RSSB-JE 2020

Rajasthan Staff Selection Board

Combined Junior Engineer Direct Recruitment Examination

2000+ MCQs

Fully solved multiple choice questions
with detailed explanations

Practice Book
Civil Engineering

Including Previous Solved Paper

2000+ MCQs for RSSB-JE: Civil Engineering

First Edition: 2020

PREFACE

B. Singh (Ex. IES)

With the announcement of vacancies by Rajasthan Staff Selection Board (RSSB) for the post of Junior Engineer, it has given hope for many engineers between jobs. MADE EASY has always been a success partner for engineers right from the onset of engineering education up to they get a formal tag of engineer.

Owing to needs of students to utilise this opportunity in a fruitful way, it gives me great happiness to introduce the first edition of the Civil Engineering Practice book for RSSB-JE Examination. While preparing this book utmost care has been taken to cover all the chapters and variety of concepts which may be asked in the exam. It contains more than 2000+ multiple choice questions with answer key and detailed explanations, segregated in subject wise manner to disseminate all kind of exposure to students in terms of quick learning. The book also covers previous solved paper. Attempt has been made to bring out all kind of probable competitive questions for the aspirants preparing for RSSB-JE. This book also help every student to perform in an extraordinary way.

Full efforts have been made by MADE EASY team to provide error free solutions and explanations. The book not only covers the syllabus of RSSB-JE but also useful for other examinations conducted by various Public Service Commissions.

Our team has made their best efforts to make the book error-free. Nonetheless, we would highly appreciate and acknowledge if you find and share any printing/conceptual error. It is impossible to thank all individuals who helped us, but I would like to sincerely acknowledge all the authors, editors and reviewers for putting in their efforts to publish this book.

B. Singh (Ex. IES)
Chairman and Managing Director
MADE EASY Group

1. **Building Technology And Construction Management**

   Building Materials: Stones, bricks, steel, Timber, lime, cement, sand, aggregates for cement concrete, paints, distempers, use of pozzolana manufacturing of lime concrete, cement concrete for plain, reinforced and pre-stressed concrete work.

   Road Materials: Coarse aggregate, screenings and binding materials for WBM, Bricks for soling, Coarse and fine aggregate for bituminous roads, IRC standard size aggregates, Tars and Asphalt, Asphaltic concrete, Asphaltic emulsions, Mastic Asphalt and Minerals fillers Construction Management: Plants and equipments, planning for construction using network analysis CPM and PERT techniques.

2. **Fluid Mechanics**

   Fluids: Definition, Ideal fluids, real fluids, Newtonian and Non-Newtonian fluids.

   Properties of Fluids: Units of measurement, Mass density, Specific weight, Specific volume, Specific Gravity, Viscosity, Surface tension and Capillarity, Compressibility and Elasticity.

   Hydrostatics: Pressure at a point in a static fluid; pressure variation in an incompressible static fluid; atmospheric pressure, Gauge pressure, vacuum pressure, absolute pressure, Manometers Bourdon pressure gauge.

   Buoyancy: Forces acting on immersed plane surface. Centre of pressure, forces on curved surfaces. Conditions of equilibrium for floating bodies, meta-centre and met centric height experimental and analytical determination of met centric height.

   Equilibrium of Fluid particles and flow: Fluid mass subjected to horizontal and vertical acceleration and uniform rotation.

   Hydro-kinematics: Types of Flows: Steady and unsteady, uniform and non-uniform, stream lines, path lines, stream tubes, principles of conservation of mass, equation of continuity, acceleration of fluid particles local and connective, Rotational and irrational motions, free and forced vortex, circulation and voracity velocity potential and stream function, elementary treatment of flow net. Euler's equations of motion and integration of Euler's equations, Bernoulli's equation for in compressible Fluids, assumptions in Bernoulli's equation, Energy correction factor.

   Applications of Bernoulli's equation: Pitot tube, Venturi meter, orifice meter, orifices & mouth pieces, time of emptying of tanks by orifices, sharp edged rectangular, triangular and trapezoidal notches, Francis formula. Velocity of approach. End contractions Cippoletti Weir, time of emptying reservoirs by weirs.

   Momentum Equation and its Application: Development of momentum equation by control volume concept, Momentum correction factor, applications-Borda's mouth pieces, sudden enlargement of flow, pressure on flat plates, Nozzles.

   Flow Through Pipes: Laminar flow, Reynolds experiment, transition from laminar to turbulent flow. Turbulent Flow: Laws of fluid friction, friction factor Moodys diagram, loss of head due to friction and other causes. Hydraulic gradient, total energy line Chezy's, Darcy's and Manning's formula, flow through parallel pipes and pipes in series, flow through branched pipes. Flow along a bypass. Power transmission through pipe, condition for maximum power. Elementary water hammer concept.

3. **Surveying, Estimating Costing &Field Engineering**

   Introduction: Importance of surveying to engineers, Plane and geodetic surveying, methods of location of points, principle of surveying from whole to part, conventional signs.

   Measurement of Distances: Different types of chains, tapes and their uses. Sources of error and precautions, corrections to tape measurements. Field problems in distance measurement. Advance techniques of distance measurement.

   Measurement of Angles & Direction: Different types of direction measuring instruments and their uses. Reference meridians, Bearing and azimuths, magnetic declination and its variation. Use and adjustment of surveyors and prismatic compass. Vernier and micro optic theodolite, temporary and permanent adjustment of vernier theodolite Measurement of horizontal and vertical angle by different methods. Application of theodolite in field problems.

   Traversing: Different methods of traversing; chain traverse, chain & compass traverse, transit-tape traverse. Methods of computations and adjustment of traverse; transit rule, Bowditchrule, graphical method, axis method. Gales traverse table.

   Leveling: Definitions of various terms in leveling. Different types of leveling, sources of error sin leveling curvature and refraction corrections. Temporary and permanent adjustment of dumpy and tilting levels. Computation and adjustment of level. Profile leveling L-Section and cross-sections.

   Plane Table Surveying: Elements of plane table survey working operations, methods of plane table survey; inter section, traversing and resection, two point and three point problems.

   Contouring: Characteristics of contours, contour interval, contour gradient, Methods of locating contours, uses of contour maps.

   Trigonometric Leveling: Trigonometric leveling, Objects accessible and non accessible, Determination of levels object- when.

   Field Astronomy: Definitions of terminology used in Astronomy, Introduction to Remote Sensing and GIS Estimation for quantities for various types of construction, Rate Analysis, Preparation of Tender & contract documents, Centre-line diagram, Building layout.

4   **Irrigation & Water Resources**

Definition, necessity, benefits, types and methods of irrigation, Hydrology - Measurement of rainfall, run off coefficient, rain gauge, losses from precipitation - evaporation, infiltration, etc. Water requirement of crops, duty, delta and base period, Kharif and Rabi Crops, Command area, Time factor, Crop ratio, Overlap allowance, Irrigation efficiencies. Different type of canals, types of canal irrigation, loss of water in canals. Canal lining-types and advantages. Shallow and deep to wells, yield from a well. Weir and barrage, Failure of weirs and permeable foundation, Slit and Scour, Kennedy's theory of critical velocity. Lacey's theory of uniform flow. Definition of flood, causes and effects, methods of flood control, water logging, preventive measure. Land reclamation, Characteristics of affecting fertility of soils, purposes, methods, description of land and reclamation processes. Major irrigation projects in India.

5.   **Theory of Structures and Strength of Materials**

Elasticity constants, types of beams-determinate and indeterminate, bending moment and shear force diagrams of simply supported, cantilever and over hanging beams. Moment of area and moment of inertia for rectangular & circular sections, Bending moment and shear stress for tee, channel and compound sections, chimneys, dams and retaining walls, Eccentric loads, slope deflection of simply supported and cantilever beams, critical load and columns. Torsion of circular section. Springs, Vibration.

6.   **Structural Analysis**

Introduction to Indeterminate structures, Degrees of freedom per node, Static and Kinematic indeterminacy (i.e. for beams, frames & portal with & without sway etc.), Releases in structures, Maxwell's reciprocal theorem and Betti's theorem, Analysis of Statically Indeterminate Structures using Slope - deflection method. Analysis of structures using Moment-distribution method applied to continuous beams and portal frames with and without inclined members. Unit load method & their applications : deflection of determinate beams and frames, analysis of determinate and redundant frames up to two degree of redundancy, lack of fit in redundant frames.

7.   **Soil Mechanics and Foundations Engineering**

Origin of soil, phase diagram, Definitions-void ratio, porosity, degree of saturation, water content, specific gravity of soil grains, unit weights, density index and interrelationship of different parameters, Grain size distribution curves and their uses. Index properties of soils, Atterberg's limits, ISI soil classification and plasticity chart. Permeability of soil, coefficient of permeability, determination of coefficient of permeability, Unconfined and confined aquifers, effective stress, quick sand, consolidation of soils, Principles of consolidation, degree of consolidation, pre-consolidation pressure, normally consolidated soil, e-log p curve, computation of ultimate settlement. Shear strength of soils, direct shear test, Vane shear test, Triaxial test. Soil compaction, Laboratory compaction test, Maximum dry density and optimum moisture content, earth pressure theories, active and passive earth pressures, bearing capacity of soils, plate load test, standard penetration test.

8.   **Design of R.C. Concrete and Masonry Structures**

RCC beams-flexural strength, shear strength, bond strength, design of singly reinforced and double reinforced beams, cantilever beams. T-beams, lintels. One way and two way slabs, isolated footings. Reinforced brick works, columns, staircases, retaining wall, water tanks (RCC design questions may be based on both Limit State and Working Stress methods)

Concrete Technology: Properties, Advantages and uses of concrete, cement aggregates, importance of water quality, water cement ratio, workability, mix design, storage, batching, mixing, placement, compaction, finishing and curing of concrete, quality control of concrete, hot weather and cold weather concreting, repair and maintenance of concrete structures.

9.   **Design of Steel Structures**

Steel Design: Steel design and construction of steel columns, beams roof trusses plate girders.

10.   **Construction Technology**

Stone and Brick Masonry: Ashlar, course and random rubble, stone pillar, dry stone and arch masonry, brick bonds and type of walls.

Lintels: Plastering, pointing, flooring, Expansion and construction joints; Centring and shuttering, General Selection criteria of site, Planning and orientation of buildings.

Roofing: Stone slab, RCC, G.C. Steel, Asbestos cement and jack arch roofing.

Flooring: Cement concrete, flag stone, terrazzo mosaic, Terrazzo tile, Brick on edge, timber Granolithic, linoleum and other floorings.

Plastering: Lime, cement sand, composite and rough coat plaster, Plaster of Paris, painting, Damp proof course, anti-termite treatment.

Centring and Shuttering: Centring form work, shuttering and moulds, timber & steel trestles and false work, scaffolding and shoring, under pinning.

11.   **AutoCAD Civil Engineering Drawing**

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Contents

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UNIT 02

Construction Technology

Q.1 The arrangement of supporting an existing structure by providing supports underneath, is known as:
(a) Shoring
(b) Underpinning
(c) Jacking
(d) Piling

Q.2 Which is an example of cased cast-in-situ concrete pile?
(a) Raymond pile
(b) Watson pile
(c) Reynold pile
(d) Boston pile

Q.3 As per building bye-laws, for fixing up the height of a building, which rule is generally used?

(a) $63\frac{1}{2}°$ Rule
(b) $37\frac{2}{3}°$ Rule

(c) $65\frac{1}{2}°$ Rule
(d) $45°$ Rule

Q.4 Principles of planning for buildings include
A. Aspect and Prospect
B. Roominess
C. Grouping
D. Flexibility and Privacy
(a) A and B only
(b) B and D only
(c) A and C only
(d) A, B, C and D

Q.5 Which of the following is a method of mechanical ventilation?
(a) Plenum System
(b) Bleeding System
(c) Segregation System
(d) Natural Ventilation System

Q.6 In a wooden door, "Style" is the:
(a) outside vertical member of the shutter
(b) topmost horizontal member of the shutter
(c) middle horizontal member of the shutter
(d) horizontal projection of head

Q.7 The vertical distance between the springing line and highest point of the inner curve of an arch is known as:
(a) spandrel
(b) rise
(c) intrados
(d) extrados

Q.8 From practical considerations and effective working of the ventilation system, the desired value of rate of air changes per hour is:
(a) one
(b) five
(c) twenty
(d) thirty

Q.9 The lowest part of a structure which transmits the load to the soil is known as
(a) super-structure
(b) plinth
(c) foundation
(d) basement

Q.10 The foundation in a building is provided to
(a) distribute the load over a large area
(b) increase overall stability of the structure
(c) transmit load to the bearing surface (sub soil) at a uniform rate
(d) all of the above

Q.11 The bearing capacity of soils can be improved by
(a) increasing the depth of footing
(b) draining the sub-soil water
(c) ramming the granular material like crushed stone in the soil
(d) all of the above

Q.12 The maximum bearing capacity of soil is that of
(a) hard rocks
(b) black cotton soil
(c) dry, coarse sandy soil
(d) fine sandy soil

Q.13 When heavy structural loads from columns are required to be transferred to a soil of low bearing capacity, the most economical foundation is
(a) shallow foundation
(b) deep foundation
(c) raft foundation
(d) grillage foundation

Q.14 In order to protect the beam against corrosion, a minimum cover of _____ is kept on the outer sides of the external beams as well as above the upper flange of the top tier.
(a) 50 mm (b) 100 mm
(c) 200 mm (d) 150 mm

Q.15 In masonry construction, excessive tension is not permissible and hence in order that the supporting area is fully in compression, the width of footing is so adopted that the centre of gravity of the load falls
(a) at the centre of base
(b) within the middle third of base
(c) within the middle fifth of base
(d) any one of these

Q.16 Which of the following statement is correct?
(a) A combined footing is so proportioned that the centre of gravity of the supporting area is in line with the centre of gravity of the two column loads
(b) A combined rectangular footing is provided where loading condition is such that either the two columns are equally loaded or the interior column carries greater load.
(c) A trapezoidal shaped footing is provided under any condition of loading.
(d) Al of the above

Q.17 In made-up ground having a low value of its bearing power, heavy concentrated structural loads are generally supported by providing
(a) combined footing
(b) strap footing
(c) raft footing
(d) all of these

Q.18 A black cotton soil is unsuitable for foundations because it
(a) undergoes volumetric changes with the change of atmospheric conditions
(b) swells excessively when wet
(c) shrinks excessivey when dry
(d) all of the above

Q.19 Pile foundation is generally used when the soil is
(a) compressible (b) water-logged
(c) made-up type (d) all of these

Q.20 The piles which are driven in the type of soil whose strength does not increase with depth or where the rate of increase in strength with depth is very slow, are known as
(a) friction piles (b) bearings piles
(c) batter piles (d) compaction piles

Q.21 Batter piles are
(a) used to function as retaining walls
(b) used to protect concrete deck or other water front structures from the abrasion or impact
(c) driven at an inclination to resist large horizontal inclined forces
(d) driven in granular soil with the aim of increasing the bearing capacity of the soil

Q.22 Fender piles are
(a) used to function as retaining walls
(b) used to protect concrete deck or other water front structures from the abrasion or impact
(c) driven at an inclination to resist large horizontal inclined forces
(d) driven in granular soil with the aim of increasing the bearing capacity of the soil

Q.23 A type of cast-in-situ pile best suited for places where the ground is soft and offers little resistance to the flow of concrete, is
(a) simplex pile (b) franki pile
(c) vibro-pile (d) raymond pile

Q.24 A type of cast-in-situ pile which has an enlarge base and a corrugated stem, is
(a) simplex pile (b) franki pile
(c) vibro-pile (d) raymond pile

Q.25 In a Raymond pile
(a) the length varies from 6 to 12 m
(b) the diameter at the top varies from 400 to 600 mm and the diameter at the base varies from 200 to 280 mm
(c) the thickness of the outer shell depends upon the pile diameter and site conditions
(d) all of the above

Q.26 The pre-stressed concrete piles as compared to pre-cast and reinforced concrete piles
(a) are lesser in weight
(b) have high load carrying capacity
(c) are extremely durable
(d) all of these

Q.58 The type of stone masonry commonly adopted in the construction of residential building is
(a) uncoursed rubble masonry
(b) coursed rubble masonry
(c) random rubble masonry
(d) dry rubble masonry

Q.59 Which of the following statement is wrong?
(a) In English bond, vertical joints in the header courses come over each other and vertical joints in the stretcher courses are in the same line
(b) In English bond, the heading course should start with a queen closer
(c) In Flemish bond, the alternate headers of each course are centrally supported over the stretchers in the course below.
(d) In Flemish bond, every alternate course starts with a header at the corner.

Q.60 In a stretching bond
(a) all the bricks are laid as headers
(b) all the bricks are laid as stretchers
(c) the arrangement of brick is similar to English bond
(d) the bonding bricks are laid at any angle of other than zero or ninety degrees

Q.61 A bond consisting of heading and stretching course so arranged that one heading course comes after several stretching courses, is called
(a) raking bond   (b) dutch bond
(c) facing bond   (d) heading bond

Q.62 The heading bond is usually used for
(a) half brick wall
(b) one brick wall
(c) one and half brick wall
(d) two brick wall

Q.63 Herring-bone bond is commonly used for
(a) brick paving
(b) very thick walls
(c) partition walls
(d) footings in foundations

Q.64 In a raking bond,
(a) all the bricks laid as headers
(b) all the bricks are laid is stretchers
(c) the arrangement of bricks is similar to English bond
(d) the bonding bricks are laid at any angle other than zero or ninety degree

Q.65 A wall built to resist the pressure of earth filling, is known as
(a) breast wall   (b) retaining wall
(c) parapet wall   (d) buttress

Q.66 A retaining wall may be built in
(a) dry stone masonry
(b) stone masonry
(c) plain cement concrete
(d) all of these

Q.67 A stone wall provided to protect the slopes of cutting in natural ground from the action of weather, is known as
(a) retaining wall   (b) breast wall
(c) parapet wall   (d) buttress

Q.68 The total horizontal pressure (p) per metre length of retaining wall at a depth h meter is

(a) $wh^2 \times \dfrac{1+\sin\phi}{1-\sin\phi}$ (b) $wh^2 \times \dfrac{1-\sin\phi}{1+\sin\phi}$

(c) $\dfrac{wh^2}{2} \times \dfrac{1+\sin\phi}{1-\sin\phi}$ (d) $\dfrac{wh^2}{2} \times \dfrac{1-\sin\phi}{1+\sin\phi}$

where,
w = Weight of filling in N/m^3, and
ϕ = Angle of repose of the soil

Q.69 Which of the following statement is correct?
(a) The retaining wall should be structurally capable of resisting the earth pressure applied to it.
(b) The section of the wall should be so proportioned that it will not overturn by the lateral pressure
(c) The weight of the retaining wall and the force resulting from the earth pressure should not stress its foundation to a value greater than safe bearing capacity of the soil
(d) all of the above

Q.70 Plain brick type of partition wall is constructed by
(a) laying bricks as stretchers in cement mortar
(b) laying bricks as headers in cement mortar
(c) reinforcing the brick wall with iron straps
(d) brick work built within a frame-work of wooden members

Q.121 The final operation of finishing floors is known as
    (a) floating   (b) finishing
    (c) troweling   (d) all option are correct

Q.122 What is the full form of PVCN with respect to paint?
    (a) Pigment Volume Carbon Number
    (b) Paint Volume Carbon Number
    (c) Paint Volume Concentration Number
    (d) Pigment Volume Concentration Number

Q.123 Which of the following is added as a vehicle in paints?
    (a) Turpentine oil   (b) Tung oil
    (c) White lead   (d) Red lead

Q.124 The most durable varnish is
    (a) water varnish
    (b) spirit varnish
    (c) turpentine varnish
    (d) oil varnish

Q.125 The ingredient of paint which are used to hide the surface irregularities and imparts color is known as _____.
   (a) adultrants   (b) drier
    (c) pigments   (d) solvents

■■■■

Answers	**Construction Technology**														
1. (b)	2. (c)	3. (a)	4. (d)	5. (a)	6. (a)	7. (b)	8. (c)
9. (c)	10. (d)	11. (d)	12. (a)	13. (d)	14. (b)	15. (b)	16. (d)
17. (c)	18. (d)	19. (d)	20. (a)	21. (c)	22. (b)	23. (c)	24. (b)
25. (d)	26. (d)	27. (d)	28. (d)	29. (b)	30. (a)	31. (b)	32. (d)
33. (d)	34. (a)	35. (d)	36. (d)	37. (a)	38. (c)	39. (b)	40. (a)
41. (a)	42. (d)	43. (a)	44. (c)	45. (d)	46. (a)	47. (c)	48. (c)
49. (b)	50. (c)	51. (a)	52. (c)	53. (b)	54. (b)	55. (c)	56. (c)
57. (a)	58. (b)	59. (b)	60. (b)	61. (c)	62. (b)	63. (a)	64. (d)
65. (b)	66. (d)	67. (b)	68. (d)	69. (d)	70. (a)	71. (d)	72. (b)
73. (d)	74. (b)	75. (d)	76. (c)	77. (a)	78. (d)	79. (c)	80. (c)
81. (a)	82. (d)	83. (b)	84. (d)	85. (d)	86. (d)	87. (c)	88. (a)
89. (b)	90. (d)	91. (a)	92. (d)	93. (b)	94. (d)	95. (a)	96. (a)
97. (d)	98. (c)	99. (a)	100. (d)	101. (a)	102. (c)	103. (c)	104. (a)
105. (c)	106. (a)	107. (d)	108. (a)	109. (a)	110. (b)	111. (a)	112. (c)
113. (d)	114. (b)	115. (d)	116. (b)	117. (a)	118. (a)	119. (b)	120. (b)
121. (c)	122. (d)	123. (b)	124. (d)	125. (c)			

Explanations

1.   (b)

Underpinning - a solid foundation laid below ground level to support or strengthen a building.
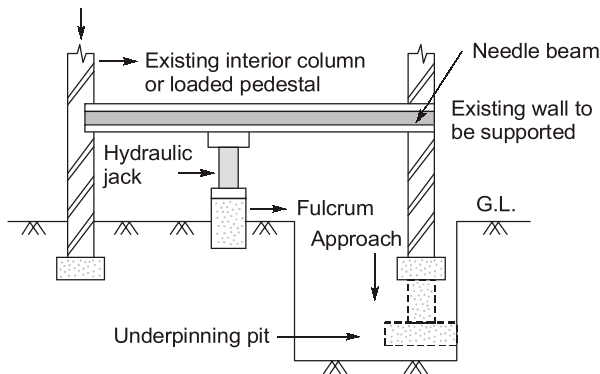
2.   (c)

Type of cast-in-situ piles Simpler pile, Franbi pile, Vibro pile, Raymond pile, Mac Arthor pile.

3.   (a)

Bye laws are a set of rules and regulations drawn up by the govt. of every country to assure a systematic and disciplined growth of the town or city.

4.   (d)

For planning a building, all the mentioned principles are included, hence answer (d).

5.   (a)

Plenum system of ventilation - a system of mechanical ventilation in which fresh air is forced into the spaces to be ventilated from a chamber (planum chamber) at a pressure slightly higher than atmospheric pressure, so as to expel foul air.

6.   (a)

- Top most horizontal member of the shutter is known as top rail.
- Middle horizontal member is known as lock rail.
- Vertical outside member of the shutter is known as stiles or styles.

7.   (b)
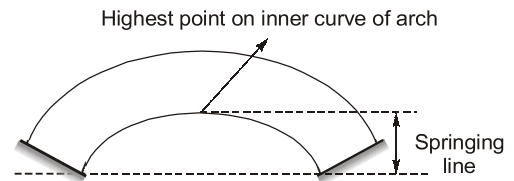
8.   (c)

Air changes per hour or air change rate, (ACH or ACPH) is a measure of the air volume added to or removed from a space divided by the volume of the space.

$$\text{ACPH} = \frac{60\,\theta}{vol}$$

Where, θ = Volumetric flow rate

It varies from a minimum value of 4 to 30. For ventilation purpose the value of ACPH should be kept around 20.

9.   (c)

A building has two main components, i.e., foundations or sub-structure and super-structure. The foundation or substrcture is the lowest part of the structure which transmit the loads to the soil.

10.   (d)

The basic function of the foundation is to transmit dead loads, super-imposed or live loads and wind loads from a building to the soil on which the building rests, in such a way that the settlements are within permissible limits, without causing cracks in the super-structure and the soil does not fail.

11.   (d)

The bearing capacity of soil can be improved by:
(a) increasing the depth of footing
(b) draining the sub-soil water
(c) driving sand piles and
(d) ramming the granular material like crushed stone in the soil.

13.   (d)

When heavy structural loads from column are required to be transferred to a soil of low bearing capacity, the most economical foundation is grillage foundation.

45. **(d)**

King closer: A brick is cut in such a way that the width of its one end is half that of a full brick.

Queen closer: A brick which is half as wide as the full brick.

Bevelled closer: A brick whose whole length is bevelled in such a way that half width is maintained at one end and full width is obtained at other end.

Mitred closer: A brick whose one end is splayed or mitred for full length, is called mitred closer. it is the portion of brick obtained by cutting the triangular portion of the brick through its width.

59. **(b)**

English bond: This type of bond consists of alternate courses of headers and stretchers. This is the most commonly used bond for all wall thickness. This wall is considered to be the strongest bond.

Note: The vertical joints in the header courses come over each other and verical joints in the stretcher courses are also in the same line.

The heaing course should never start with a queen closer.

60. **(b)**

Stretching bond: In this type of bond, all the bricks are laid as stretchers on the faces of walls It is suitable for half brickwalls only.

61. **(c)**

Facing bond: This type of bond consists of heaving and stretching courses so arranged that one heading course comes after several stretching courses. This bond is not structurally good and the load distribution is not uniform.

70. **(a)**

The plain brick partition walls are usually half thick. These are constructed by laying bricks as stretchers in cement mortar. The walls is then plastered on both sides.

74. **(b)**

Mosaic flooring: The flooring made with small pieces of broken tiles of china glazed or of marble or of cement, arranged in different pattern.

Asphalt flooring: The Asphalt flooring is recommended for swimming pools, because it is non-slippery.

Granolithic flooring: When hard bearing surface is required, then granolithic finish is carried out over the cement concrete.

75. **(d)**
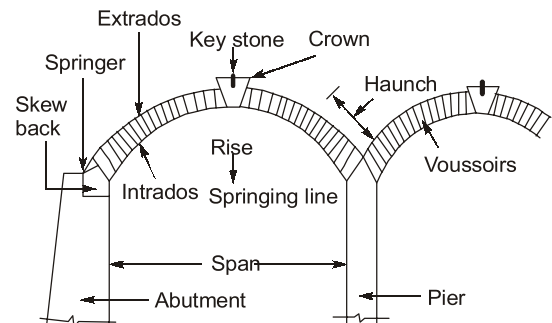
81. **(a)**

Dormer window: It is a vertical window provided on the sloping roof with the object of providing light and air to the enclosed space below the roof.

89. **(b)**

Hip: It is the ridge formed by the intersection of two sloped surfaces having an exterior angles greater than 180°.

Note: The ridge formed by the intersection of two sloped surfaces having an exterior angle less than 180° is called a valley.

105. **(c)**

$$\text{Number of riser} = \frac{3250}{130} = 25$$

Number of treads = 25 – 1 = 24

108. **(a)**

$$\text{Number of riser} = \frac{3000}{150} = 20$$

Number of treads = 20 – 2 = 18
(For double flight staircase)

109. **(a)**

Enamel paint contains white lead or zinc white, oil, petroleum spirit and resinous matter.

- **Spirit Varnish:** Spirit Varnish is resin of soft variety such as lac or shellac dissolved in spirit. The examples are Frensh polish, lacquer and shellac varnish. It dries very quickly. These are not durable and are easily affected by weathering action.

- **Asphalt Varnish:** Asphalt Varnish is made by dissolving melted hard asphalt in linseed oil with a thinner such as turpentine or petroleum spirit. It is used over shop fabricated steel works.

- **Water Varnish:** Water Varnish is shellac dissolved in hot water to which enough quantity of either ammonia, borax, soda or potash is added. These are used for varnishing maps and pictures.

125. **(c)**

Pigments In paints are used to hide the surface imperfections and impart desired colour on the surface. They protect the paint film by reflecting the destructive ultra violet light, which acts as a catalytic agent for the destructive oxidation of the film. They also improve the impermeability of the paint film and enhance its resistance to weathering, affect the flow characteristics making it possible to paint vertical and uneven surfaces smoothly.

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