Youth Competition Times

# RAILWAY RECRUITMENT BOARD

# RRB JE

# CIVIL

# &

# ALLIED ENGINEERING

## SOLVED PAPERS & PRACTICE BOOK


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# SYLLABUS

**Government of India, Ministry of Railways,**
**Railway Recruitment Boards**
**CENTRALISED EMPLOYMENT NOTICE (CEN) No.03/2018**
**Recruitment of Junior Engineer (JE), Junior Engineer (Information Technology) [JE(IT)], Depot Material Superintendent (DMS)**

**2nd Stage CBT :** Short listing of Candidates for the 2nd Stage CBT exam shall be based on the normalized marks obtained by them in the 1st Stage CBT Exam. Total number of candidates to be shortlisted for 2nd Stage shall be 15 times the community wise total vacancy of Posts notified against the RRB as per their merit in 1st Stage CBT. However, Railways reserve the right to increase/decrease this limit in total or for any specific category(s) as required to ensure availability of adequate candidates for all the notified posts.

**Duration** : 120 minutes *(160 Minutes for eligible PwBD candidates accompanied with Scribe)*

**No of Questions** : 150

**Syllabus :** The Questions will be of objective type with multiple choices and are likely to include questions pertaining to General Awareness, Physics and Chemistry, Basics of Computers and Applications, Basics of Environment and Pollution Control and Technical abilities for the post. The syllabus for General Awareness, Physics and Chemistry, Basics of Computers and Applications, Basics of Environment and Pollution Control is common for all notified posts under this CEN as detailed below:-

a) **General Awareness :** Knowledge of Current affairs, Indian geography, culture and history of India including freedom struggle, Indian Polity and constitution, Indian Economy, Environmental issues concerning India and the World, Sports, General scientific and technological developments etc.

b) **Physics and Chemistry:** Up to 10th standard CBSE syllabus.

c) **Basics of Computers and Applications:** Architecture of Computers; input and Output devices; Storage devices, Networking, Operating System like Windows, Unix, Linux; MS Office; Various data representation; Internet and Email; Websites & Web Browsers; Computer Virus.

d) **Basics of Environment and Pollution Control:** Basics of Environment; Adverse effect of environmental pollution and control strategies; Air, water and Noise pollution, their effect and control; Waste Management, Global warming; Acid rain; Ozone depletion.

e) **Technical Abilities:** The educational qualifications mentioned against each post shown in Annexure-A, have been grouped into different exam groups as below. Questions on the Technical abilities will be framed in the syllabus defined for various Exam Groups given at Annexure-VII-A, B, C, D, E, F & G.

The section wise Number of questions and marks are as below :

| Subjects | No. of Questions | Marks for each Section |
|---|---|---|
| | Stage-II | Stage-II |
| General Awareness | 15 | 15 |
| Physics & Chemistry | 15 | 15 |
| Basics of Computers and Applications | 10 | 10 |
| Basics of Environment and Pollution Control | 10 | 10 |
| Technical Abilities | 100 | 100 |
| Total | 150 | 150 |
| Time in Minutes | 120 | |

*The section wise distribution given in the above table is only indicative and there may be some variations in the actual question papers.*

**Minimum percentage of marks** for eligibility in various categories: UR -40%, OBC-30%, SC-30%, ST -25%. This percentage of marks for eligibility may be relaxed by 2% for PwBD candidates, in case of shortage of PwBD candidates against vacancies reserved for them.

Virtual calculator will be made available on the Computer Monitor during 2nd Stage CBT.

## 2nd Stage Syllabus for Civil and Allied Engineering Exam Group – JE

1 **Engineering Mechanics-** Force (resolution of force, moment of force, force system, composition of forces), Equilibrium, Friction, Centroid and Center of gravity, Simple machines.

2 **Building Construction-** Building components (substructure, superstructure), type of structure (load bearing, framed and composite structures).

3 **Building materials-** Masonry materials (stones, bricks, and mortars), Timber and miscellaneous materials (glass, plastic, fiber, aluminum steel, galvanized iron, bitumen, PVC, CPVC, and PPF).

4 **Construction of substructure-** job layout, earthwork, foundation (types, dewatering, coffer dams, bearing capacity).

5 **Construction of superstructure-** stone masonry, brick masonry, Hollow concrete block masonry, composite masonry, cavity wall, doors and windows, vertical communication (stairs, lifts, escalators), scaffolding and shoring.

6 **Building finishes-** Floors (finishes, process of laying), walls (plastering, pointing, painting) and roofs (roofing materials including RCC).

7 **Building maintenance-** Cracks (causes, type, repairs- grouting, guniting, epoxy etc.), settlement (causes and remedial measures), and re-baring techniques.

8 **Building drawing-** Conventions (type of lines, symbols), planning of building (principles of planning for residential and public buildings, rules and byelaws), drawings (plan, elevation, section, site plan, location plan, foundation plan, working drawing), perspective drawing.

9 **Concrete Technology-** Properties of various types/grades of cement, properties of coarse and fine aggregates, properties of concrete (water cement ratio, properties of fresh and hardened concrete), Concrete mix design, testing of concrete, quality control of concrete (batching, formwork, transportation, placing, compaction, curing, waterproofing), extreme weather concreting and chemical admixtures, properties of special concrete (ready mix, RCC, pre-stressed, fiber reinforced, precast, high performance).

10 **Surveying-** Types of survey, chain and cross staff survey (principle, ranging, triangulation, chaining, errors, finding area), compass survey (principle, bearing of line, prismatic compass, traversing, local attraction, calculation of bearings, angles and local attraction) leveling (dumpy level, recording in level book, temporary adjustment, methods of reduction of levels, classification of leveling, tilting level, auto level, sources of errors, precautions and difficulties in leveling), contouring (contour interval, characteristics, method of locating, interpolation, establishing grade contours, uses of contour maps), area and volume measurements, plane table survey (principles, setting, method), theodolite survey (components, adjustments, measurements, traversing), Tacheometric survey, curves (types, setting out), advanced survey equipment, aerial survey and remote sensing.

11 **Computer Aided Design-** CAD Software (AutoCAD, Auto Civil, 3D Max etc.), CAD commands, generation of plan, elevation, section, site plan, area statement, 3D view.

12 **Geo Technical Engineering-** Application of Geo Technical Engineering in design of foundation, pavement, earth retaining structures, earthen dams etc., physical properties of soil, permeability of soil and seepage analysis, shear strength of soil, bearing capacity of soil, compaction and stabilization of soil, site investigation and sub soil exploration.

13 **Hydraulics-** properties of fluid, hydrostatic pressure, measurement of liquid pressure in pipes, fundamentals of fluid flow, flow of liquid through pipes, flow through open channel, flow measuring devices, hydraulic machines.

14 **Irrigation Engineering-** Hydrology, investigation and reservoir planning, percolation tanks, diversion head works.

15 **Mechanics of Structures-** Stress and strain, shear force and bending moment, moment of inertia, stresses in beams, analysis of trusses, strain energy.

16 **Theory of structures-** Direct and bending stresses, slope and deflection, fixed beam, continuous beam, moment distribution method, columns.

17 **Design of Concrete Structures-** Working Stress method, Limit State method, analysis and design of singly reinforced and doubly reinforced sections, shear, bond and development length, analysis and design of T Beam, slab, axially loaded column and footings.

18 **Design of Steel Structures-** Types of sections, grades of steel, strength characteristics, IS Code, Connections, Design of tension and compression members, steel roof truss, beams, column bases.

19 **Transportation Engineering-** Railway Engineering (alignment and gauges, permanent way, railway track geometrics, branching of tracks, stations and yards, track maintenance), Bridge engineering (site selection, investigation, component parts of bridge, permanent and temporary bridges, inspection and maintenance), Tunnel engineering (classification, shape and sizes, tunnel investigation and surveying, method of tunneling in various strata, precautions, equipment, explosives, lining and ventilation).

20 **Highway Engineering-** Road Engineering, investigation for road project, geometric design of highways, construction of road pavements and materials, traffic engineering, hill roads, drainage of roads, maintenance and repair of roads.

21 **Environmental Engineering-** Environmental pollution and control, public water supply, domestic sewage, solid waste management, environmental sanitation, and plumbing.

22 **Advanced Construction Techniques and Equipment-** Fibers and plastics, artificial timber, advanced concreting methods (under water concreting, ready mix concrete, tremix concreting, special concretes), formwork, pre-fabricated construction, soil reinforcing techniques, hoisting and conveying equipment, earth moving machinery (exaction and compaction equipment), concrete mixers, stone crushers, pile driving equipment, working of hot mix bitumen plant, bitumen paver, floor polishing machines.

23 **Estimating and Costing-** Types of estimates (approximate, detailed), mode of measurements and rate analysis.

24 **Contracts and Accounts-** Types of engineering contracts, Tender and tender documents, payment, specifications.

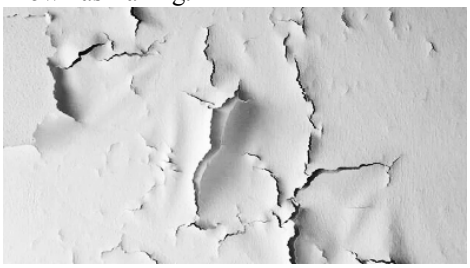
# Railway Recruitment Board (RRB)
# Junior Engineer Civil (CBT-II)
# Re-exam-2025

**Exam Date : 04 June 2025** **Time : 10:00-12:00**

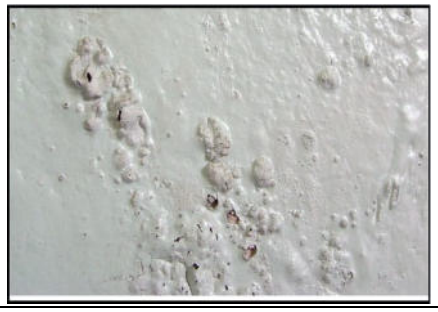
**1. Which of the following defects is due to poor bonding between coats of plaster?**

(a) Blistering (b) Staining
(c) Flaking (d) Popping

**Ans. (c) : Flaking:-** Small loose masses are formed on plastered surfaces due to failure of bonding between the coats, known as flaking.



**Blowing or Blistering:-** This consists of the formation of small patches of plaster swelling out beyond the plastered surface



**2. Which of the following is NOT a primary function of the plinth?**

(a) Distributing load to the foundation
(b) Raising the floor level to prevent water ingress
(c) Preventing insects from entering the building
(d) Providing support to upper floors

**Ans. (d) : Plinth:–** This is the portion of structure between the surface of the surrounding ground an surface of the floor, immediately above the ground.

**Primary function of plinth area:–**

- To transmit the load of the super structure to the foundation
- Raising the floor level to prevent water ingress.
- Preventing insects from entering the building.
- To act as a retaining wall so as to keep the filling portion below the raised floor or the building.

**Note– RRB deleted this question.**

**3. According to IS 456:2000, a column is classified as a short column if the slenderness factor about both the major and minor principal axes is less than:**

(a) 22 (b) 12
(c) 34 (d) 40

**Ans. (b) :** According to the IS 456:2000 (Cl. 25.1.2), a compression member may be a 'short column' if its slenderness ratios with respect to the major principal axis $\left(\ell_{ex}/D_x\right)$ as well as the 'minor principal axis' $\left(\ell_{ey}/D_y\right)$ are both less than 12; otherwise it should be treated as 'slender column'.

Where,

$l_{ex}$ , $l_{ey}$ = effective length in x direction and y direction

$D_x$, $D_y$ = lateral dimension in x direction and y direction

**4. Which of the following bonds is used when constructing curved brick walls?**

(a) Dutch bond (b) Stretcher bond
(c) Header bond (d) English bond

**Ans. (c) : Header bond:**

- It is the arrangement of bonding that consists of a header in each course.
- In order to break the alignment of the vertical joint to be in the same straight line each alternate course started in the quarter bat.
- Used for curved surfaces in work such as well lining or well foundation etc.
- This bond is generally provided in foundation work, in order to uniformly distributed the transverse load.
- A lap of half-width is available for each header in all the courses.

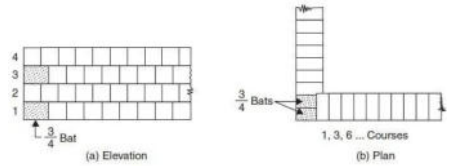


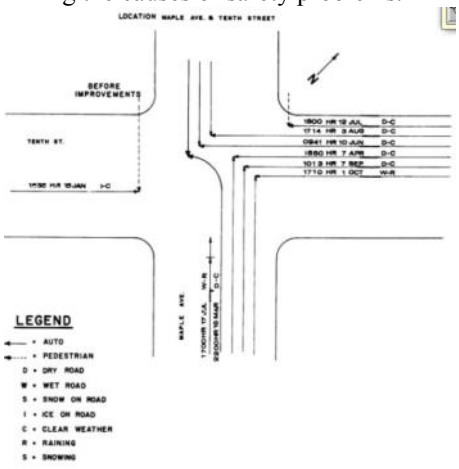

Fig. 8.5. Header bond

**5. Which of the following best describes a collision diagram in traffic engineering?**

(a) A statistical report on traffic volume at a location
(b) A graphical representation of accident patterns at a location
(c) A chart showing vehicle speeds on a highway
(d) A blueprint for road intersection design at a location

**Ans. (b) : Collision Diagrams:-** These diagrams are used to display and identify similar accident patterns.

- These diagrams show the approximate path of vehicles and pedestrians involved in the accidents.
- They provide information on the type and number of accidents; including conditions such as time of day, day of the week, climatic conditions, pavement conditions, and other information critical to determining the causes of safety problems.




**6. Which of the following is NOT commonly used in pre-fabricated construction?**

(a) Forklift (b) Tunneling Machine
(c) Tower Crane (d) Concrete Pump

**Ans. (b) :**

- Prefabrication involves the production of building components, modules, or entire structures, which are then transported to the construction location for final assembly.

**Tower Crane:-** Frequently used to lift and place large pre-fabricated elements like walls and slabs into position.

**Forklift:-** Commonly used for transporting pre-fabricated components like panels and beams within the construction site.

**7. Which of the following is NOT an assumption of pure bending theory?**

(a) The beam follows Hooke's Law within the elastic limit.
(b) The beam is subjected to both bending moments and shear forces.
(c) The cross-section of the beam remains plane before and after bending.
(d) The material is homogeneous and isotropic.

**Ans. (b) : Assumptions in pure bending theory: The assumptions made in the theory of simple bending are as follows:**

- The material of the beam is perfectly homogeneous and isotropic.
- The stresses are purely longitudinal and local effects of concentrated loads are neglected.
- The value of the modulus of elasticity for the material is same in tension and compression.
- The transverse sections, which are plane and normal to the longitudinal axis before bending remain plane and normal to the longitudinal axis of the beam after bending
- The radius of curvature of the bent axis of the beam is large compared to the dimensions of the section of beam.
- The beam is subjected to pure bending and therefore bends in the form of an arc of a circle.
- The material is stressed within elastic limit and obeys Hooke's law.

**8. What instrument is primarily used for setting out a right-angle layout on site?**

(a) Theodolite (b) Total station
(c) Cross staff (d) Dumpy level

**Ans. (c) : Cross staff:-** The cross staff or open cross staff is a simple instrument used for setting out offsets to chain line from a given point.

- It is also used setting out right angle at given point of chain line.
- The accuracy of french cross staff is less than the open cross staff.
- The french cross staff has the advantages that the line can also be set out at angle of 45°, 90° and 135°.

**9. According to IS 456:2000, for a column effectively held in position at one end but not restrained against rotation, and at the other end restrained against rotation but not held in position, the theoretical value of effective length is:**

(a) equal to the unsupported length
(b) 2.0 times the unsupported length
(c) 0.5 times the unsupported length
(d) 1.5 times the unsupported length

**Ans. (b) :** As per IS code effective length for different end conditions

| **Degree of End Restraint** | **Recommended Effective Length** |
|---|---|
| Effectively held in position and restrained against rotation at both ends | 0.65 L |
| Effectively held in position at both ends, restrained against rotation at one end | 0.80 L |
| Effectively held in position at both ends, but not restrained against rotation | 1.00 L |
| Effectively held in position and restrained against rotation at one end; at the other end, restrained against rotation but not held in position | 1.20 L |
| Effectively held in position and restrained against rotation at one end; at the other end, partially restrained against rotation but not held in position | 1.50 L |

| | |
|---|---|
| Effectively held in position at one end but not restrained against rotation; at the other end, restrained against rotation but not held in position | 2.00 L |
| Effectively held in position and restrained at one end, but not held in position nor restrained against rotation at the other end | 2.00 L |

**10. For dewatering in cohesive soils, which technique is typically ineffective?**

(a) Deep wells (b) Electro-osmosis
(c) Sump pumping (d) Well-point system

**Ans. (c) : Drainage or Dewatering:-** The removal of excess water from a saturated soil mass is known as drainage or dewatering.

**Pumping from Sumps or Ditches:-**

- This is the simplest method of dewatering but can be used only when shallow excavations in coarse soils are involved.
- It is ineffective in cohesive soils due to slow water movement.

**Note– RRB deleted this question.**

**11. In India, which of the following timber is most commonly used for scaffolding?**

(a) Bijasal (b) Banyan
(c) Bakul (d) Bamboo

**Ans. (d) :**

| TIMBER | USES |
|---|---|
| Benteak | boat construction, Furniture |
| Teak | Boat, shipbuilding, mallets |
| Jack fruit | Musical Instruments, ornamental paneling |
| Babul | Agricultural Instruments, wheels of bullock carts |
| Deodar | Railway Sleepers, Rough Furniture |
| Pine | doors, windows, paving materials |
| Bamboo | scaffolding, rafters, fancy goods |

**12. Which of the following is the primary cause of water hammer?**

(a) High fluid viscosity
(b) Increase in pi.pe diameter
(c) Sudden changes in flow velocity
(d) Low water temperature

**Ans. (c) : Water Hammer:-**

- When a liquid flow in a long pipeline is reduced suddenly, due to the compressibility of the liquid, the sudden change in momentum would cause a pressure surge to develop.
- This pressure moves through the pipe at high speed and undergoes reflection at the ends and the phenomenon is known as water hammer.

**The pressure rise due to water hammer depends upon the following factors:**

- Time is taken to close the valve or the closure of the valve.
- The velocity of flow of water in the pipe.
- The length of the pipe.
- Elastic properties of the material of the pipe.
- The density of fluid.

**13. Which type of window is hinged at the top and opens outward?**

(a) Casement window (b) Pivot window
(c) Awning window (d) Sliding window

**Ans. (c) : Awning Windows**:- Awning windows are hinged at the top and open outward, permitting ventilation without letting in rain or falling leaves.

- Typically, they are ideal for basements, bathrooms, and kitchens.

**14. Which of the following options authorises the engineering department to take up the work under consideration and start preparing preliminary designs?**

(a) Environmental sanction
(b) Administrative sanction
(c) Expenditure sanction
(d) Technical sanction

**Ans. (b) : Administrative approval:-**

- For any project by the department, an approval or sanction of the competent authority with respect to the cost and work is necessary at the first instance.
- Thus administrative approval denotes the formal acceptance of the proposals for incurring expenditure by the concerned administrative department.

**Technical sanction:-**

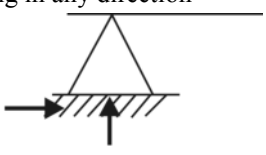
- It means the sanction and order by the competent authority of the department to the detailed estimate design calculations, quantities of work rates and cost of work.
- After the technical sanction of the estimate is received the work is then taken up for construction.

**15. A hinge support in a beam can resist:**

(a) only vertical force
(b) both horizontal and vertical forces
(c) bending moment only
(d) only horizontal force

**Ans. (b) : Pinned or hinge support:-** It resists the horizontal and vertical loads but is unable to resist the moment, It has two support reactions and these are vertical and horizontal reactions.

- It allows the structural member to rotate but does not allow translating in any direction



Pinned Support

**16. Which component of a staircase supports the treads and risers?**

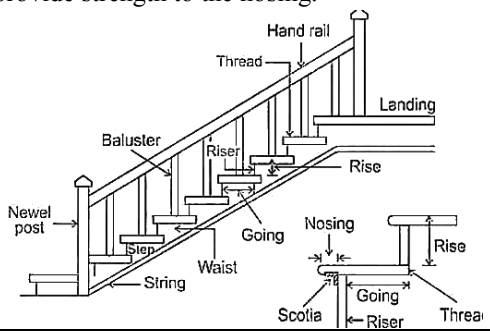
(a) Newel post (b) Handrail
(c) Stringer (d) Baluster

**Ans. (c) : Stringer:–** These are the slopping members which support the treads and risers in a stair.

- Stringer is usually 220mm wide and 32mm thick. The length will depend on the rise and go.

**Baluster:–** It is a vertical member of wood or metal, supporting the handrail.

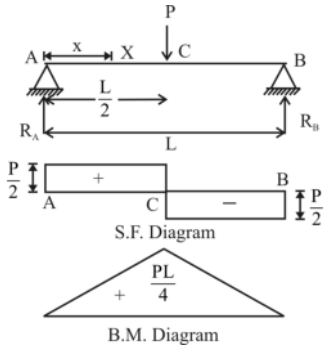
**Scotia:–** It is a molding provided under the nosing to provide strength to the nosing.




**17. Consider a beam of length 'AB' with 'C' as the midpoint. What is the magnitude of the shear force (sign convention to be neglected) in the span 'AC' of this simply supported beam with a central point load 'P' kN?**

(a) Zero (b) P
(c) $\frac{P}{2}$ (d) $\frac{P}{4}$

**Ans. (c) :**




$R_A + R_B = P$ ..... (i)

Taking moment at point A

$$R_B \times L = P \times \frac{L}{2}$$

$$R_B = \frac{P}{2}$$

From equation (i)-

$R_A = P - R_B = P - P/2 = P/2$

For SFD: (From left side)

S.F. at A = P/2

S.F. between A and C = P/2

**18. In railway track construction, which method is most commonly used for laying new tracks?**

(a) Cut-and-Cover Method
(b) Telescopic Method
(c) Trenchless Method
(d) Incremental Launching

**Ans. (b) : Telescope method:-** In railway track construction, the telescopic method is the most commonly used technique for laying new tracks, especially in areas where new railway lines are being extended gradually.

**19. Which of the following is NOT a type of flow line?**

(a) Path line (b) Energy line
(c) Streakline (d) Vortex line

**Ans. (b) : Path line:-** Actual path travelled by any individual fluid particle over some time period is called path line and path line is a lagrangian concept.

- These are the actual lines not imaginary.
- These lines may cut one another.

**Streak line:-** It is the locus of all fluid particles at and instant which have crossed through the same point.

**Vortex line:-**This is a line that is perpendicular to the velocity vector in a rotating flow, indicating the axis of rotation.

**Energy line:–** They represent the total mechanical energy per unit weight of the fluid at any point. While important in fluid mechanics, they are not considered a type of flow line itself.

**20. Which of the following is a key difference between short columns and long columns?**

(a) Long columns have a higher slenderness ratio compared to short columns.
(b) Short columns fail due to buckling, while long columns fail due to crushing.
(c) Long columns experience pure axial compression, while short columns experience lateral deflection.
(d) Short columns are only used in steel structures, while long columns are used in concrete structures.

**Ans. (a) : Comparison Between Short Column and Long Column:–**

| Description | Short Column | Long Column |
|---|---|---|
| Slenderness ratio | Slenderness ratio is less than 12 | Slenderness ratio is more than 12. |
| Radius of Gyration | Lower radius of gyration. | Higher radius of gyration. |
| Load | Higher load-carrying capacity. | Lower load-carrying capacity |
| Strength | Stronger and highly preferable. | Weaker and normally not preferred. |

| | | |
|---|---|---|
| Stress | Subjected to compressive stress. | Subjected to buckling stress. |
| Failure | Failure occurs primarily due to shearing. | Failure occurs due to buckling. |

**21. In stone quarrying, tamping is the process of:**

(a) ramming the wood wedges into holes drilled into the rock
(b) filling the hole containing the explosive charge with damp clay
(c) separating rock layers by applying electricity
(d) dampening the rock layers with water before digging with tools

**Ans. (b) :** In stone quarrying, tamping is the process of filling the hole containing the explosive charge with damp clay.

**Tamping:-** After placing the charge in the hole, a greased priming needle, projecting a little outside the hole, is placed in the hole which is then filled up with damp clay or stone dust in layers tamped sufficiently with a braced tamping rod

**22. Aerated concrete is manufactured by expanding the binding material mix by:**

(a) foam forming agents
(b) vibrating the mix thoroughly
(c) reduction of coarse aggregates
(d) gas forming substances

**Ans. (a,d) : Aerated concrete**

(i) Aerated concrete is made by introducing air or gas into a slurry composed of Portland cement or lime and finely crushed siliceous filler so that when the mix sets and hardens, a uniformly cellular structure is formed.

(ii) **Aerated concrete can be manufactured by:**

- By the formation of gas by chemical reaction within the mass during liquid or plastic state.
- By mixing the preformed stable foam with the slurry.
- By using finely powdered metal (usually aluminium powder) with the slurry and made to react with the calcium hydroxide liberated during the hydration process, to give out large quantity of hydrogen gas.

**Note– RRB deleted this question.**

**23. Which method of plane tabling is used when the distance between the point and the instrument station is too large?**

(a) Radiation (b) Resection
(c) Traversing (d) Intersection

**Ans. (d) :**

**Intersection (Graphic Triangulation) method:–**

- Intersection is resorted to when the distance between the point and the instrument station is either too large or cannot be measured accurately due to some field conditions.
- The distance between the two instrument stations is measured and plotted on the sheet to some scale.
- The location of an object is determined by sighting at the object from two plane table stations (previously plotted) and drawing the rays.
- The intersection of these rays will give the position of the object. It is therefore very essential to have at least two instrument stations to locate any point.

**24. If consistency index of a soil is more than 1, the consistency stage of soil is:**

(a) either semi-solid or solid
(b) either semi-solid or plastic
(c) plastic only
(d) solid only

**Ans. (a) : Consistency Index:-** It is defined as a ratio of the difference between the liquid limit and the natural water content of the soil to the plasticity index.

$$I_c = \frac{w_L - w}{I_p}$$

| Consistency | Description | $I_c$ |
|---|---|---|
| Liquid | Liquid | < 0 |
| Plastic | Very soft | 0-0.25 |
| | Soft | 0.25-0.5 |
| | Medium stiff | 0.5-0.75 |
| | Stiff | 0.75-1.00 |
| Semi-solid | Very stiff or hard | > 1 |
| Solid | Hard or very hard | > 1 |

**25. Identify the correct statements from the following.**

**A: Densification of soil is a type of mechanical stabilisation.**

**B: Addition of calcium chloride can facilitate soil compaction.**

**C: Heating of soil is not a method of soil stabilisation.**

(a) C only (b) A only
(c) A and B only (d) B and C only

**Ans. (c) :** Mechanical stabilization involves methods like compaction, rolling, vibration, and densification to improve soil strength and reduce voids.

- Calcium chloride acts as a hygroscopic agent, helping to retain moisture and improve compaction, especially in granular soils.
- Heating causes permanent changes in soil properties, often rendering the material herd and durable.
- Treatment is reported to result in significant decrease in compressibility and increase in cohesion, internal friction angle.

**26. According to IS 456:2000, how is the nominal shear stress ($\tau_v$) in a beam calculated?**

**Where,**

**$V_u$ = Factored shear force**

**b = Breadth of beam**

**d = Effective depth of the beam section**

**D = Overall depth of section**

(a) $\tau_v = \frac{V_u}{b+D}$ (b) $\tau_v = \frac{V_u}{d}$

(c) $\tau_v = \frac{V_u}{b \times d}$ (d) $\tau_v = \frac{V_u}{b}$

**Ans. (c) :** Nominal shear stress is given by

$\tau_v = \frac{V_u}{b \times d}$

$V_u$ = Factored shear force

b = Breadth of beam

d = Effective depth of the beam section

**27. According to BIS (IS: 808–1989), which of the following is classified as a rolled steel column section?**

(a) ISMB (Indian Standard Medium Weight Beams)

(b) ISHB (Indian Standard Heavy Weight Beams)

(c) ISLB (Indian Standard Light Beams)

(d) ISJB (Indian Standard Junior Beams)

**Ans. (b) : Rolled steel column section:–**

- Indian standard heavy weight beam (ISHB)
- Indian standard column sections (ISSC)

**Rolled steel beam sections:–**

- Indian standard junior beams (ISJB)
- Indian Standard light weight beam (ISLB)
- Indian standard medium weight beams (ISMB)
- Indian standard wide flange beams (ISWB)

**28. In case of Bridge Engineering, which type of maintenance is performed to prevent potential failures before they occur?**

(a) Corrective maintenance

(b) Deferred maintenance

(c) Preventive maintenance

(d) Emergency maintenance

**Ans. (c) : Preventive maintenance:–**

- It is regularly performed on a piece of equipment to lessen the likelihood of it failing.
- It is performed while the equipment is still working so that it does not break down unexpectedly.
- It is a most effective maintenance

**Breakdown maintenance:–**

- It is a type of maintenance used for equipment after equipment break down or main function is often the most expensive.

**Corrective maintenance:–**

- This type of maintenance is carried out to correct errors that were not discovered during the product development phase.

**29. Which of the following commands/settings facilitates the cursor movement to select midpoint, endpoint etc. of objects while drawing in AutoCAD?**

(a) Polar Tracking (b) Snap

(c) Ortho (d) Object Snap

**Ans. (d) :** Object Snap allows you to precisely snap your cursor to specific points on existing objects like midpoints, endpoints, or centers, making it ideal for aligning objects accurately while drawing in AutoCAD.

**30. Which type of equipment is best suited for laying asphalt in road construction?**

(a) Asphalt paver (b) Road roller

(c) Scraper (d) Motor grader

**Ans. (a) :** An asphalt paver is specifically designed to lay down asphalt on roads, whereas a road roller is used to compact the asphalt after it has been laid by the paver.

**31. In which of the following types of pointing does the profile have a flat surface and aligns with the face of the wall?**

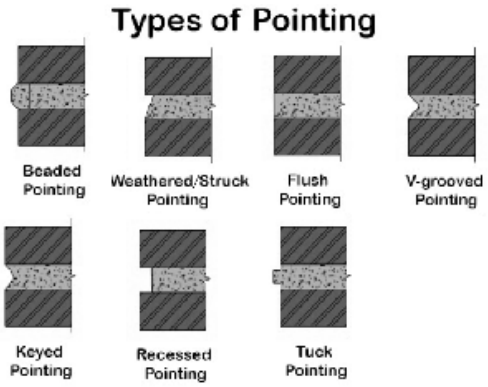
(a) Recessed pointing (b) Flush pointing

(c) Beaded pointing (d) V pointing

**Ans. (b) :**

**Flush pointing:-** The mortar is pressed hard in the raked joints and by finishing off flush with the edge of masonry units.

- The edges are neatly trimmed with a trowel and straight edge.
- Flush pointing involves filling the mortar joints completely and smoothing them out to be flush with the face of the wall, creating a smooth and seamless appearance.




**32. In public buildings such as hospitals, the administrative department should be located:**

(a) at the back of the building for security

(b) in an area with the best outside view

(c) in the farthest corner for privacy

(d) centrally for convenience

**Ans. (d) :** In public buildings such as hospitals, the administrative department should be located centrally to ensure ease of access for patients, staff, and visitors.

- A central location allows for better coordination with other departments and promotes efficient workflow throughout the facility.

**33. Which component of an elevator system is responsible for regulating its speed and ensuring smooth stopping during normal operations?**

(a) Governor (b) Guide rails
(c) Traction motor (d) Counterweight

**Ans. (c) :** The component of an elevator system that is responsible for regulating its speed and ensuring smooth stopping during normal operations is the traction motor.

- The traction motor powers the elevator, controlling its movement, acceleration, deceleration, and stopping.
- Modern traction motors, especially those with variable frequency drives (VFDs), allow precise speed regulation and smooth starts and stops.

**Note– RRB deleted this question.**

**34. Which of the following is the most accurate method of estimation?**

(a) Thorough estimate
(b) Cube rate estimate
(c) Total quantity method
(d) Unit quantity method

**Ans. (c) : Total quantity method–**

- It is also known as the item rate method.
- It is a detailed construction, cost estimation technique that calculates the precise quantities of all required work items from project drawings and specification.
- Total quantity method or item rate method or detailed method is the most accurate method of estimation.

**35. A sample of coarse aggregate weighing 5 kg is fully immersed in water for 24 hours. After surface-drying, its weight is found to be 5.08 kg. If the oven-dried weight of the sample is 5 kg, what is the water absorption percentage of the aggregate?**

(a) 4% (b) 2.5%
(c) 3% (d) 1.6%

**Ans. (d) :** Given
SSD weight (Saturated Surface Dry weight)
= 5.08 kg
Oven-dry weight = 5.00 kg
Water Absorption (%)

$$= \frac{\text{SSD weight} - \text{Oven dry weight}}{\text{Oven dry weight}} \times 100$$

$$= \frac{5.08 - 5.00}{5.00} \times 100 = 1.6\%$$

**36. Which of the following is NOT a proper access and egress method for a trench deeper than 4 feet?**

(a) Steps (b) Ramps
(c) Scaffolding (d) Ladders

**Ans. (c) :** General requirement that should be followed during excavation–

- Surface encumbrances must be removed or supported if they present a hazard.
- Proper identification of utilities localize and indentify utility lines before digging.
- **Access and egress–** Must be provided by ladders, ramps, or steps on trenches deeper than 4 feet.
- **Exposure to traffic–** Reflectorised warning vests must be used when excavation is taking place near traffic.

**37. What is the main purpose of constructing Thiessen polygons?**

(a) To identify flood-prone areas in a watershed
(b) To predict future rainfall patterns
(c) To measure the infiltration capacity of soil
(d) To determine the distribution of rainfall based on nearby stations

**Ans. (d) : Thiessen Polygon Method:-** Thiessen polygons divide an area into regions around each rainfall measurement station, allowing for the estimation of average rainfall for each region based on the proximity of a given point to the nearest station.

- For this method, all the gauges in and around the basin are considered
- Thiessen's method assumes that the rainfall at any point within the polygon is identical to the nearest gauge.
- This method is also called the weighted average method.

**38. Introducing slip joints between external wall and roof slab will reduce cracking due to:**

(a) external chemical reaction
(b) the movement of ground
(c) temperature variation
(d) moisture changes

**Ans. (c) : Slip Joints:-** When variations in temperature, moisture content or loading result in tendency for one part of a structure to move in a plane at right angles to the plane of another part it is necessary to provide a slip plane between the two parts thus enabling freedom of movement in both planes.

- Sliding joints are usually formed by applying a layer of plaster to one of the surfaces and finishing it smooth before the other is cast on it or by any other approved suitable method.

**39. In a beam under bending (for sagging bending), where is the maximum compressive strain observed?**

(a) At the bottom fibre
(b) Uniformly across the section
(c) At the top fibre
(d) At the neutral axis

**Ans. (c) :** In a beam under sagging bending (positive bending moment), the beam curves downwards. This causes:

- Top fibres to compress.
- Bottom fibres to extend (tension).
- The neutral axis to remain unstressed (zero strain).

Therefore, the maximum compressive strain occurs at the top fibre of the beam.

**40. In the construction of mud floors, what material used in the mix, prevents the cracks from forming?**

(a) Fine muram (b) Sand
(c) Natural resin (d) Chopped straw

**Ans. (d) :** • The straw acts as a binder, preventing the mud from cracking.
- When the available soil is not suitable enough for construction then soil can be used by manipulating its composition by adding suitable stabilizers.
- Mud floors are typically made by mixing clay or mud with other materials to improve their strength and durability. One common additive is chopped straw.

• Mud flooring is commonly constructed in villages.

**Materials required for mud flooring -**
- sifted sand
- clay
- cow manure
- chopped and sifted straw

**41. Which of the following statements is INCORRECT about a total station?**

(a) Height of collimation error exists when the optical axis of the theodolite is not exactly perpendicular to the telescope axis.
(b) Circle graduation error can be eliminated by photo-etching the graduations onto a glass circle.
(c) Horizontal collimation error and height of standards error can magnify each other.
(d) Horizontal collimation error is eliminated after checking the height of standards.

**Ans. (d) : Circle graduation error:–**
- For precise measurements surveyors advanced their circle on each successive set of angles so that circle graduation errors were "meaned out".
- This is accomplished by photo-etching the graduations onto the glass circles and making a precise master circle and photographing.

**Height of standards error:–**
- Horizontal collimation error is usually eliminated before checking for height of standards.
- Generally, determination of this error should be accomplished by a qualified technician because horizontal collimation and height of standards error interrelate and can magnify or offset one another.
- Height of collimation error exists when the optical axis of theodolite is not exactly perpendicular to the telescope axis.

**Note– RRB deleted this question.**

**42. Which of the following is the default rendering engine in Autodesk's latest 3ds Max version?**

(a) Mental Ray (b) V-Ray
(c) Scanline Renderer (d) Arnold

**Ans. (d) :** Arnold is the default renderer as it is an advanced Monte Carlo ray tracing renderer built for the demands of feature length animation and visual effects that features integration with 3ds Max shapes, cameras, lights, and shaders as well as a state of the art physical sky, 3ds Max Active Shade interactive rendering that allows you to easily preview, AOV and Deep EXR support, and much more.

**43. What is the primary purpose of the re-barring technique in building maintenance?**

(a) To replace damaged reinforcement bars in old buildings
(b) To provide surface finishing to exposed concrete
(c) To increase the load-bearing capacity of an existing structure
(d) To improve the thermal resistance of the building

**Ans. (c) :**
- Concrete rebar is a structural element made of steel. It is used for increasing the tensile strength of concrete.
- The importance of concrete rebar lies in its ability to significantly improve the overall performance of structure preventing cracking and enhancing load bearing capacity.
- It enables structures to resist forces like tension, bending, torsion, and shearing that would otherwise compromise their integrity.
- Typically concealed within concrete, concrete rebar is often made of steel due to shared thermal properties with concrete.

**44. A field test for brick where in the brick is immersed in water for a certain amount of time is known as _____.**

(a) hardness test (b) absorption test
(c) structure test (d) shrinkage test

**Ans. (b) : Water absorption test**:- In this test, bricks are weighed in dry condition and let immersed in fresh water for 24 hours. After 24 hours of immersion, those are taken out from the water and wipe out with a cloth. Good quality brick doesn't absorb more than 20% water of its own weight.

**45. Which of the following has the lowest removal efficiency for particulate matter?**

(a) Centrifugal collectors
(b) Gravitational settling chambers
(c) Electrostatic precipitators
(d) Bag filters

**Ans. (b) :**

| Device | Minimum Particle Size Removal | Efficiency |
|---|---|---|
| Gravitational Settling Chambers | ≥ 50 μm | < 50% |
| Cyclone or Dynamic Collectors | 5 – 25 μm | 50-90% |

| | | |
|---|---|---|
| Wet Scrubbers (Spray Tower, Venturi) | > 10 μm | 80-99% |
| Electrostatic Precipitator | < 1 μm | > 99% |
| Fabric Filters | < 0.5 μm | > 99% |

**46. Site plan is also known as:**

(a) Sanction plan (b) Landscape plan
(c) Ground floor plan (d) Plot plan

**Ans. (d) : Site Plan or Plot plan:-** Shows the detailed layout of proposed construction within the plot.
Includes:
• Building footprints
• Driveways, parking, pathways
• Landscaping, drainage, and utility lines
• Setbacks, north direction, and access points
**Used for:-** Construction approvals, municipal permits, and on-site execution.

**47. When an elastic body is subjected to an axial tensile force, it undergoes:**

(a) decrease in length and increase in cross-sectional area
(b) increase in length and increase in cross-sectional area
(c) increase in length and decrease in cross-sectional area
(d) decrease in length and decrease in cross-sectional area

**Ans. (c) :** A tensile force pulls the body along its length, causing it to elongate. However, due to the conservation of volume, as the body stretches in one direction, it will contract slightly in the perpendicular directions, resulting in a decrease in cross-sectional area.

**48. What type of machine is used for grading and leveling large areas?**

(a) Grader (b) Bulldozer
(c) Excavator (d) Scraper

**Ans. (a) : Grader:–** A grader is a heavy construction vehicle with a long blade designed to create smooth surfaces, particularly for roads and other large areas.
**Backhoe:–** Used for excavating trenches below the machine level
**Excavators:–** For excavation but other than that they are also used for heavy lifting, demolition, river dredging, cutting of trees
**Dragline Excavator:–** For the construction of ports, for excavations under water, sediment removal in water bodies etc.

**49. If a building settles by 100 mm in a 5-year-period after construction, the type of soil below the foundation is _____ and the reason of settlement is _____.**

(a) clayey; consolidation (b) clayey; compaction
(c) sandy; consolidation (d) sandy; compaction

**Ans. (a) :** If a building settles by 100 mm over a 5-year period, this indicates a slow, time-dependent settlement process.
Such behavior is characteristic of clayey soils, which settle gradually due to the expulsion of water from their fine pores — a process known as consolidation. In contrast, sandy soils settle quickly (immediately after loading) due to compaction, not over several years.

**50. For slender cylinders, as the height to lateral dimension ratio of the concrete specimen increases, the compressive strength:**

(a) remains constant
(b) increases
(c) first increases, then decreases
(d) decreases

**Ans. (d) :** The compressive strength of a material depends on the crushing/buckling load which is calculated from the Euler's Buckling load formula. Critical stress using Euler buckling theory gives the compressive strength of the column.

Critical buckling load, $P_e = \frac{\pi^2 E I_{min}}{L_e^2}$

Critical buckling stress, $\sigma_e = \frac{P_e}{A} = \frac{\pi^2 E I_{min}}{L_e^2 A}$

The radius of Gyration, $k = \sqrt{\frac{I_{min}}{A}}$

$$\sigma_e = \frac{\pi^2 E k^2}{L_e^2} = \frac{\pi^2 E}{\left(\frac{L_e}{k}\right)^2}$$

Slenderness Ratio (S) is the ratio between the length and least radius of gyration.

$$S = \frac{L_e}{k}$$

So with the increase of slenderness ratio, the compressive strength of the column is decreased.

**51. The most simple epoxy injection method is _____ injection.**

(a) brush (b) low pressure
(c) hand gun (d) high pressure

**Ans. (c) : Epoxy Injections:-** Epoxy injections are used to fill the cracks that are as narrow as 0.05 millimeters.
- Under this method, the cracks on exposed surfaces are sealed injecting epoxy under the concrete.
- The most simple epoxy injection method is hand gun injection. However, it is important to find and fix the root cause of cracks before injecting the epoxy into the cracks otherwise the cracks will keep on emerging again and again.

**52. The 'Multiplying constant' used in the distance equation of stadia tacheometry is also known as _____.**

(a) stadia interval factor
(b) stadia correction factor
(c) stadia correction constant
(d) stadia hair constant

**Ans. (a) :** For stadia tacheometry the horizontal distance is given by -

$D = kS + C$

This formula involves the computation of two constants i.e. multiplying constant (k) and additive constant (C).

$k = \frac{f}{i}$ $\quad\quad$ $C = (f + d)$

Where,

f = Focal length of the objective lens

i = Distance between the stadia wires

d = distance of the objective from the center of the instrument.

Constant k is known as the multiplying constant or stadia interval factor and the constant (f + d) = C is known as the additive constant of the instrument.

**53. All received tenders can be rejected by the department if:**

(a) figure quoted by the lowest bidder is higher than available funds
(b) the department wishes for a re-advertisement, without any cause
(c) more than 50 tenders are received for one invitation
(d) there is a change of government

**Ans. (a) :** The authority may cancel the process of procurement or rejecting all bids at any time before intimating acceptance of successful bid under circumstances mentioned below.

- If effective competition is lacking. However, lack of competition shall not be determined solely on the basis of the number of Bidders
- Radical changes in design are found necessary during the interval preceding the opening of the tenders The Bids'/ Proposals' prices are substantially higher than the updated cost estimate or available budget.
- If the quantity and quality of requirements have changed substantially or there is an un-rectifiable infirmity in the bidding process.
- When none of the tenders is substantially responsive to the requirements of the Procurement Documents.
- None of the technical Proposals meets the minimum technical qualifying score.
- If the bidder, whose bid has been found to be the lowest evaluated bid withdraws or whose bid has been accepted, fails to sign the procurement contract as may be required, or fails to provide the security as may be required for the performance of the contract or otherwise withdraws from the procurement process, the procuring entity shall cancel the procurement process.
- All received tenders can be rejected by the department if the figure quoted by the lowest bidder is higher than the available funds.

**54. When considering the economics of a road alignment, what costs are taken into account?**

(a) Only the initial construction cost
(b) Only the maintenance cost
(c) The total cost, including initial construction, maintenance, and vehicle operation costs
(d) Only the vehicle operation cost

**Ans. (c) : Road alignment:-** Road alignment is considered economical only if the total cost, including the initial cost, maintenance cost and vehicle operation cost is the lowest.

- All these factors should given due consideration before working out the economics of reach alignment.
- The alignment should be such that it would offer maximum utility by serving the maximum population and products. The utility of a road can be judged from its utility value per unit length of the road.

**55. What is the role of bituminous binder in pavement construction?**

(a) It acts as a filler material.
(b) It binds the aggregates together.
(c) It reduces the pavement strength.
(d) It increases the water absorption capacity.

**Ans. (b) :**

- Bituminous binders, also known as asphalt binders or bitumen, are essential components in the construction of roads and pavements.
- They are black, sticky substances derived from crude oil or natural deposits.
- Bituminous binders serve as the glue that holds together the aggregates (such as crushed stone, sand, and gravel) in asphalt mixtures, creating a durable and flexible pavement surface.

**56. Two forces act in the same plane. Force 1 is 40 kN towards the right, and Force 2 is 30 kN downward. The angle between the two forces is 90°. What is the magnitude of the resultant force?**

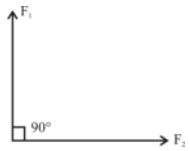
(a) 5 kN (b) 50 kN
(c) 70 kN (d) 60 kN

**Ans. (b) :** Given

$F_1 = 40$ N

$F_2 = 30$N

$\theta = 90^o$




Resultant force $F_r$, of any two forces $F_1$ and $F_2$ with an angle $\theta = 90^o$ between them, can be given as

$$F_r = \sqrt{R_1^2 + F_2^2 + 2F_1F_2\cos\theta}$$

$= \sqrt{40^2 + 30^2 + 2F_1F_2\cos 90^\circ}$

$= \sqrt{40^2 + 30^2 + 0} = \sqrt{2500} = 50\,\text{kN}$

**57. Which of the following statements is INCORRECT about the contour interval of a contour map?**

(a) Large contour interval is used where the time available for the survey is less.
(b) Small contour interval is selected for surveying on flat ground.
(c) The contour interval should be directly proportional to the scale of the map.
(d) Large contour interval is used where the extent of survey is large.

**Ans. (c) :** Line joining points of the same elevation are called contour lines.

**Contour Interval:-** A contour interval is a vertical distance or difference in elevation between contour lines.

- It is always kept the same or constant for a map.

The contour interval depends upon the following factors:

- **The scale of the map:-**The contour interval normally varies inversely to the scale of the map i.e., if the scale of the map is large, the contour interval is considered to be small and vice versa.
- **Nature of ground:-** For flat ground, a small contour interval is chosen whereas, for undulating, extant of survey is large and broken ground, a greater contour interval is adopted.
- **Time & Cost:-** Time and expense of field and office work If the time available is less, greater contour interval should be used. If the contour interval is small, greater time will be taken in the field survey, in reduction and in plotting the map.

**58. Under which of the following conditions should you prefer a caisson foundation?**

(a) Residential buildings in clay soil
(b) High-rise building in dry soil
(c) Bridge piers in water
(d) Multi-storey car parks

**Ans. (c) : Caisson:-** A caisson is defined as a type of foundation in the shape of a hollow prismatic box, which is constructed above the ground level and then sunk to the desired depth.

- Caisson foundations are ideal for bridge piers in water because they are designed to be constructed underwater.

**59. Which type of elevator is best suited for high-rise buildings?**

(a) Hydraulic elevator (b) Traction elevator
(c) Pneumatic elevator (d) Belt elevator

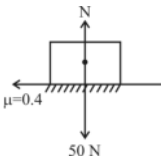
**Ans. (b) : Passenger Elevator (Traction)**:- If your building has more than G +5 floors you will probably want to consider an electric traction elevator.

- Traction elevators are better suited for taller buildings since they are capable of much greater speeds and heights.

**60. A block of weight 50 N is resting on a horizontal surface. The coefficient of friction between the block and the surface is 0.4. What is the maximum frictional force before the block starts moving?**

(a) 5 N (b) 25 N
(c) 20 N (d) 10 N

**Ans. (c) :** Given




Weight of block (W) = 50N

Coefficient of static friction($\mu$) = 0.4

Maximum frictional force

$f_{max} = \mu \cdot N$

$= 0.4 \times 50 = 20$ N

**61. In which type of construction is a high plinth level recommended?**

(a) Desert regions (b) Seismic zones
(c) Industrial buildings (d) Flood-prone areas

**Ans. (d) :** A high plinth level is recommended in flood-prone areas because it elevates the building above the potential floodwater level, minimizing the risk of flooding damaging the lower floors and contents.

**62. Which stair type is most suitable for limited space?**

(a) Dog-legged staircase
(b) Quarter-turn staircase
(c) Straight flight
(d) Spiral staircase

**Ans. (d) :**

- Spiral staircases are designed to occupy minimal floor space, making them ideal for locations where space is limited.
- They rise around a central column and do not require large landings or extended lengths like other stair types.
- Commonly used in tight spots like small apartments, lofts, or as secondary stairs.

**63. The materials of a grout should not _____, but should _____ to fill gaps.**

(a) condense; evaporate (b) harden; crumble
(c) shrink; expand (d) expand; shrink

**Ans. (c) : Grouting**

- Grout, typically a mixture of Portland cement, sand, and water or chemicals, is employed to fill gaps, repair concrete cracks, seal joints, waterproof structures, and stabilize soil.
- It should not shrink, because shrinkage would cause gaps or reduce bonding.
- It should expand slightly, ensuring that all voids are filled tightly and the material stays in contact with surfaces.

**64. With reference to treatment of waste water, the skimming tanks are used for:**

(a) removal of oil and grease
(b) mixing of coagulants
(c) removal of gases like methane
(d) removal of inorganic grit

**Ans. (a) : Skimming Tank:-** A skimming tank is a chamber so arranged that the floating matter like oil, fat, grease etc, rise and remain on the surface of the waste water (Sewage) until removed, while the liquid flows out continuously under partitions or baffles.

- Therefore, this process in skimming tank is known as skimming.

**65. Which of the following methods is most commonly used for underwater concreting?**

(a) Shotcrete method
(b) Roller compacted concrete
(c) Hand mixing
(d) Tremie method

**Ans. (d) :** The following are the principal techniques that have been used for placing concrete underwater:

1. Placing in de-watered caissons or cofferdams
2. Tremie method
3. Bucket placing
4. Placing in bags
5. Prepacked concrete

- The tremie process is the underwater placing technique used most frequently.

**66. With reference to disposal of solid wastes, pulverisation refers to:**

(a) heating at 1,100°C
(b) cutting and tearing
(c) crushing and grinding
(d) cutting only

**Ans. (c) : Pulverization:-** Pulverization refers to the action of crushing and grinding, whereas shredding refers to the action of cutting and tearing.

**67. According to IS 456:2000, under what conditions can the shear strength of an RC section near the supports or concentrated load be enhanced?**

(a) When the considered beam section is farther from the face of a support or concentrated load than twice the effective depth (2d)
(b) When the considered beam section is closer to the face of a support or concentrated load than twice the effective depth (2d) of the beam
(c) Enhancement is not permitted near the supports
(d) When the considered beam section is exactly at a distance equal to the effective depth (d) from the support

**Ans. (b) : According to IS 456:2000 (clause 40.5.1)**

- The enhancement of shear strength may be taken into account in the design of sections near a support by increasing design shear strength of concrete.
- Account may be taken of the enhancement in any situation where the section considered is closer to the face of a support of concentrated load than twice the effective depth (2d).

**68. How is the centroid of a composite shape determined?**

(a) By finding the intersection of the diagonals
(b) By considering only the shape with the largest area
(c) By taking the weighted average of the centroids of individual areas
(d) By taking the sum of individual areas

**Ans. (c) :** For composite (or built-up) shapes, the centroid (x, y) is found by:

1. Dividing the shape into simpler, non-overlapping parts.
2. Calculating each part's area $A_i$ and centroid $(x_i, y_i)$
3. Using the weighted average formulas:

$$\bar{x} = \frac{\sum A_i x_i}{\sum A_i}$$

$$\bar{y} = \frac{\sum A_i y_i}{\sum A_i}$$

**69. To modify an existing surface in Autodesk Civil 3D 2024, which command is used to add or remove surface data?**

(a) Add Surface Data (b) Surface Modify
(c) Surface Changing (d) Surface Edit

**Ans. (d) :** In Autodesk Civil 3D, the "Surface Edit" command allows you to modify the surface's definition by adding or removing surface data.

- This is done by editing the surface definition, which is a list of operations used to build the surface.

**70. The pressure head in a fluid is expressed in terms of:**

(a) velocity (b) force
(c) length (d) time

**Ans. (c):** Pressure head is a measure of pressure in fluid dynamics, and it is commonly expressed in units of length, such as meters (m) or feet (ft).

- It represents the height of a fluid column that exerts the same pressure as the pressure being measured.
- This height is equivalent to the potential energy per unit weight of the fluid.

**Note– RRB deleted this question.**

**71. Which of the following is NOT a type of dump truck?**

(a) Tower crane truck
(b) Bottom dump truck
(c) Articulated dump truck
(d) Side or rear dump truck

**Ans. (a) :** A dump truck is a vehicle that is utilized at construction sites to transport construction materials to and from the site.

**Types of Dump Trucks**

1. Standard Dump Truck
2. Super Dump Truck
3. Winter Weather Dump Truck
4. Transfer Dump Truck
5. Side Dump Truck
6. Haul Dump Truck
7. Semi-Truck Trailer End Dump Truck
8. Semi-Truck Trailer Bottom Dump Truck
9. Articulated Haul Dump Truck

**72. What type of pump is commonly used for conveying Ready Mix Concrete (RMC)?**

(a) Submersible pump (b) Gear pump
(c) Centrifugal pump (d) Piston pump

**Ans. (d) :** The type of pump commonly used for conveying Ready Mix Concrete (RMC) is the piston pump.

- This is because Ready Mix Concrete is a dense, viscous, and abrasive material that requires high pressure to move efficiently through pipelines.
- Piston pumps, being positive displacement pumps, are capable of generating the necessary pressure and handling the heavy load without getting clogged.

**73. Under which of the following circumstances is the revised estimate prepared?**

(a) When another copy of estimate is requested by authorities
(b) When the original sanctioned estimate is exceeded by more than 2%
(c) When there are material deviation from the original proposal
(d) When the expenditure on a work exceeds the amount of administrative sanction by more than 5%

**Ans. (c) :** Revised estimate is a detailed estimate and it is require to be prepared under any one of the following circumstances.

(i) When the original sanctioned estimate is exceeded or likely to more than 5%.
(ii) When the expenditure on a work exceeds or likely to exceed the amount of administrative sanction b more than 10%.
(iii) When there are material deviation from the original proposal, even thought the cost may be met from the sanctioned amount.

**74. As per IS 456:2000, what is the maximum water-cement ratio for M30 concrete with severe exposure conditions?**

(a) 0.50 (b) 0.40
(c) 0.55 (d) 0.45

**Ans. (d) :**

| S.No. | Exposure | Plain concrete | | | Reinforced Concrete | | |
|---|---|---|---|---|---|---|---|
| Min. Cement content ($kg/m^3$) | | Min. Cement content ($kg/m^3$) | Max. W/C Ratio | Min Grade | Min. Cement ($kg/m^3$) | Max. W/C Ratio | Min. Grade |
| i) | Mild | 220 | 0.60 | - | 300 | 0.55 | M20 |
| ii) | Moderate | 240 | 0.60 | M15 | 300 | 0.50 | M25 |
| iii) | Severe | 250 | 0.50 | M20 | 320 | 0.45 | M30 |
| iv) | Very Severe | 260 | 0.45 | M20 | 340 | 0.45 | M35 |
| v) | Extreme | 280 | 0.40 | M25 | 360 | 0.40 | M40 |

**75. Which of the following types of station yards is primarily used for loading and unloading cargo?**

(a) Marshalling yard (b) Goods yard
(c) Locomotive yard (d) Passenger yard

**Ans. (b) : Station Yards:-** Yard is a system of tracks laid for receiving, storing, sorting, making up new trains, dispatch of vehicles and for other purposes

**Types of Yards**

1 Passenger bogie yards
2. Goods yards
3 Marshalling yards
4 Locomotive yards

- **Goods Yards:-** The main function is to provide facilities for receiving, loading, unloading, delivery of goods and the movement of goods-vehicles

**76. What is the recommended slump range for beams and slabs requiring medium workability?**

(a) 25 to 75 mm (b) 25 to 50 mm
(c) 50 to 100 mm (d) 30 to 45 mm

**Ans. (c) :**

| Placing Condition | Degree of Workability | Slump, mm |
|---|---|---|
| Mud mat, shallow section, pavement using pavers | Very low | 0 - 25 |
| Mass concrete; lightly reinforced slabs, beams, walls, columns; strip footings | Low | 25-75 |