Civil Engineering

1. The process of reducing the moisture content in freshly cut timber to a suitable level is known as:

A) Curing

B) Seasoning

C) Treating

D) Plying

Answer: B) Seasoning

Explanation: Seasoning of timber is essential to increase its strength, durability, and dimensional stability by removing sap and water. It prevents warping and decay.

2. In a brick, the depression made on the top face during moulding is called a:

A) Frog

B) Indent

C) Groove

D) Perforation

Answer: A) Frog

Explanation: The frog serves as a key for the mortar, creating a stronger bond between successive courses of bricks. It also often bears the manufacturer's mark.

3. The fundamental principle of surveying is to work from the:

A) Whole to the part

B) Part to the whole

C) Lower level to the higher level

D) Higher level to the lower level

Answer: A) Whole to the part

Explanation: This principle is adopted to localize errors. By establishing a framework of control points first, the minor errors in subsequent detailed measurements do not accumulate.

4. The property of fresh concrete that describes the ease with which it can be mixed, placed, compacted, and finished is called:

A) Strength

B) Segregation

C) Bleeding

D) Workability

Answer: D) Workability

Explanation: Workability is a crucial property of fresh concrete. It is commonly measured using tests like the slump test, compaction factor test, or Vee-bee test.

5. The water content at which a soil changes from a plastic state to a liquid state is known as the:

A) Plastic Limit

B) Shrinkage Limit

C) Liquid Limit

D) Permeability Limit

Answer: C) Liquid Limit

Explanation: The Liquid Limit is one of the Atterberg limits, which are used to classify fine-grained soils based on their consistency and water content.

6. A force system is said to be in equilibrium when the:

A) Resultant of all forces is zero

B) Sum of moments about any point is zero

C) Algebraic sum of forces in any direction is zero and the sum of moments is zero

D) System is at rest

Answer: C) The algebraic sum of forces in any direction is zero and the sum of moments is zero

Explanation: For complete static equilibrium, both the net force and the net moment acting on the body must be zero, preventing both translation and rotation.

7. Within the elastic limit, stress is directly proportional to strain. This statement is known as:

A) Newton's Law

B) Hooke's Law

C) Bernoulli's Principle

D) Pascal's Law

Answer: B) Hooke's Law

Explanation: Hooke's Law is the fundamental principle of linear elasticity, expressed as $\sigma = E \epsilon$, where E is the Modulus of Elasticity or Young's Modulus.

8. The point in a beam where the bending moment changes its sign (from positive to negative or vice versa) is called the:

A) Point of maximum shear

B) Point of zero shear

C) Point of inflexion

D) Point of contraflexure

Answer: D) Point of contraflexure

Explanation: At the point of contraflexure, the bending moment is zero. This is also where the curvature of the beam's elastic curve changes direction.

9. Bernoulli's equation in fluid dynamics deals with the conservation of:

A) Mass

B) Momentum

C) Energy

D) Volume

Answer: C) Energy

Explanation: Bernoulli's principle states that for an inviscid flow, an increase in the speed of the fluid occurs simultaneously with a decrease in pressure or a decrease in the fluid's potential energy.

10. A graphical representation of discharge versus time at a particular point in a river is known as a:

A) Hyetograph

B) Mass curve

C) Hydrograph

D) Isohyet

Answer: C) Hydrograph

Explanation: A hydrograph is a fundamental tool in hydrology used to analyze the response of a watershed to a rainfall event.

11. The amount of oxygen required by microorganisms to decompose biodegradable organic matter in wastewater is measured as:

A) Dissolved Oxygen (DO)

B) Biochemical Oxygen Demand (BOD)

C) Chemical Oxygen Demand (COD)

D) Total Organic Carbon (TOC)

Answer: B) Biochemical Oxygen Demand (BOD)

Explanation: BOD is a key indicator of the level of organic pollution in water. A higher BOD value indicates a greater degree of pollution.

12. The process of adding chlorine to water to kill pathogenic organisms is called:

A) Coagulation

B) Sedimentation

C) Filtration

D) Disinfection

Answer: D) Disinfection

Explanation: Disinfection is the final treatment stage to ensure the water is safe for consumption. Chlorine is the most common disinfectant used in water supply systems.

13. In Reinforced Cement Concrete (RCC) beams, steel reinforcement is primarily provided to resist:

A) Compressive stresses

B) Tensile stresses

C) Shear stresses

D) Torsional stresses

Answer: B) Tensile stresses

Explanation: Concrete is strong in compression but very weak in tension. Steel bars are placed in the tension zone of the beam to carry the tensile loads.

14. Two structural members joined together by welding are connected by a:

A) Rivet

B) Bolt

C) Fillet or Groove

D) Pin

Answer: C) Fillet or Groove

Explanation: Fillet welds and groove welds are the two principal types of welds used to fuse steel plates or sections together in structural applications.

15. The relationship between the area to be irrigated and the quantity of water required for it during the entire crop period is known as:

A) Delta

B) Duty

C) Base Period

D) Crop Ratio

Answer: B) Duty

Explanation: Duty of water is typically expressed as hectares per cumec (hectares of land that can be irrigated by a constant supply of 1 cubic meter per second of water).

16. The outward transverse slope provided to the road surface to drain off rainwater is called:

A) Superelevation

B) Camber

C) Gradient

D) Cant

Answer: B) Camber

Explanation: Camber, or crossfall, is essential for road surface drainage, preventing water from ponding and damaging the pavement structure.

17. The standard distance between the inner faces of the two rails of a railway track is known as the:

A) Sleeper density

B) Ballast

C) Formation width

D) Gauge

Answer: D) Gauge

Explanation: Different gauges are used worldwide, such as Broad Gauge (1.676 m), Standard Gauge (1.435 m), and Meter Gauge (1.0 m) in India.

18. The primary purpose of a taxiway at an airport is to:

A) Provide a parking area for aircraft

B) Allow aircraft to take off and land

C) Provide a path for aircraft to move between the runway and the apron/terminal

D) House the air traffic control tower

Answer: C) Provide a path for aircraft to move between the runway and the apron/terminal

Explanation: Taxiways are designed to handle aircraft traffic on the ground, connecting various parts of the airfield efficiently and safely.

19. The project management technique that uses a probabilistic approach for activity time estimates is:

A) CPM (Critical Path Method)

B) PERT (Program Evaluation and Review Technique)

C) Bar Chart

D) Milestone Chart

Answer: B) PERT (Program Evaluation and Review Technique)

Explanation: PERT is used for projects with uncertain activity durations (e.g., R&D projects) and uses three time estimates (optimistic, pessimistic, most likely) to calculate the expected time.

20. In the SI system, the unit of pressure or stress is:

A) Newton (N)

B) Joule (J)

C) Watt (W)

D) Pascal (Pa)

Answer: D) Pascal (Pa)

Explanation: A Pascal is defined as one Newton of force per square meter (N/m^2). It is the standard unit for pressure, stress, and modulus of elasticity.

21. A structure in which the number of unknown reactions is more than the number of available equilibrium equations is called:

A) Statically determinate

B) Statically indeterminate

C) Unstable

D) A mechanism

Answer: B) Statically indeterminate

Explanation: Statically indeterminate or redundant structures require additional compatibility equations (based on deformations) for their analysis, in addition to the static equilibrium equations.

22. A measuring tape that is shorter than the standard length will result in a:

A) Positive cumulative error

B) Negative cumulative error

C) Compensating error

D) No error

Answer: A) Positive cumulative error

Explanation: If a 30 m tape is actually 29.9 m, every time it is used to measure 30 m, it records a length that is actually 0.1 m shorter. This makes the measured length greater than the actual length.

23. The total depth of water required by a crop during its entire period of growth in the field is known as:

A) Duty

B) Delta

C) Base Period

D) Crop Period

Answer: B) Delta

Explanation: Delta is usually expressed as a depth in centimeters or meters and is directly related to the duty and base period of the crop ($\Delta = 864 \times B / D$).

24. The ratio of the volume of voids to the total volume of the soil mass is called:

A) Void ratio

B) Porosity

C) Degree of saturation

D) Water content

Answer: B) Porosity

Explanation: Porosity (n) is a measure of the void space in a soil and is expressed as a percentage ($n = V_v / V \times 100\%$). It is an important index property of soils.

25. An instrument that can measure horizontal angles, vertical angles, and distances electronically is a:

A) Theodolite

B) Dumpy Level

C) Compass

D) Total Station

Answer: D) Total Station

Explanation: A Total Station is an integrated electronic instrument that combines an Electronic Distance Measurement (EDM) device with an electronic theodolite for modern surveying.

26. The process of biological decomposition of organic matter in wastewater under anaerobic conditions produces:

A) Oxygen and water

B) Carbon dioxide and water

C) Methane and carbon dioxide

D) Nitrogen and sulfur

Answer: C) Methane and carbon dioxide

Explanation: Anaerobic digestion is used in sludge treatment to reduce volume and produce biogas (primarily methane), which can be used as an energy source.

27. The lateral ties in an RCC column are provided to:

A) Resist the axial load

B) Prevent the buckling of the longitudinal reinforcing bars

C) Increase the compressive strength of concrete

D) Resist bending moment

Answer: B) Prevent the buckling of the longitudinal reinforcing bars

Explanation: Lateral ties confine the main longitudinal bars and prevent them from buckling outwards under compression, thus ensuring the column's stability.

28. The final payment made to a contractor after the satisfactory completion of all work as per the contract is known as:

A) Running account bill

B) Mobilization advance

C) Final bill

D) Earnest money

Answer: C) Final bill

Explanation: The final bill is prepared after the completion of the work and includes all quantities, rates, and deductions, settling the full account with the contractor.

29. The method of tunnelling commonly used in soft ground, such as clay or sand, is:

A) Heading and Bench method

B) Shield tunnelling

C) Cut and Cover method

D) Drill and Blast method

Answer: B) Shield tunnelling

Explanation: A tunnel shield is a protective structure that supports the surrounding soil while excavation and lining installation are performed inside it.

30. A structure built along the seashore to protect the coast from the action of waves is called a:

A) Wharf

B) Jetty

C) Breakwater

D) Pier

Answer: C) Breakwater

Explanation: Breakwaters absorb the energy of waves, creating calm water zones behind them, which is essential for the safety of ships in a harbour.

31. The estimated value of an asset at the end of its useful life, without being dismantled, is called:

A) Scrap Value

B) Book Value

C) Salvage Value

D) Market Value

Answer: C) Salvage Value

Explanation: Salvage value is the value of a property that can be expected to be sold for a purpose other than its original one. Scrap value implies the value of dismantled materials.

32. In remote sensing, a sensor that generates its own energy to illuminate the target is called a/an:

A) Passive sensor

B) Active sensor

C) Optical sensor

D) Thermal sensor

Answer: B) Active sensor

Explanation: Active sensors, like RADAR and LiDAR, emit radiation and then measure the reflected signal. Passive sensors, like cameras, detect naturally available energy (e.g., sunlight).

33. Fineness Modulus is an index number that represents the:

A) Compressive strength of cement

B) Mean size of particles in aggregate

C) Workability of concrete

D) Surface texture of aggregate

Answer: B) Mean size of particles in aggregate

Explanation: A higher Fineness Modulus indicates a coarser aggregate, while a lower value indicates a finer aggregate. It is used in concrete mix design.

34. A load that does not change its magnitude, direction, or point of application is known as a:

A) Live Load

B) Dead Load

C) Wind Load

D) Moving Load

Answer: B) Dead Load

Explanation: Dead loads are permanent, static loads resulting from the self-weight of the structure and other fixed components like walls, floors, and roofs.

35. The ratio of the lateral strain to the longitudinal strain within the elastic limit is known as:

A) Young's Modulus

B) Shear Modulus

C) Bulk Modulus

D) Poisson's Ratio

Answer: D) Poisson's Ratio

Explanation: Poisson's ratio (μ) is a measure of the "Poisson effect," the phenomenon where a material tends to contract in directions perpendicular to the direction of stretching.

36. A foundation that transfers the load from the structure to the soil at a shallow depth is a:

A) Pile foundation

B) Caisson foundation

C) Raft foundation

D) Well foundation

Answer: C) Raft foundation

Explanation: A raft or mat foundation is a type of shallow foundation that covers the entire area beneath a structure and supports it as a single unit. Piles and caissons are deep foundations.

37. The process of determining the plotting positions of stations on a map by drawing rays from two or more known points is called:

A) Traversing

B) Triangulation

C) Resection

D) Levelling

Answer: C) Resection

Explanation: Resection is a method used in plane table surveying to determine the location of the instrument station by sighting towards known points.

38. The grade of concrete M20, according to IS 456:2000, corresponds to a characteristic compressive strength of:

A) 20 MPa

B) 20 GPa

C) 20 N/mm

D) 20 kg/cm²

Answer: A) 20 MPa

Explanation: In the designation 'M20', 'M' stands for Mix, and '20' denotes the characteristic compressive strength of 150 mm concrete cubes at 28 days, in N/mm^2 or MPa.

39. The seepage of water through the body of an earthen dam can be controlled by providing a/an:

A) Spillway

B) Impervious core

C) Gallery

D) Freeboard

Answer: B) Impervious core

Explanation: An impervious core, typically made of clay, is built at the center of the dam to reduce the flow of water (seepage) through the embankment.

40. The critical path in a project network is the path that:

A) Is the shortest in length

B) Connects the most activities

C) Has the maximum duration

D) Has zero slack for all its activities

Answer: D) Has zero slack for all its activities

Explanation: The critical path determines the minimum total project duration. Any delay in an activity on the critical path will delay the entire project.

41. A temporary structure constructed to support an unsafe structure is called:

A) Scaffolding

B) Shoring

C) Underpinning

D) Formwork

Answer: B) Shoring

Explanation: Shoring provides temporary lateral support to walls or structures that are in danger of collapse or during alterations. Underpinning strengthens an existing foundation.

42. The phenomenon of a gradual increase in strain under a constant stress over time is known as:

A) Fatigue

B) Creep

C) Elasticity

D) Plasticity

Answer: B) Creep

Explanation: Creep is a time-dependent deformation that is particularly significant in concrete structures under sustained load and in steel at high temperatures.

43. In a fluid flow, if the velocity at any given point does not change with time, the flow is said to be:

A) Unsteady

B) Steady

C) Uniform

D) Non-uniform

Answer: B) Steady

Explanation: In steady flow, fluid properties like velocity, pressure, and density at a point may differ from another point, but they do not change with time at that specific point.

44. The process of laying out railway track, including sleepers and rails, is known as:

A) Boxing

B) Plate laying

C) Packing

D) Tilting

Answer: B) Plate laying

Explanation: Plate laying is the general term for the construction of a railway track. It involves preparing the formation and assembling the track components.

45. The type of bitumen that is graded based on its viscosity at 60°C is:

A) Penetration grade bitumen

B) Cutback bitumen

C) Viscosity grade (VG) bitumen

D) Emulsion bitumen

Answer: C) Viscosity grade (VG) bitumen

Explanation: VG bitumen, such as VG-30, is specified by its absolute viscosity at 60°C and kinematic viscosity at 135°C, which is more relevant to pavement performance in hot climates.

46. A foundation provided for a column that carries a very heavy load and transfers it to a firm stratum at a considerable depth is a:

A) Strip footing

B) Combined footing

C) Mat foundation

D) Pile foundation

Answer: D) Pile foundation

Explanation: Pile foundations are a type of deep foundation used to transfer loads through weak soil layers to a stronger, more competent soil or rock layer below.

47. The most efficient cross-section for a channel in open channel flow is one that has the:

A) Maximum wetted perimeter

B) Minimum wetted perimeter for a given area

C) Maximum roughness coefficient

D) Minimum cross-sectional area

Answer: B) Minimum wetted perimeter for a given area

Explanation: For a given slope and roughness, a channel with a minimum wetted perimeter for a certain flow area will have the maximum discharge, making it hydraulically efficient.

48. A cantilever beam is a beam that is:

A) Supported at both ends

B) Fixed at one end and free at the other

C) Supported on more than two supports

D) Fixed at both ends

Answer: B) Fixed at one end and free at the other

Explanation: The fixed support provides resistance against vertical movement, horizontal movement, and rotation, making the cantilever a common structural element.

49. The chemical compound in cement that is responsible for the initial setting and early strength gain is:

A) Dicalcium silicate (C_2S)

B) Tricalcium silicate (C_3S)

C) Tricalcium aluminate (C_3A)

D) Tetracalcium aluminoferrite (C_4AF)

Answer: C) Tricalcium aluminate (C_3A)

Explanation: C_3A reacts very rapidly with water and is responsible for the flash set. Gypsum is added to cement to control this rapid reaction. C_3S contributes most to early strength.

50. The orientation of a runway at an airport is primarily determined by the:

A) Direction of prevailing winds

B) Topography of the area

C) Length of the runway

D) Type of aircraft

Answer: A) Direction of prevailing winds

Explanation: Runways are oriented so that aircraft can take off and land into the wind, which provides greater lift and reduces the required ground run. A wind rose diagram is used for this analysis.

51. The process of strengthening the foundation of an existing structure is known as:

A) Shoring

B) Scaffolding

C) Grouting

D) Underpinning

Answer: D) Underpinning

Explanation: Underpinning is done when the existing foundation is no longer adequate, either due to settlement or an increase in the load from the structure.

52. The flow in a pipe is considered laminar when the Reynolds number is:

A) Less than 2000

B) Between 2000 and 4000

C) Greater than 4000

D) Equal to 1

Answer: A) Less than 2000

Explanation: The Reynolds number is a dimensionless quantity that predicts flow patterns. In laminar flow, fluid moves in smooth parallel layers with no disruption between them.

53. The vertical distance between the crown of a road and its edge is known as:

A) Camber

B) Superelevation

C) Gradient

D) Freeboard

Answer: A) Camber

Explanation: Camber is the height of the center of the road surface relative to its edges. It is provided to facilitate surface water drainage.

54. The force per unit area that a soil mass can safely support without undergoing excessive settlement or shear failure is its:

A) Shear strength

B) Safe bearing capacity

C) Ultimate bearing capacity

D) Compressive strength

Answer: B) Safe bearing capacity

Explanation: The safe bearing capacity is determined by dividing the ultimate bearing capacity by a suitable factor of safety to account for uncertainties.

55. In the limit state design of RCC structures, the partial safety factor for concrete is typically taken as:

A) 1.0

B) 1.15

C) 1.5

D) 2.0

Answer: C) 1.5

Explanation: A higher partial safety factor is used for concrete compared to steel (1.15) to account for its greater variability in quality and on-site workmanship.

56. The quantity of brickwork is generally measured in:

A) Cubic meters

B) Square meters

C) Running meters

D) Numbers

Answer: A) Cubic meters

Explanation: For full brick walls, the volume is calculated by multiplying the length, height, and thickness. Half brick walls are measured in square meters.

57. An Influence Line Diagram (ILD) shows the variation of a specific function (like shear, moment, or reaction) at a:

A) Specific point on a structure as a unit load moves across it

B) Specific cross-section for a given static load

C) Variable point on the structure for a fixed load

D) Point of maximum stress in the structure

Answer: A) Specific point on a structure as a unit load moves across it

Explanation: ILDs are essential tools for analyzing structures subjected to moving loads, such as bridges, to determine the maximum stress resultants.

58. The difference in elevation between the inner and outer rails on a curved railway track is called:

A) Cant

B) Gauge

C) Gradient

D) Superelevation

Answer: A) Cant

Explanation: Cant, also known as superelevation, is provided on curves to counteract the effect of centrifugal force, ensuring passenger comfort and stability of the train.

59. The initial security deposit provided by a contractor along with the tender document is called:

A) Security Deposit

B) Performance Bond

C) Earnest Money Deposit (EMD)

D) Mobilization Advance

Answer: C) Earnest Money Deposit (EMD)

Explanation: EMD is a guarantee that the bidder will not withdraw their bid before the end of the bid validity period and will sign the contract if awarded.

60. The process of determining the relative heights of different points on, above, or below the surface of the earth is called:

A) Chaining

B) Traversing

C) Levelling

D) Contouring

Answer: C) Levelling

Explanation: Levelling is a branch of surveying whose objective is to find the elevations of points or to establish points at a given elevation.