.

The centre pin of the hinge can be removed and the two leaves or straps of the hinge can be fixed separately to the frame and the shutter.

8. Rising butt hinge: Such a hinge is provided with helical nickel joints, due to which the shutter is raised by 10 mm on being opened. The door is closed automatically.

Such hinges are used for doors of rooms having carpets, etc.

They are used in place of ordinary butt hinges.

9. Strap hinge: It is the substitute of garnet or T-hinge.

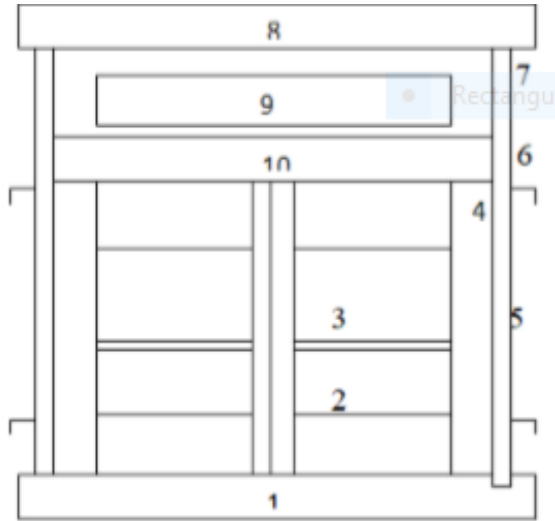
It is also used for ledged and braced doors, and for heavy doors such as for garages, stables, gates, etc.

10. Spring hinges: Single acting or double acting spring hinges are used for swinging doors.

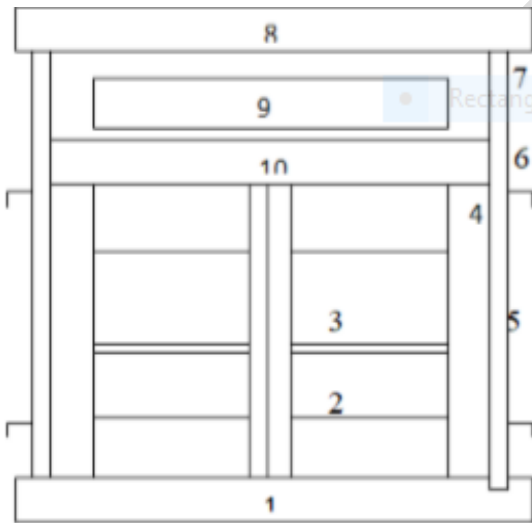
Single acting hinge is used when the door shutter opens only in one direction, while the double acting hinge is used when the shutter swings in both the directions.

The door closes automatically due to spring action.

Q18. . By using a neat sketch, show at least 10 parts of fixed windows and its function for each part. / **15marks**



ANSWER:



1. Sill
2. Panel

3. The rail
4. The style
5. The frame
6. The hold fast
7. The horn
8. The head
9. Transom head

GOOD LUCK!