

MODEL ANSWERS & SOLUTION KEY (आदर्श उत्तर)

Subject: Construction (Brick Masonry) | विषय: कंस्ट्रक्शन (ब्रिक मसनरी)

Class: 12th (NSQF)

Session: 2026-2027

Max Marks: 60 | Time: 2.30 Hrs

SECTION - A: LONG ANSWER TYPE QUESTIONS (3 × 5 = 15 MARKS)

Q.1. Step-by-step process of stone masonry construction & Precautions.

[5 Marks]

Answer / उत्तर:

Step-by-Step Process of Stone Masonry:

1. **Dressing of Stones:** Stones are shaped and dressed properly to remove rough edges and fit in walls.
2. **Wetting/Moistening:** Stones are thoroughly wetted before use so they do not absorb moisture from mortar.
3. **Laying Mortar Bed:** A uniform bed of cement mortar (usually 1:3 or 1:4 ratio) is laid on the foundation or previous layer.
4. **Laying Stones & Alignment:** Stones are placed carefully, checked for horizontal alignment using line-dori and vertical alignment using plumb bob (Sahawal).
5. **Bonding & Joint Filling:** Proper bond is maintained, header/through stones are placed at regular intervals (1.5m), and joints are packed tightly with mortar and spalls.

Precautions during Construction:

- Stones must be laid on their natural bed for maximum strength.
- Use through-stones at proper intervals for structural integrity.
- Proper curing (min 7-14 days) must be done after laying.

--- OR / अथवा ---

Answer (OR Part) / उत्तर:

Stone Masonry: The art of building structures using stones bound together with mortar is called Stone Masonry.

Main Qualities of Good Building Stones:

1. **Strength & Hardness:** Compressive strength should be high (greater than 100 N/mm²).
2. **Durability:** Able to resist weathering effects like rain, wind, and frost.
3. **Low Water Absorption:** Water absorption should be less than 5% by weight.
4. **Workability & Texture:** Easily dressable and possessing a compact fine-grained structure.
5. **Fire Resistance:** Free from calcium carbonate and soluble salts that cause decay under high heat.

Q.2. Concrete flooring, construction procedure & advantages of IPS flooring.**[5 Marks]****Answer / उत्तर:**

Concrete Flooring: A durable floor surface made by laying a layer of concrete over a prepared bed of earth/sand compaction.

IPS Flooring (Indian Patent Stone) Construction Procedure:

1. **Base Preparation:** The sub-base surface is cleaned, watered, and compacted properly.
2. **Panel Division:** The floor area is divided into square/rectangular panels using glass or aluminum strips (to prevent thermal cracks).
3. **Concrete Mix & Laying:** Concrete (1:2:4 ratio, cement:sand:aggregate) of 40mm thickness is laid in alternate panels.
4. **Finishing & Troweling:** A neat cement slurry finish is applied on top and finished smoothly with steel trowels.

Advantages of IPS Flooring:

- Highly durable, tough, and wear-resistant.
- Economical and low maintenance cost.
- Provides a smooth, non-absorbent, and hygienic surface.

--- OR / अथवा ---

Answer (OR Part) / उत्तर:

Tremix (Vacuum Dewatered) Flooring: A modern technique where excess water from green concrete is extracted using a high-vacuum pump system before setting, resulting in higher compressive strength and wear resistance.

Tools & Machinery Used:

1. **Needle & Surface Vibrators:** For compaction and leveling of wet concrete.
2. **Screed Board Vibrator:** To achieve exact surface level and grade.
3. **Vacuum Pump & Suction Mat:** To suck out excess uncombined water from wet concrete.
4. **Power Trowel / Power Floater:** For initial floating and final smooth troweling finish.

Q.3. Construction site safety rules OR Fire Extinguisher types & PASS procedure.**[5 Marks]****Answer / उत्तर:****Safety Rules at Construction Site:**

1. **Wear Mandatory PPE:** Always wear helmets, safety shoes, high-visibility jackets, gloves, and eye protection.
2. **Scaffolding Safety:** Use secure, inspected scaffoldings with guardrails and safety harnesses when working at heights (>2 meters).
3. **Electrical Safety:** Ensure proper earthing of electrical tools and do not touch loose/bare wires.
4. **Proper Storing & Handling:** Keep walkways clear of debris, scrap materials, and sharp tools.
5. **Follow Safety Signs & Instructions:** Adhere to warning signs, barricades, and toolbox talk guidelines.

--- OR / अथवा ---

Answer (OR Part) / उत्तर:

Types of Fire Extinguishers: Water type (Class A), Foam type (Class B), Dry Powder / ABC type (Class A, B, C), CO2 type (Electrical fires), Wet Chemical type.

PASS Method Step-by-Step Procedure:

- **P - Pull:** Pull the safety pin located at the top of the extinguisher.
- **A - Aim:** Aim the nozzle/hose low at the base of the fire.
- **S - Squeeze:** Squeeze the lever/handle to release the extinguishing agent.
- **S - Sweep:** Sweep the hose from side to side across the base of the fire until extinguished.

SECTION - B: SHORT ANSWER TYPE QUESTIONS (6 × 3 = 18 MARKS)

Q.4. Three differences between Brick Masonry and Stone Masonry.

[3 Marks]

Feature	Brick Masonry	Stone Masonry
Material	Made of artificial burnt clay bricks of standard uniform size.	Made of naturally occurring stones, irregular/dressed.
Labor & Cost	Requires less skilled labor and is cheaper.	Requires highly skilled masons and is costlier.
Weight & Strength	Lighter in weight, suitable for multi-story partition.	Heavier, stronger, highly durable for heavy structures.

Q.5. Definition of Pointing & Two main reasons for doing it.

[3 Marks]

Definition: Pointing is the process of raking mortar joints to a depth of 12-20mm and refilling them with superior quality mortar to a specific shape/finish.

Reasons for Pointing:

1. To protect masonry joints from rain water penetration and atmospheric weathering.
2. To improve the aesthetic appearance and neat look of the unplastered wall.

Q.6. Three advantages of Vacuum Dewatered Flooring (Tremix).

[3 Marks]

1. **Higher Strength:** Increases compressive strength by up to 30-50% due to reduced water-cement ratio.
2. **High Wear/Abrasion Resistance:** Provides an extremely tough, dust-free surface suitable for heavy industrial traffic.
3. **Reduced Shrinkage & Cracking:** Dewatering minimizes plastic shrinkage cracks and drying contraction.

Q.7. Name any six Personal Protective Equipment (PPE) items.

[3 Marks]

1. Safety Helmet | 2. Safety Shoes / Boots | 3. Hand Gloves | 4. Safety Goggles / Glasses | 5. High-Visibility Reflective Jacket | 6. Earplugs / Earmuffs (or Dust Mask / Safety Harness).

Q.8. Safe storage and stacking of cement bags OR 4 Stone Masonry hand tools & uses.

[3 Marks]

Safe Stacking of Cement Bags:

- Store in a completely dry, moisture-proof godown with closed doors/windows.
- Stack bags on wooden platforms elevated at least 15-20 cm above the floor.
- Keep stacks at least 60 cm away from exterior walls and limit stack height to 10-12 bags max.

--- OR / अथवा ---

1. **Chisel (Chedi):** Used for cutting and dressing stones.
2. **Spall Hammer:** Used for heavy knapping and rough dressing of stones.
3. **Trowel (Kurni):** Used to lift and spread mortar on joints.
4. **Plumb Bob (Sahawal):** Used to check verticality of stone masonry walls.

Q.9. First Aid steps for injured worker OR Tile Adhesives preference over cement mortar. [3 Marks]

Basic First Aid Steps:

1. Ensure safety of the area and immediately stop any bleeding by applying direct pressure with a clean cloth/bandage.
2. Clean wounds with antiseptic liquid/water and apply sterile dressing.
3. Keep victim calm, comfortably seated, and call for medical help / ambulance immediately.

--- OR / अथवा ---

Tile Adhesives: Pre-mixed polymer-modified cementitious compounds used for fixing tiles on surfaces.

Why preferred over plain mortar:

- Higher bonding strength and non-shrink property (prevents hollow sounds under tiles).
- Faster application, thinner layer requirement, and no need to soak tiles in water beforehand.

SECTION - C: VERY SHORT ANSWER TYPE QUESTIONS (6 × 2 = 12 MARKS)

Q.10. Importance of curing (tarai) for concrete structures. [2 Marks]

Curing keeps concrete moist to allow complete hydration of cement, ensuring full structural strength development and preventing shrinkage cracks.

Q.11. Two properties of Granite stone. [2 Marks]

1. Extremely hard, dense, and durable igneous rock with high compressive strength.
2. Highly resistant to weathering, acids, and water absorption.

Q.12. Use of Spirit Level tool in construction. [2 Marks]

Spirit Level is used to check horizontal level surfaces (floors/beams) and vertical alignment of brick/stone courses using air bubble position.

Q.13. Two precautions while stacking bricks at site. [2 Marks]

1. Stack bricks on a firm, level, dry ground on edge in layers (header & stretcher bonding style).
2. Limit stack height to a maximum of 1.5 meters (approx. 10 layers) to prevent collapse.

Q.14. Definition of Mortar & main ingredients OR Full form of PPE and VDF. [2 Marks]

Mortar: A paste-like binding material used to join bricks/stones.

Ingredients: Binding material (Cement/Lime) + Fine Aggregate (Sand) + Water.

--- OR / अथवा ---

1. **PPE:** Personal Protective Equipment
2. **VDF:** Vacuum Dewatered Flooring

Q.15. First Aid Box definition & 2 items OR Dry Stone Masonry definition. [2 Marks]

First Aid Box: A emergency kit containing medical supplies for immediate basic treatment.

Items: Bandages / Cotton, Antiseptic liquid (Dettol/Betadine) / Burn ointment.

--- OR / अथवा ---

Dry Stone Masonry: Stone masonry constructed without using any mortar in joints, relying solely on stone interlocking and gravity for stability.

SECTION - D: OBJECTIVE TYPE QUESTIONS (15 × 1 = 15 MARKS)

Q. No.	Correct Option / Answer	Key Concept / Explanation
Q.16	a) Plumb bob (Sahawal)	Plumb bob checks vertical straightness of walls.
Q.17	d) All of these	Helmet, boots, and gloves are all essential site PPE.
Q.18	a) Indian Patent Stone	IPS stands for Indian Patent Stone flooring.
Q.19	b) 7 days	Standard minimum moist curing period for concrete is 7 days.
Q.20	b) Cement	Cement acts as the main binding agent in cement mortar.
Q.21	a) Pull the pin	PASS = Pull, Aim, Squeeze, Sweep.
Q.22	b) Vacuum Dewatered Flooring	Tremix flooring is also called Vacuum Dewatered Flooring (VDF).
Q.23	b) At least 60 cm away	Cement bags should be kept minimum 60 cm (2 ft) away from walls.
Q.24	a) Igneous Rock	Granite is formed by cooling of magma (Igneous rock).
Q.25	b) Class C / Electrical Fire	Electrical fires fall under Class C (or electrical category).
Q.26	b) Dry Masonry	Masonry without mortar is called Dry Stone Masonry.
Q.27	a) Head injury from falling objects	Safety helmets protect the head from impacts.
Q.28	a) Phawra (Spade) / Trowel	Phawra and Trowel are used to mix and handle mortar.
Q.29	Equipment	Full form: Personal Protective Equipment .
Q.30	Pointing	Finishing and filling of joints is defined as Pointing .