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Answer Key of

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Civil Engineering

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Set-B

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CIVIL ENGINEERING

- Q.1** The under surface of an arch is called
- (a) Soffit (b) Haunch
(c) Springer (d) Lancet

Ans. (a)

• • • **End of Solution**

- Q.2** The vertical sides of a door and window openings provided in a wall are known as
- (a) Verticals (b) Reveals
(c) Jambs (d) Rebate

Ans. (c)

• • • **End of Solution**

- Q.3** The least count of a vernier scale is
- (a) Sum of the smallest divisions of main and vernier scales
(b) Value of one division of the primary scale divided by the total number of divisions of the vernier scale
(c) Value of one division of vernier scale divided by the total number of divisions of primary scale
(d) Value of one division of vernier scale

Ans. (b)

• • • **End of Solution**

- Q.4** The bearing of line XY is 195° and that of line ZY is $255^\circ 45'$. The included angle XYZ is
- (a) $60^\circ 45'$ (b) $70^\circ 45'$
(c) $85^\circ 15'$ (d) $90^\circ 15'$

Ans. (a)

• • • **End of Solution**

- Q.5** An imaginary line joining the points of equal elevation on the surface of the earth represents
- (a) Contour surface (b) Level lines
(c) Contour lines (d) Isohyets

Ans. (c)

• • • **End of Solution**

- Q.6** Centre of gravity of a thin hollow cone lies on the axis of symmetry at a height of
- (a) One half of the total height above base
 - (b) One third of the total height above base
 - (c) One fourth of the total height above base
 - (d) At the centre of the base

Ans. (b)

• • • **End of Solution**

- Q.7** The angle of friction is
- (a) The ratio of friction and the normal reaction
 - (b) The force of friction when the body is in motion
 - (c) The angle between the normal reaction and the resultant of normal reaction and limiting friction
 - (d) The force of friction at which the body is just above to move

Ans. (c)

• • • **End of Solution**

- Q.8** The path traced by a projectile in the sky is
- (a) Parabolic
 - (b) Circular
 - (c) Elliptical
 - (d) Catenary

Ans. (a)

• • • **End of Solution**

- Q.9** Periodic time of a particle moving with simple harmonic motion is the time taken by the particle for
- (a) Half oscillation
 - (b) Quarter oscillation
 - (c) Complete oscillation
 - (d) None of these

Ans. (c)

• • • **End of Solution**

- Q.10** When a body moves around a fixed axis it has
- (a) A rotary motion
 - (b) A circular motion
 - (c) A translatory motion
 - (d) A rotary and translatory motion

Ans. (b)

• • • **End of Solution**

- Q.11** The shear force on a simply supported beam is proportional to
- (a) Displacement of the neutral axis
 - (b) Sum of the moments divided by the effective depth

- (c) Sum of transverse forces
- (d) Algebraic sum of the transverse forces of the section

Ans. (d)

● ● ● **End of Solution**

- Q.12** Struts are the load carrying members of a frame which are subjected to
- (a) Axial tension loads
 - (b) Axial compression loads
 - (c) Torsional loads
 - (d) Transverse loads

Ans. (b)

● ● ● **End of Solution**

- Q.13** When a body is elastically stretched, the value of Poisson's ratio always remains
- (a) Greater than one
 - (b) Less than one
 - (c) Equal to one
 - (d) None of these

Ans. (b)

● ● ● **End of Solution**

- Q.14** Fluids undergo volume change under external pressure due to
- (a) Plasticity
 - (b) Viscosity
 - (c) Tenacity
 - (d) Compressibility

Ans. (d)

● ● ● **End of Solution**

- Q.15** A trapezoidal channel has a bottom width of 6 m and side slope of 1:1. The depth of flow 1.5 m at a discharge of 15 cum/sec. The hydraulic radius and hydraulic average depth of flow respectively are
- (a) 1.098 m, 1.25 m
 - (b) 2.239 m, 2.50 m
 - (c) 1.25 m, 1.098 m
 - (d) 2.50 m, 2.239 m

Ans. (a)

● ● ● **End of Solution**

- Q.16** In a sludge digestion tank, the gas that mainly evolves is
- (a) Methane
 - (b) Hydrogen Sulphide
 - (c) Ammonia
 - (d) Nitrogen

Ans. (a)

● ● ● **End of Solution**

- Q.17** The per capita demand of water is calculated in litres
- (a) Per person per year
 - (b) Per person per month
 - (c) Per person per day
 - (d) Peak hour consumption

Ans. (c)

• • • End of Solution

- Q.18** Zero hardness of water can be achieved by
- (a) Lime soda process
 - (b) Excess lime treatment
 - (c) Ion exchange method
 - (d) Excess alum dosage

Ans. (c)

• • • End of Solution

- Q.19** Surge tanks are provided
- (a) For storage of water
 - (b) To increase the velocity of flow in a pipeline
 - (c) As overflow controllers
 - (d) To guard against water hammer

Ans. (d)

• • • End of Solution

- Q.20** The ratio of volume of water present in a given soil mass to the total volume of its voids is known as
- (a) Porosity
 - (b) Voids ratio
 - (c) Percentage voids
 - (d) Degree of saturation

Ans. (d)

• • • End of Solution

- Q.21** Uniformity coefficient of a well graded soil is
- (a) Equal to 1
 - (b) Less than 2
 - (c) Equal to 3
 - (d) Greater than 5

Ans. (d)

• • • End of Solution

- Q.22** The water content of a soil at which the soil volume becomes constant is called
- (a) Plastic limit
 - (b) Liquid limit
 - (c) Solid limit
 - (d) Shrinkage limit

Ans. (d)

• • • End of Solution

Q.23 As per BIS 456-2000 (reaffirmed 2005), the minimum grade of concrete, with normal weight aggregate of 20 mm nominal maximum size, specified for a severe exposure condition is

- (a) M 20 (b) M 25
(c) M 30 (d) M 35

Ans. (c)

● ● ● **End of Solution**

Q.24 Which one of the following is employed to determine the strength of hardened concrete of an existing concrete structure?

- (a) Bullet test (b) Kelly ball test
(c) Rebound hammer test (d) Cone penetrometer test

Ans. (c)

● ● ● **End of Solution**

Q.25 Tricalcium aluminates (C3A)

- (a) Reacts slowly with water
(b) Generates large amount of heat of hydration
(c) Has more resistance to sulphate attack
(d) Occurs in nature

Ans. (b)

● ● ● **End of Solution**

Q.26 A soil sample is partially saturated. Its natural moisture content was found to be 22% and bulk density 2 gm/cc. If the specific gravity of the solid particles is 2.65 and the density of water is 1 gm/cc, the void ratio of the sample is

- (a) 0.3825 (b) 0.6165
(c) 0.8188 (d) 0.9122

Ans. (b)

● ● ● **End of Solution**

Q.27 The horizontal distance between parallel main reinforcement bars shall not be more than the effective depth of solid slab.

- (a) Two times (b) Three times
(c) Four times (d) Five times

Ans. (b)

● ● ● **End of Solution**

- Q.28** If the span to effective depth ratio of a simply supported beam, for span upto 10 m, does not exceed, the vertical deflection limits may generally be satisfied.
- (a) 30 (b) 35
(c) 20 (d) 26

Ans. (c)

● ● ● **End of Solution**

- Q.29** Tension failure occurs in a singly reinforced beam in
- (a) Balanced reinforced beam (b) Under reinforced beam
(c) Over reinforced (d) None of these

Ans. (b)

● ● ● **End of Solution**

- Q.30** Net sectional area of a tension member is equal to its gross sectional area
- (a) Plus the area of the rivet holes
(b) Divided by the area of the rivet holes
(c) Multiplied by the area of the rivet holes
(d) Minus the area of the rivet holes

Ans. (d)

● ● ● **End of Solution**

- Q.31** To prevent creep in rails, the steel sleepers are fixed with rails by
- (a) One anchor key (b) Two anchor keys
(c) Three anchor keys (d) Four anchor keys

Ans. (d)

● ● ● **End of Solution**

- Q.32** What is the volume of a 6 m deep tank having rectangular shaped top 6 m × 4 m and bottom 4 m × 2 m computed through the use of Prismoidal formula?
- (a) 96 cum (b) 94 cum
(c) 92 cum (d) 90 cum

Ans. (c)

● ● ● **End of Solution**

- Q.33** The area to be measured for painting distemper for an internal surface of a plastered 230 mm thick brick wall having dimension of 3000 mm length and 3200 mm height and having a glazed louvered ventilator of size 600 mm × 400 mm in the wall is
- (a) 9.60 sq.m (b) 9.36 sq.m
(c) 9.84 sq.m (d) 9.12 sq.m

Ans. (a)

● ● ● **End of Solution**

Q.34 The value of $\Delta = \begin{vmatrix} 2 & 0 & 1 & 2 \\ 1 & 0 & 2 & 1 \\ 1 & 2 & 0 & 1 \\ 3 & 0 & 2 & 2 \end{vmatrix}$ is

- (a) 62 (b) 6
(c) 0 (d) -48

Ans. (b)

• • • End of Solution

- Q.35** A rectangular sheet of metal of length 6 m and width 2 m is given. Four equal squares are removed from the corners. The side of this sheet are now turned up to form an open rectangular box. The height of box such that the volume of the box maximum will be
- (a) 45 cms (b) 40 cms
(c) 35 cms (d) 20 cms

Ans. (a)

• • • End of Solution

- Q.36** In a square matrix $A = [a_{ij}]$, if $a_{ij} = -a_{ji}$ for all i and j so that all the leading diagonal elements are zero, then the matrix is called
- (a) Skew symmetric matrix (b) Triangular matrix
(c) Symmetric matrix (d) Null matrix

Ans. (a)

• • • End of Solution

- Q.37** The difference of two complex numbers $(x_1 + iy_1)$ and $(x_2 + iy_2)$ is
- (a) $(x_1 + y_1) + i(x_2 + y_2)$ (b) $(x_1 + y_1) - i(x_2 + y_2)$
(c) $(x_1 - y_1) - i(x_2 - y_2)$ (d) $(x_1 - x_2) + i(y_1 - y_2)$

Ans. (d)

• • • End of Solution

- Q.38** The value of $\lim_{x \rightarrow 0} \frac{\log x}{\cot x}$ is

- (a) $\sqrt{3}$ (b) $\sqrt{2}$
(c) 0 (d) 1

Ans. (c)

• • • End of Solution

- Q.39** A box contains 5 red and 10 green balls. Eight (8) of them are placed in another box. The chances that the later box contains 2 red and 6 green balls are
- (a) 240/429 (b) 140/367
(c) 140/429 (d) 240/367

Ans. (c)

● ● ● **End of Solution**

- Q.40** The rocks having alumina or clay as their significant components are known as
- (a) Siliceous rocks (b) Argillaceous rocks
(c) Calcareous rocks (d) None of the above

Ans. (b)

● ● ● **End of Solution**

- Q.41** Age of a tree may be ascertained by
- (a) Radius of its stem (b) Circumference of its stem
(c) Number of branches (d) Number of annular rings

Ans. (d)

● ● ● **End of Solution**

- Q.42** A pug mill is used for
- (a) Moulding of brick earth (b) Baking of bricks
(c) Tempering of brick earth (d) Testing of bricks

Ans. (c)

● ● ● **End of Solution**

- Q.43** The foundation in which a cantilever beam is provided to join two footings is called
- (a) Raft footing (b) Strap footing
(c) Combined footing (d) Strip footing

Ans. (b)

● ● ● **End of Solution**

- Q.44** A covering of concrete placed on the exposed top of an external wall is known as
- (a) Coping (b) Cornice
(c) Frieze (d) Lintel

Ans. (a)

● ● ● **End of Solution**

- Q.45** The vertical members fixed between steps and handrail in a staircase is known as
- (a) Balusters (b) Strings
(c) Newel posts (d) Soffits

Ans. (a)

● ● ● **End of Solution**

- Q.46** If the whole circle bearing of a line is 145° , its reduced bearing is
(a) N 135° E (b) S 45° E
(c) N 215° E (d) S 35° E

Ans. (d)

• • • End of Solution

- Q.47** The representative fraction $1/1800$ means that the scale is
(a) 1 cm = 0.18 m (b) 1 cm = 1.8 m
(c) 1 cm = 18 m (d) 1 cm = 180 m

Ans. (c)

• • • End of Solution

- Q.48** The true meridian of a place is the line in which earth's surface is intersected by a plane through
(a) East and west points (b) Zenith and nadir points
(c) North and south magnetic poles (d) North and south geographic poles

Ans. (d)

• • • End of Solution

- Q.49** Removal of parallax in a Theodolite can be achieved by focusing
(a) The objective (b) The eye piece
(c) The objective and the eye piece (d) The horizon

Ans. (c)

• • • End of Solution

- Q.50** The proportion of second moment of area about the centroidal axis to second moment of area about the base of a rectangle will be
(a) 0.25 (b) 0.50
(c) 2.0 (d) 3.0

Ans. (a)

• • • End of Solution

- Q.51** If g_1 and g_2 are the gravitational acceleration on two mountains A and B respectively, then the weight of body when transported from A to B will be multiplied by
(a) Factor g_1 (b) Factor g_2
(c) Factor (g_1/g_2) (d) Factor (g_2/g_1)

Ans. (d)

• • • End of Solution

Q.52 The two forces of 9 Newtons and 12 Newtons which are acting at right angles to each other will have a resultant of

- (a) 8 Newtons (b) 10 Newtons
(c) 15 Newtons (d) 20 Newtons

Ans. (c)

● ● ● **End of Solution**

Q.53 The distance between the centres of adjacent rivets in the same row is called

- (a) Pitch (b) Lap
(c) Gauge (d) Staggered lap

Ans. (a)

● ● ● **End of Solution**

Q.54 Along the principal plane subjected to maximum principal stresses

- (a) Maximum shear stress acts (b) Minimum shear stress acts
(c) No shear stress acts (d) Partial shear stress acts

Ans. (c)

● ● ● **End of Solution**

Q.55 The bending moment is maximum on a section of a beam where shearing force

- (a) Is maximum (b) Is minimum
(c) Is equal (d) Changes sign

Ans. (d)

● ● ● **End of Solution**

Q.56 The unit of kinematic viscosity is

- (a) m^2/sec (b) $\text{Newton sec}/\text{m}^2$
(c) $\text{Newton sec}/\text{m}^3$ (d) $\text{Kg sec}/\text{m}^2$

Ans. (a)

● ● ● **End of Solution**

Q.57 A floating body attains stable equilibrium of its metacentre is

- (a) At the centroid (b) Above the centroid
(c) Below the centroid (d) Anywhere

Ans. (b)

● ● ● **End of Solution**

Q.58 The equation of continuity of flow is based on the principle of conservation of

- (a) Mass (b) Momentum
(c) Force (d) Energy

Ans. (a)

● ● ● **End of Solution**

- Q.59** Weber number is the ratio of inertia force to
- (a) Surface tension
 - (b) Gravitational force
 - (c) Elasticity
 - (d) Viscous force

Ans. (a)

● ● ● End of Solution

- Q.60** Water contains
- (a) One hydrogen atom and one oxygen atom
 - (b) Two hydrogen atom and one oxygen atom
 - (c) One hydrogen atom and two oxygen atom
 - (d) Two hydrogen atom and three oxygen atom

Ans. (b)

● ● ● End of Solution

- Q.61** If 2% solution of a sewage sample is incubated for 5 days at 20 degrees and depletion of oxygen was found to be 5 ppm, BOD of the sewage is
- (a) 1000 ppm
 - (b) 300 ppm
 - (c) 250 ppm
 - (d) 10 ppm

Ans. (c)

● ● ● End of Solution

- Q.62** The consistency index of soil is defined as the ratio of
- (a) Liquid limit plus the natural water content to the plasticity index of the soil
 - (b) Liquid limit minus the natural water content to the plasticity index of the soil
 - (c) Natural water of a soil plus its plastic limit to the plasticity index of the soil
 - (d) Natural water content of a soil minus its plastic limit to the plasticity index of the soil

Ans. (b)

● ● ● End of Solution

- Q.63** The angle of internal friction is least for
- (a) Angular grained loose sand
 - (b) Round grained loose sand
 - (c) Silts
 - (d) Clays

Ans. (d)

● ● ● End of Solution

- Q.64** Failure of slopes occurs only when total shear force is
- (a) Equal to total shear strength
 - (b) Greater than total shear strength
 - (c) Less than total shear strength
 - (d) None of these

Ans. (b)

● ● ● End of Solution

Q.65 The compression resulting from a long term static load and consequent escape of pore water is known as

- (a) Consolidation (b) Compaction
(c) Swelling (d) None of these

Ans. (a)

• • • End of Solution

Q.66 A partially saturated soil is classified as

- (a) One phase soil (b) Two phase soil
(c) Three phase soil (d) Four phase soil

Ans. (c)

• • • End of Solution

Q.67 The Vicat's apparatus is used for testing cement for its

- (a) Consistency (b) Fineness
(c) Compressive strength (d) Soundness

Ans. (a)

• • • End of Solution

Q.68 If 1000 gms of sand is sieved through 4.75 mm, 2.36 mm, 1.18 mm, 600 micron, 300 micron and 150 micron standard sieves and the weights retained are 0 gms, 100 gms, 150 gms, 200 gms, 350 gms and 200 gms respectively, then the fineness modulus of the sand is

- (a) 2.00 (b) 2.60
(c) 2.75 (d) 2.90

Ans. (b)

• • • End of Solution

Q.69 Workability of a concrete mix with low water cement ratio is determined by

- (a) Tensile strength test (b) Water content test
(c) Cube compression test (d) Compaction factor test

Ans. (d)

• • • End of Solution

Q.70 In a singly reinforced beam, the effective depth is measured from its compression edge to

- (a) Tensile edge (b) Longitudinal central axis
(c) Neutral axis of the beam (d) Centre of tensile reinforcement

Ans. (d)

• • • End of Solution

- Q.71** The maximum shear stress in a rectangular beam is
- (a) 1.25 times the average
 - (b) 1.50 times the average
 - (c) 1.75 times the average
 - (d) 2.00 times the average

Ans. (b)

● ● ● **End of Solution**

- Q.72** A cantilever beam 'A' with rectangular cross section is subjected to a concentrated load at its free end. If the width and depth of another cantilever beam 'B' are twice those of beam 'A' and subjected to the same load, then the deflection at the free end of beam 'B' as compared to that of 'A' will be
- (a) 6.25%
 - (b) 14.0%
 - (c) 23.6%
 - (d) 28.0%

Ans. (a)

● ● ● **End of Solution**

- Q.73** The difference in level between the top of a bank and supply level in a canal, is called
- (a) Berm
 - (b) Supply capacity
 - (c) Height of bank
 - (d) Free board

Ans. (d)

● ● ● **End of Solution**

- Q.74** The river training work is generally required when the river is
- (a) Meandering type
 - (b) Aggrading type
 - (c) Degrading type
 - (d) Sub critical type

Ans. (a)

● ● ● **End of Solution**

- Q.75** In water bound macadam roads, the binding material is
- (a) Sand
 - (b) Crushed aggregate dust
 - (c) Cement
 - (d) Bitumen

Ans. (b)

● ● ● **End of Solution**

- Q.76** A gradient along which the vehicle does not require any tractive effort to maintain a specified speed is known as
- (a) Ruling gradient
 - (b) Pushing gradient
 - (c) Minimum gradient
 - (d) Floating gradient

Ans. (d)

● ● ● **End of Solution**

Q.77 The complete solution of the linear differential equation

$$\frac{d^2 z}{dt^2} + (p+q)\frac{dz}{dt} + pqz = 0$$

- (a) $c_1 e^{-pt} + c_2 e^{-qt}$ (b) $c_1 e^{pt} - c_2 e^{qt}$
(c) $c_1 e^{-pt} + c_2 e^{qt}$ (d) $c_1 e^{pt} + c_2 e^{qt}$

Ans. (a)

● ● ● End of Solution

Q.78 The sequence $\lim_{n \rightarrow \infty} [3 + (-1)^n]$ is

- (a) Convergent (b) Divergent
(c) Oscillatory (d) Harmonic

Ans. (c)

● ● ● End of Solution

Q.79 If $P = \begin{vmatrix} 6 & 1 & 0 \\ 0 & 1 & 0 \\ 0 & 0 & 2 \end{vmatrix}$ and $Q = \begin{vmatrix} 2 & 3 & 1 \\ 0 & 5 & 1 \\ 0 & 0 & 5 \end{vmatrix}$

Then the product of determinant P and Q (PQ) has the value

- (a) 50 (b) 80
(c) 500 (d) 600

Ans. (d)

● ● ● End of Solution

Q.80 The differential equation $y = x \frac{dy}{dx} + \frac{x}{(dy/dx)}$ is

- (a) First order and first degree (b) First order and second degree
(c) Second order and first degree (d) Second order and second degree

Ans. (b)

● ● ● End of Solution

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