MARKING SCHEME & SOLUTION KEY

MODEL QUESTION PAPER (2026-2027) - CLASS XI

SUBJECT: BRICK MASONRY / CONSTRUCTION | **CODE:** SECONDARY | **MAX MARKS:** 60

GENERAL INSTRUCTIONS FOR EVALUATORS:

- **Stepwise Marking:** Award marks step-by-step according to the division indicated in the scheme.
- **Equivalent Answers:** Full credit should be given for alternative, technically correct terminology or explanations expressed in candidate's own words.
- **Diagrams:** Neat sketches where relevant should be given due weightage even if not explicitly demanded.

SECTION - A: LONG ANSWER TYPE QUESTIONS (15 MARKS)

Q1. Step-by-Step Process of Laying Concrete Blocks for Wall Construction — 5 MARKS

Answer Summary:

- 1. **Surface Preparation & Marking:** Clean the footing/foundation bed thoroughly. Lay out wall centerline, corners, and opening locations using chalk lines.
- 2. **Mortar Bedding:** Spread a uniform layer (10-12 mm thick) of 1:4 cement-sand mortar along the foundation line.
- 3. **Laying Corner Blocks (Lead Blocks):** Lay corner blocks first with precision. Check horizontal alignment with a spirit level and vertical alignment with a plumb bob.
- 4. **String Line & Intermediate Blocks:** Stretch a mason's line between corner blocks to guide the alignment of intermediate blocks. Apply vertical mortar joints (head joints) on block edges before placing.
- 5. **Interlocking & Staggering:** Lay subsequent courses maintaining a half-block overlap (staggered vertical joints) to ensure structural bond strength.
- 6. **Jointing & Curing:** Tool mortar joints while plastic for a clean finish. Keep the constructed wall moist and cure for at least 7 to 10 days.

OR

Q1 (OR). Differentiate Between English Bond and Flemish Bond in Brick Masonry — 5 MARKS

Answer Summary:

- **Arrangement:** English bond consists of alternate courses of stretchers and headers. Flemish bond consists of alternate stretchers and headers in every course.
- **Appearance:** English bond gives a plain, formal appearance. Flemish bond provides an aesthetically pleasing and decorative face appearance.
- **Strength:** English bond is structurally stronger and preferred for thick load-bearing walls. Flemish bond is slightly less strong for walls over 1.5 bricks thick.
- **Queen Closers:** In English bond, a queen closer is placed next to the quoin header in header courses. In Flemish bond, queen closers are placed in alternate courses next to quoin headers.
- **Workmanship & Cost:** Flemish bond requires skilled labor and attention to alignment, whereas English bond is easier to construct cleanly.

Q2. Step-by-Step Process of Applying Cement Plaster on a Wall Surface

5 MARKS

Answer Summary:

- 1. **Surface Preparation:** Rake out mortar joints in masonry to a depth of 10-15 mm. Clean dust, oil, and loose particles, then wet the wall thoroughly.
- 2. **Fixing Level Dots & Screeds:** Place small plaster patches (dots) of ~15x15 cm at 2-meter spacing and connect them vertically into screeds to maintain a uniform plaster thickness.
- 3. **First Coat (Undercoat):** Apply 1:4 cement-sand mortar mix forcibly onto the wall surface between screeds to a thickness of 10–12 mm.
- 4. **Levelling & Floating:** Level the applied mortar using a wooden float and straight edge. Scratch the surface slightly if a second coat is needed.
- 5. **Finishing Coat & Curing:** Apply a thin smooth finishing coat (if specified) or finish with a wooden float. Allow plaster to set and water-cure for a minimum of 7 days.

OR

Q2 (OR). Procedure of Brick Bat Coba Waterproofing for a Roof Slab

5 MARKS

Answer Summary:

Brick Bat Coba is a traditional, durable insulation and waterproofing treatment for flat roofs:

- 1. **Surface Cleaning & Slurry Application:** Clean the RCC roof slab thoroughly and apply a cement slurry mixed with waterproofing compound.
- 2. **Base Mortar Bed:** Spread a 25 mm thick layer of cement mortar (1:4) over the concrete base.
- 3. **Laying Brick Bats:** Embed well-burnt, broken brick bats (50-112 mm size) into the green mortar layer, maintaining required slope (1 in 80 to 1 in 100) toward drain pipes.
- 4. **Grouting & Finishing:** Fill gaps between brick bats completely with liquid cement mortar mixed with waterproofing liquid. Smooth the top surface with a wooden float.
- 5. **Curing:** Pond the finished surface with water for at least 14 days to prevent shrinkage cracks.

Q3. Stone Masonry: Definition, Ashlar Masonry & Rubble Masonry

5 MARKS

Answer Summary:

Stone Masonry: The art of building structures using natural stone blocks bonded together with mortar.

- **Ashlar Masonry:** Built using accurately dressed rectangular/square stone blocks with fine, thin mortar joints (less than 3 mm). Stones are cut to precise dimensions with smooth surfaces, giving a high-quality aesthetic finish and superior load strength.
- **Rubble Masonry:** Built using undressed, rough, or coarsely dressed stones directly obtained from quarries. Joints are wider (up to 12–20 mm) and filled with mortar/spalls. It is cheaper and used for retaining walls, boundary walls, or low-cost structures.

OR

Q3 (OR). Types of Joints in Stone Masonry & Explanation of Any Three — 5 MARKS

Answer Summary:

Common Types of Joints: Butt Joint, Rebated/Lapped Joint, Tongue and Groove Joint, Joggle Joint, Cramped Joint, Plugged Joint.

Explanation of Three Joints:

- 1. **Butt Joint:** The simplest joint where square-dressed edges of adjacent stones simply abut against each other with a thin layer of mortar.
- 2. **Joggle Joint:** A projection (key) on one stone fits into a corresponding groove/recess of the adjacent stone to prevent lateral movement.
- 3. **Cramped Joint:** Metal straps (cramps) made of copper, brass, or stainless steel are embedded into channels cut into adjacent stones and sealed with lead/cement to tie them tightly together.

SECTION - B: SHORT ANSWER TYPE QUESTIONS (18 MARKS)

Q4. Dots and Screeds in Plastering & Purpose — 3 MARKS

Dots: Small square patches (~15 cm x 15 cm) of plaster applied temporarily on walls at regular intervals to establish the desired plaster thickness.

Screeds: Vertical bands of plaster formed by connecting upper and lower dots along the wall length.

Purpose: They act as physical gauge strips to ensure a uniform plaster thickness and a perfectly plumb, flat wall surface.

Q5. Advantages and Disadvantages of Concrete Blocks over Bricks — 3 MARKS

Advantages:

- 1. Faster construction due to larger size.
- 2. Saves mortar consumption during laying.
- 3. Higher thermal/acoustic insulation (especially hollow concrete blocks).

Disadvantages:

- 1. Higher prone to shrinkage cracking if uncured.
- 2. Requires skilled labor and careful handling due to unit weight.
- 3. Less aesthetic for exposed masonry compared to burnt clay bricks.

Q6. Three Common Defects in Brick Masonry Work — 3 MARKS

- 1. **Efflorescence:** White powdery salt deposits formed on brick surfaces due to soluble salts and moisture.
- 2. **Cracking:** Caused by thermal movement, foundation settlement, or structural overloading.
- 3. **Sulphate Attack:** Chemical reaction between sulphate salts in bricks and cement mortar causing expansion, spalling, and joint disintegration.

Q7. Stacking and Curing Procedure for Precast Concrete Blocks — 3 MARKS

Stacking: Stack blocks on a level, dry, firm platform up to a maximum height of 5 to 6 layers in a staggered, criss-cross pattern for stability and air circulation.

Curing: Keep freshly molded precast blocks continuously wet (by water sprinkling or submersion in curing tanks) for 14 to 28 days to attain full design strength.

Q8. Functions of Spirit Level, Plumb Bob, and Mason's Square in Brickwork — 3 MARKS

- **Spirit Level:** Used to check horizontal alignment/trueness of brick courses.
- **Plumb Bob:** Used to check verticality (plumb) of walls and corners.
- **Mason's Square (Try Square):** Used to measure and set perfect 90-degree right angles at wall corners.

OR

Q8 (OR). Efflorescence in Brickwork & Prevention — 3 MARKS

Efflorescence: Appearance of white alkaline salt deposits on brick walls caused by moisture dissolving soluble salts present inside bricks or mortar and evaporating on the surface.

Prevention: Use well-burnt, salt-free bricks; use clean water for mortar preparation; apply water-repellent silane coatings on exposed masonry.

Q9. Step-by-Step Procedure of Waterproofing in Bathroom / W.C. Area — 3 MARKS

- 1. Clean concrete sunken slab and seal pipe penetrations tightly with non-shrink grout.
- 2. Apply elastomeric cementitious/polymer slurry coating (2 coats) over slab and carry up walls to a height of 300 mm (dado area).
- 3. Fill sunken portion with brick bat mortar or lightweight cinders, maintaining slope toward drain outlets.
- 4. Perform a 48-hour water ponding test to verify zero leakage before laying floor tiles.

OR

Q9 (OR). Difference Between Ashlar Masonry and Rubble Masonry — 3 MARKS

- 1. **Dressing:** Ashlar uses finely dressed square/rectangular stones; Rubble uses undressed or roughly dressed irregular stones.
- 2. **Joints:** Ashlar has thin joints (< 3 mm); Rubble has wide, irregular mortar joints (10–20 mm).
- 3. **Cost & Strength:** Ashlar is highly expensive and structurally stronger; Rubble is economical and suitable for simpler structures.

SECTION - C: VERY SHORT ANSWER TYPE QUESTIONS (12 MARKS)

Q10. Define Queen Closer and King Closer — 2 MARKS

Queen Closer: A brick cut longitudinally into two equal halves, used next to a quoin header to create lap in brickwork.

King Closer: A brick cut diagonally such that one header end is half the width while the stretcher face remains full length.

Q11. 'Through Stone' in Stone Masonry & Its Purpose — 2 MARKS

Through Stone: A long stone block that extends full length across the entire thickness of a stone wall.

Purpose: It binds front and back faces of stone walls together, preventing lateral separation under load.

Q12. Standard Size and Modular Size of a Building Brick — 2 MARKS

Standard (Non-Modular) Size: 19 cm × 9 cm × 9 cm

Nominal / Modular Size (with mortar joint): 20 cm × 10 cm × 10 cm

Q13. Define Terms 'Toothing' and 'Racking Back' in Brickwork — 2 MARKS

Toothing: Projecting alternate brick courses at the end of a wall to provide a key for future wall extensions.

Racking Back: Stepping back successive courses of a brick wall at an angle during construction when work is stopped temporarily.

Q14. Main Raw Materials Needed to Prepare Cement Mortar — 2 MARKS

1. Cement (Binding material)
2. Fine Aggregate / Sand (Inert filler)
3. Clean Water (Hydration medium)

OR

Q14 (OR). Importance of Water-Cement Ratio and Compaction in Concrete Blocks — 2 MARKS

Proper water-cement ratio ensures complete hydration without excess porosity, and thorough compaction removes entrapped air pockets, maximizing block compressive strength and density.

Q15. Two Types of Decorative Plaster Finishes — 2 MARKS

1. Pebble Dash / Rough Cast Finish
2. Sand Face Finish / Stucco Plaster

OR

Q15 (OR). Bituminous Coating Waterproofing — 2 MARKS

A protective waterproofing method where liquid bitumen emulsion or hot asphalt membrane is applied on concrete/masonry surfaces to prevent dampness and water ingress.

SECTION - D: OBJECTIVE TYPE QUESTIONS (15 MARKS)

Answer Key for Questions 16 to 30 (1 Mark Each)

Q. No.	Correct Option / Answer	Explanation / Remarks
Q.16	**(b) 20 cm × 10 cm × 10 cm**	Modular brick size includes a 10 mm mortar joint allowance around the 19x9x9 cm standard brick.
Q.17	**(a) Bed joint**	The horizontal layer of mortar on which bricks are laid is called a bed joint.
Q.18	**(b) Stronger and faster setting**	Adding cement to lime creates gauged mortar, improving strength and curing speed.
Q.19	**(a) 3 mm**	Ashlar Fine masonry features finely dressed stones with joint thickness not exceeding 3 mm.
Q.20	**(c) Efflorescence**	Soluble salts crystallization on walls forms a white powdery deposit known as efflorescence.
Q.21	**(b) Plumb rule and bob**	A plumb bob suspended from a plumb rule checks vertical alignment of masonry.
Q.22	**(c) Coping**	Coping is placed on the top course of exposed boundary walls to shed rainwater.
Q.23	**(c) 14 to 28 days**	Standard moist curing duration for cementitious precast concrete blocks is 14–28 days.
Q.24	**(a) Next to the first header**	In English bond, a queen closer is placed next to the corner/quoin header to create lap.
Q.25	**(b) Joggle joint**	A joint formed by fitted key projections between stone edges is called a joggle joint.
Q.26	**Blistering (ब्लिस्टरिंग)**	Small swelling patches/bubbles on plaster surfaces are called blistering or popping.
Q.27	**Stretcher (स्ट्रैचर)**	A brick laid lengthwise parallel to the face of the wall is called a stretcher.
Q.28	**Cramps (क्रैम्प्स)**	Metal strips (copper, brass, steel) used in stone jointing are called cramps.
Q.29	**Course (कोर्स)**	A horizontal continuous layer of bricks in masonry is defined as a course.
Q.30	**Corbel (कॉरबेल)**	A stone block projecting from a wall face to support overhead beams/ joists is a corbel.