Answer Key of

OPSC 2019

ODISHA PUBLIC SERVICE COMMISSION

Astt. Executive Engineer

Civil Engineering
Paper-II

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Odisha Public Service Commission Exam, 2019

Civil Engineering : Paper-II

(Assistant Executive Engineer)

SET A

Q.1 F.S.L. of a canal at its head with respect to parent channel is kept:
(A) At the same level
(B) 15 cm lower
(C) 15 cm higher
(D) None of these

Ans. (B)

Q.2 The measure to remove water logging of land, is
(A) To reduce percolation from canals and water courses
(B) To increase outflow from the ground water reservoir
(C) Both (A) and (B)
(D) Neither (A) nor (B)

Ans. (C)

Q.3 For smooth entry of water in a canal, the angle between head regulator and water is generally kept:
(A) 80° (B) 90°
(C) 110° (D) 120°

Ans. (C)

Q.4 If L is total length of a canal in kilometers, P is total perimeter of its lining in metres and C is the cost of lining per square metre, the additional expenditure involved on lining, is

(A) 1000 PLC (B) $\frac{PLC}{1000}$

(C) $\frac{PL}{1000C}$ (D) $\frac{PC}{100L}$

Ans. (A)

Q.5 When a canal is carried over a natural drainage, the structure provided, is known as
(A) Siphon
(B) Aqueduct
(C) Super passage
(D) Siphon-aqueduct

Ans. (B)

Q.6 Inundation of habitation is worse close to
(A) Reservoirs
(B) Diversion Weirs
(C) Deltaic plains
(D) None of these

Ans. (A)

Q.7 The measure to remove water logging of land, is
(A) To reduce percolation from canals and water courses
(B) To increase outflow from the ground water reservoir
(C) Both (A) and (B)
(D) Neither (A) nor (B)

Ans. (C)

Q.8 Groynes are generally built:
(A) Perpendicular to the bank
(B) Inclined up stream up to 30°
(C) Inclined down stream up to 30°
(D) All these

Ans. (B)

Q.9 The top of the capillary zone
(A) Lies below the water table at every point
(B) Lies above the water table at every point
(C) Coincides the water table at every point
(D) None of these

Ans. (B)

Q.10 For the design of major hydraulic structures on the canals, the method generally preferred to, is based on
(A) Bligh's theory
(B) Electrical analogy method

(C) The relaxation method
(D) Khosla's method of independent variables

Ans. (D)

Q.11 The depth of rice root zone is
(A) 50 cm (B) 70 cm
(C) 80 cm (D) 90 cm

Ans. (D)

Q.12 The saturation line is the line up to which banks get saturated after the canal runs for some time. The saturation gradient in ordinary loam soil is generally
(A) 2 : 1 (B) 3 : 1
(C) 4 : 1 (D) 5 : 1

Ans. (C)

Q.13 The depth of the crest of a scouring sluice below the crest of a head regulator, is generally kept
(A) 0.2 m (B) 1.2 m
(C) 2.2 m (D) 3.2 m

Ans. (B)

Q.14 If q is the discharge per unit width of a channel and D_1, D_2 are the depths of water before and after hydraulic jump, the following relationship is true

(A) $D_1D_2(D_2 - D_1) = \frac{2q^2}{g}$

(B) $\frac{D_2}{D_1}(D_2 - D_1) = \frac{2q^2}{g}$

(C) $D_1D_2(D_2 + D_1) = \frac{2q^2}{g}$

(D) $\frac{D_1}{D_2}(D_2 + D_1) = \frac{2q^2}{g}$

Ans. (C)

Q.15 If the intensity of rainfall is more than the infiltration capacity of soil, then the infiltration rate is
(A) Equal to rate of rainfall
(B) Equal to infiltration capacity
(C) More than rate of rainfall
(D) More than infiltration capacity

Ans. (B)

Q.16 For a given discharge in a channel, Blench curves given the relationship between the loss of head (H_L) and
(A) Specific energy up stream
(B) Specific energy down stream
(C) Critical depth of water downstream
(D) Depth of water downstream

Ans. (B)

Q.17 The velocity of drainage water in the barrels of a siphon-aqueduct, is normally limited to
(A) 1 to 2 m per second
(B) 2 to 3 m per second
(C) 3 to 4 m per second
(D) 4 to 5 m per second

Ans. (B)

Q.18 According to Khosla, the exit gradient of surface flow
(A) Depends upon the b/d ratio
(B) Is independent of the depths of d/s cut off walls
(C) Is independent of the b/d ratio
(D) None of these

Ans. (A)

Q.19 If the irrigation efficiency is 80%, conveyance losses are 20% and the actual depth of watering is 16 cm, the depth of water required at the canal outlet, is
(A) 10 cm (B) 15 cm
(C) 20 cm (D) 25 cm

Ans. (D)

Q.20 The scour depth D of a river during flood, may be calculated from the Lacey's equation

(A) $D = 0.47\left(\frac{Q}{f}\right)$ (B) $D = 0.47\left(\frac{Q}{f}\right)^{1/2}$

(C) $D = 0.47\left(\frac{Q}{f}\right)^{1/3}$ (D) $D = 0.47\left(\frac{Q}{f}\right)^{2/3}$

Ans. (C)

Q.21 If V_0 is the critical velocity of a channel, its silt transporting power, according to Kennedy, is proportional to:

(A) $V_0^{1/2}$ (B) $V_0^{3/2}$
(C) $V_0^{5/2}$ (D) $V_0^{7/2}$

Ans. (C)

Q.22 The main cause of silting up a channel
(A) Defective outlets
(B) Inadequate slope
(C) Defective head regulator
(D) All of these

Ans. (D)

Q.23 The most suitable location of a canal head work, is
(A) Boulders stage of the river
(B) Delta stage of the river
(C) Rock stage of the river
(D) Trough stage of the river

Ans. (D)

Q.24 Bligh's theory of seepage assumes
(A) Equal weightage to the horizontal and vertical creep
(B) More weightage to horizontal creep than vertical creep
(C) Less weightage to horizontal creep than vertical creep
(D) Loss of head follows the sine curve

Ans. (A)

Q.25 Regime conditions in a channel may occur if
(A) Discharge is constant
(B) Channel flows uniformly in incoherent alluvium as that transported in suspension
(C) Silt grade and silt charge are constant
(D) All of these

Ans. (D)

Q.26 An outlet which maintains a constant discharge irrespective of fluctuation in the water levels of the supplying channel or water course, is known as
(A) Non-modular outlet
(B) Semi-modular outlet
(C) Flexible modular outlet
(D) Right modular outlet

Ans. (D)

Q.27 Canals constructed for draining off water from water logged areas, are known as
(A) Drains
(B) Inundation canals
(C) Valley canals
(D) Contour canals

Ans. (A)

Q.28 A minimum of 90 cm free board is provided if the discharge in the canal is between
(A) 30 to 33 cumecs
(B) 35 to 60 cumecs
(C) Over 60 cumecs
(D) Over 100 cumecs

Ans. (C)

Q.29 If water table is comparatively high, the irrigation canal becomes useless, due to
(A) Large amount of seepage
(B) Water logging of the cultivated areas
(C) Spread of malaria
(D) All of these

Ans. (D)

Q.30 If D_C is the critical depth, D is the depth of water downstream and H_L is the total head loss at the cistern of a vertical fall, the depth x of the cistern below the bed level downstream suggested by Blench, is

(A) $D_C - D + \frac{1}{4}\left(H_L - \frac{3}{8}D_C\right)$

(B) $2D_C - D + \frac{1}{4}\left(H_L - \frac{3}{8}D_C\right)$

(C) $2D_C - D + \frac{3}{8}\left(H_L - \frac{1}{4}D_C\right)$

(D) $3D_C - D + \frac{3}{8}\left(H_L - \frac{1}{4}D_C\right)$

Ans. (B)

Q.31 The ratio of the rate of change of discharge of an outlet and parent channel, is known as
(A) Efficiency (B) Sensitivity
(C) Flexibility (D) Modular limit

Ans. (C)

Q.32 If average particle size of the silt in millimetres in m, the Lacey's silt factor f is proportional to
(A) m (B) m^3
(C) $m^{1/2}$ (D) $m^{1/3}$

Ans. (C)

Q.33 If A is the area of the surface, x is the depth of its C. G from the surface of the water and ω is the density of water, then
(A) Total pressure on the surface is equal to ωx.
(B) Depth of the point at which total pressure acts is equal to its moment of inertia divided by Ax.
(C) Depth of the centre of pressure is 2/3 H vertically below the surface.
(D) All of these

Ans. (D)

Q.34 The diversion of flood water of rivers, the type of canal constructed, is
(A) Ridge canal
(B) Perennial canal
(C) Inundation canal
(D) Canal

Ans. (C)

Q.35 V and R are the regime mean velocity and hydraulic mean depth respectively in metres. Lacey's silt factor f is

(A) $\frac{2V^2}{\sqrt{3R}}$ (B) $\frac{3V^2}{4R}$

(C) $\frac{5V^2}{2R}$ (D) $\frac{2V^2}{5R}$

Ans. (C)

Q.36 Which is not an estimate for consumptive use?
(A) Blaney-Criddle equation
(B) Manning's equation
(C) Hargreaves class A pan evaporation method
(D) Penman's equation

Ans. (B)

Q.37 Which strata does not hold water?
(A) Confined aquifer
(B) Unconfined aquifer
(C) Perched aquifer
(D) Aquiclude

Ans. (*)
No option is correct. Answer should be Aquifuge.

Q.38 The water level in unconfined aquifer is
(A) At the water table level
(B) Below water table level
(C) Above water table level
(D) Flowing well

Ans. (A)

Q.39 Volume of water released from the aquifer of unit cross-sectional area and of the full height of aquifer is called
(A) Specific Yield
(B) Specific Retention
(C) Transmissibility
(D) Storage coefficient

Ans. (D)

Q.40 Potential evapotranspiration is
(A) Evaporation where there is sufficient moisture available to a fully vegetated area
(B) The evapotranspiration of a forest area
(C) Actual evapotranspiration of a crop before application of irrigation water
(D) Amount of water needed to bring the moisture content of a soil to its field capacity

Ans. (A)

Q.41 A line on a map connecting points having the same amount of rainfall in a given period
(A) Isobars (B) Isovels
(C) Isohyets (D) Isochrone

Ans. (C)

Q.42 The consumptive use of water for a crop
(A) Is measured as the volume of water per unit area
(B) Is measured as depth of water on irrigated area
(C) May be supplied partly by precipitation and partly by irrigation
(D) All of these

Ans. (D)

Q.43 The Lacey's regime velocity is proportional to
(A) $R^{1/2}S^{3/4}$ (B) $Q^{3/4}S^{1/3}$
(C) $R^{3/4}S^{1/3}$ (D) $R^{2/4}S^{1/2}$

Ans. (*)
No option is correct. Answer should be $R^{2/3}S^{1/2}$.

Q.44 If the average particle size is 1.44 mm, the silt factor is
(A) 1.425 (B) 1.76
(C) 1.584 (D) 1.00

Ans. (*)
No option is correct. Answer should be 2.112.

Q.45 What is the cross-sectional area of regime channel for 50 cumecs discharge and silt factor 1.1?
(A) 58.4 m^2 (B) 58.4 m^2
(C) 694.2 m^2 (D) 763.63 m^2

Ans. (B)

Q.46 Garrett's diagrams are used for graphical solution of design equations of a canal by
(A) Lacey's theory
(B) Kennedy's theory
(C) Gibbs theory
(D) Lindlay's theory

Ans. (B)

Q.47 For a discharge of 64 cumecs and silt factor of 0.6, the normal regime scour depth is
(A) 2.24 m (B) 2.00 m
(C) 2.36 m (D) 2.90 m

Ans. (A)

Q.48 A measure of safety in driving on the service road of canal is called
(A) Spoil banks (B) Counter beams
(C) Dowlas (D) Berms

Ans. (D)

Q.49 Value of free board in canal for discharge between 30 to 150 cumecs
(A) 0.5 m (B) 0.6 m
(C) 0.75 m (D) 0.90 m

Ans. (D)

Q.50 If the total accumulated precipitation of the storm is plotted against time, the curve is knows as
(A) Rain hydrograph
(B) Mass curve
(C) Depth area duration curve
(D) Intensity duration frequency curves

Ans. (B)

Q.51 What is the per head water requirement for Domestic purposes in litres per day?
(A) 45 (B) 50
(C) 75 (D) 135

Ans. (D)

Q.52 What is the fire demand in litres per head for a city of 25 lakh population for moderate fire to last for 3 hours requiring three fire streams with discharge of 1100 lpm and the provision for four fires at a time?
(A) 0.95 (B) 0.24
(C) 0.32 (D) None of these

Ans. (A)

Q.53 Aeration of water is done to remove
(A) Odour (B) Colour
(C) Bacteria (D) Turbidity

Ans. (A)

Q.54 In sewar treatment plants, the oil and grease is removed by
(A) Oxidation (B) Filteration
(C) Skimming (D) Screening

Ans. (C)

Q.55 Type of joint used in metallic sewer is
(A) Collar joint
(B) Flexible joint
(C) Mechanical joint
(D) Simplex joint

Ans. (C)

Q.56 Which is the surface source of water supply scheme?
(A) Infiltration well (B) Springs
(C) Wells (D) Streams

Ans. (D)

Q.57 For wells placed closey, the minimum distance between them is
(A) Twice the diameter of the wells
(B) Twice the radius of circle of influence
(C) Twice the depth of well
(D) Twice the depth of water in the well

Ans. (B)

Q.58 Manholes on sewer lines are provided for
(A) Periodic cleaning
(B) Provide additional water for easy disposal
(C) Providing air for oxidation
(D) Removal of part of sewage

Ans. (A)

Q.59 For public water supply, the threshold number for taste and odour should not be more than
(A) 1 (B) 2
(C) 3 (D) 4

Ans. (C)

Q.60 The measurement of colour of water is carried out by means of
(A) Osmoscope
(B) Tintometre
(C) Nephelometric turbidimetre
(D) Thermometer

Ans. (B)

Q.61 The hardness is expressed in degrees as per
(A) Clark's scale
(B) Carbonate hardness
(C) Total hardness
(D) Non-carbonate hardness

Ans. (A)

Q.62 The alkalinity is caused by which positively charges ions of
(A) Ca^{++} (B) Na^{+}
(C) Mg^{++} (D) Sr^{++}

Ans. (B)

Q.63 The permissible dissolved solid for drinking water as per BIS is
(A) 200 mg// (B) 330 mg//
(C) 410 mg// (D) 500 mg//

Ans. (D)

Q.64 Activated carbon removes from water
(A) Iron (B) Organic matter
(C) Manganese (D) All of these

Ans. (D)

Q.65 In Kanpur the major source of pollution is
(A) Aircraft factory
(B) Cotton mills
(C) Tanneries
(D) All of these

Ans. (C)

Q.66 Coagulation is to be adopted when the Turbidity of water exceeds
(A) 20 ppm (B) 30 ppm
(C) 40 ppm (D) 50 ppm

Ans. (C)

Q.67 Which coagulant is also called Alum?
(A) Sodium Aluminate
(B) Aluminium Sulphate
(C) Magnesium Carbonate
(D) Chlorinated Copperas

Ans. (B)

Q.68 Jar test is carried out to decide the dosage of
(A) Coagulant (B) Ozone
(C) Chloride (D) Lime in hard water

Ans. (A)

Q.69 What is the method of removal of permanent hardness in water?
(A) Zeolite process
(B) Lime-soda process
(C) Reverse osmosis
(D) All of these

Ans. (D)

Q.70 The equivalent of seven grams per litre in parts per million would be
(A) 7 (B) 70
(C) 700 (D) 7000

Ans. (D)

Q.71 The most frequent method of bacterial reproduction is by

(A) Cell division (B) Sexual process
(C) Binding (D) Colony formation

Ans. (A)

Q.72 What is called for the process of burning municipal solid waste in a properly designed furnace under suitable temperature and operating conditions?
(A) Landfill
(B) Recycling
(C) Vermicomposting
(D) Incineration

Ans. (D)

Q.73 The simplest and most common method used in the cities is to collect and dump the waste in a
(A) Landfill (B) River
(C) Road side (D) Any of these

Ans. (A)

Q.74 What is the order of waste management hierarchy from most to least favoured?
(A) Prevention-Recycle-Reuse-Disposal
(B) Prevention-Reuse-Disposal-Recycle
(C) Prevention-Disposal-Reuse-Recycle
(D) Prevention-Reuse-Recycle-Disposal

Ans. (D)

Q.75 Organic matter, which can be decomposed by bacteria is known as
(A) Biodegradable organic matter
(B) Degradation
(C) Eutrophication
(D) Decomposers

Ans. (A)

Q.76 With passage of time, filled up solid wastes will get stabilized by
(A) Eutrophication
(B) Decomposition
(C) Hydrolysis
(D) Urbanization

Ans. (B)

Q.77 Allowed noise level in residential areas during day time in India
(A) 25 dB (B) 55 dB
(C) 75 dB (D) 100 dB

Ans. (B)

Q.78 The major contributor of Carbon monoxide in atmosphere is
(A) Motor vehicle
(B) Industrial processes
(C) Stationary fuel combustion
(D) None of these

Ans. (A)

Q.79 What is the permissible limit of 24 hourly particulate matter (size less than 10 μm) or PM 10 concentration in residential area as per Indian Standard?
(A) 60 $\mu g/m^3$ (B) 180 $\mu g/m^3$
(C) 100 $\mu g/m^3$ (D) None of these

Ans. (A)

Q.80 The pH value of potable water is
(A) 4.5 (B) 5.6
(C) 6.0 (D) 6.8

Ans. (D)

Q.81 Aeolian is the soil deposited by
(A) Wind transported soil
(B) Water transported soils
(C) Glacier deposited soils
(D) Gravity deposited soil

Ans. (A)

Q.82 Loess is silt-deposited by wind and deposits have
(A) High density and low compressibility
(B) Low density and high compressibility
(C) High density and low permeability
(D) High bearing capacity and low compressibility

Ans. (B)

Q.83 Soil transported by Gravity is called
(A) Talus (B) Loess
(C) Drift (D) Aeolian

Ans. (A)

Q.84 Which of the statement are correct for Black Cotton Soils?
(A) High swelling and low shrinkage
(B) Low bearing capacity and high shearing strength
(C) Highly compressible and low swelling characteristics
(D) High plasticity and low shearing strength

Ans. (D)

Q.85 Degree of saturation is
(A) Ratio of volume of voids to the volume of solids
(B) Ratio of volume of water to the volume of solids
(C) Ratio of volume of water to the volume of voids
(D) Ratio of volume of water to the total volume

Ans. (C)

Q.86 Water content is defined as
(A) Ratio of volume of water to the volume of solids.
(B) Ratio of mass of water to the mass of solids.
(C) Ratio of weight of water to the weight of solids.
(D) Ratio of weight of water to the volume of solids.

Ans. (C)

Q.87 Unit weight of solid is
(A) Ratio of weight of solids to the volume of solids
(B) Ratio of mass of solids to the volume of solids
(C) Ratio of mass of solids to the mass of solids
(D) Ratio of weight of solids to the weight of solids

Ans. (A)

Q.88 Specific gravity is defined as
(A) Ratio of mass of solid to the mass of equal volume of water at –4°C.
(B) Ratio of weight of solid to the weight of equal volume of water at 0°C.
(C) Ratio of mass of solid to the mass of equal volume of water at 0°C.
(D) Ratio of mass of solid to the mass of equal volume of water at 4°C.

Ans. (B)

Q.89 Porosity is defined as
(A) Ratio of volume of void to the total volume
(B) Ratio of volume of void to the volume of solids
(C) Ratio of volume of air to the volume of solids
(D) Ratio of volume of water to the volume of solids

Ans. (A)

Q.90 Soil water content and specific gravity can be determined by
(A) Oven drying method
(B) Density bottle method
(C) Pycnometer method
(D) Alcohol method

Ans. (C)

Q.91 Sand replacement method is used to determine
(A) Specific gravity of soil
(B) Mass density of soil
(C) Moisture content of soil
(D) Ratio of mass density and moisture content

Ans. (B)

Q.92 A soil mass is 20 kg and volume 0.011 m^3. After oven drying the mass reduces to 16.5 kg. $G = 2.7$. The void ratio is
(A) 0.2121 (B) 0.444
(C) 0.8 (D) 0.7158

Ans. (C)

Q.93 A moist soil mass weights 3.52 N and after oven drying the weight is 2.9 N. Specific gravity of solids and mass specific gravity are 2.65 and 1.85 respectively. The degree of saturation is
(A) 0.4253 (B) 0.2138
(C) 0.74 (D) 0.7656

Ans. (D)

Q.94 The sedimentation analysis for soil particles finer than 75 μ is based on
(A) Boyle's law (B) Stoke's law
(C) Charle's law (D) Darcy's law

Ans. (B)

Q.95 Hydrometre is used for determination of
(A) Specific gravity of liquids
(B) Density of liquid

(C) Particle size distribution of soil
(D) Turbidity of water

Ans. (C)

Q.96 Coefficient of uniformity is defined as

(A) $\frac{D_{60}}{D_{10}}$ (B) $\frac{D_{60}}{D_{30}}$

(C) $\frac{D_{10}}{D_{60}}$ (D) $\frac{D_{10}}{D_{30}}$

Ans. (A)

Q.97 According to Terzaghi, the net ultimate bearing capacity of clay is given by
(A) CN_Q (B) CN_I
(C) CN_C (D) $1.3\,CN_C$

Ans. (D)

Q.98 Uniformity coefficient of soil is
(A) Always less than 1
(B) Always equal to 1
(C) Equal to less than 1
(D) Equal to greater than 1

Ans. (D)

Q.99 Plasticity index is the numerical difference between
(A) Plastic limit and shrinkage limit
(B) Plastic limit and liquid limit
(C) Liquid limit and plastic limit
(D) Liquid limit and shrinkage limit

Ans. (C)

Q.100 What is Toughness Index?
(A) Ratio of plasticity index to the consistency index.
(B) Ratio of plasticity index to the liquidity index.
(C) Ratio of plasticity index to the flow index.
(D) Ratio of consistency index to the flow index.

Ans. (C)

Q.101 In unified soil classification system, the group system SM stands for
(A) Silty sand
(B) Clayer sand
(C) Well graded sand
(D) Silty gravels

Ans. (A)

Q.102 Liquid limit test is performed on soil samples passing through IS sieve of size
(A) 125 μ (B) 2 mm
(C) 425 μ (D) 250 μ

Ans. (C)

Q.103 The active earth pressure of a soil is proportional to (where ϕ is the angle of friction of the soil).

(A) $\tan(45° - \phi)$ (B) $\tan^2\left(45° + \frac{\phi}{2}\right)$

(C) $\tan^2\left(45° - \frac{\phi}{2}\right)$ (D) $\tan(45° + \phi)$

Ans. (C)

Q.104 The minimum water content at which the soil just begins to crumble when rolled into threads 3 mm in diameter, is known as
(A) Liquid limit
(B) Plastic limit
(C) Shrinkage limit
(D) Permeability limit

Ans. (B)

Q.105 The water held by electro-chemical forces existing on the soil surface is called
(A) Absorbed water
(B) Bonded water
(C) Molecular water
(D) Adsorbed water

Ans. (D)

Q.106 The quantity of seepage of water through soils is proportional to
(A) Coefficient of permeability of soil
(B) Total head loss through the soil
(C) Neither (A) nor (B)
(D) Both (A) and (B)

Ans. (D)

Q.107 When drainage is permitted under initially applied normal stress only and full primarily

consolidation is allowed to take place, the test is known as
(A) Drainged test
(B) Consolidated undrained test
(C) unconsolidated undrained test
(D) Quick test

Ans. (B)

Q.108 The minimum water content at which the soil retains its liquid state and also possesses a small shearing strength against flowing, is known as
(A) Liquid limit
(B) Plastic limit
(C) Shrinkage limit
(D) Permeability limit

Ans. (A)

Q.109 Minimum size of the particle of silt soil in International Classification Systems is
(A) 0.02 mm (B) 0.0425 mm
(C) 0.002 mm (D) 0.04 mm

Ans. (C)

Q.110 The coefficient compressibility of soil, is the ratio of
(A) Stress to strain
(B) Decrease in void ratio to increase in stress
(C) Strain to stress
(D) Stress to settlement

Ans. (B)

Q.111 If the failure of a finite slope occurs in which the failure surface passes below the toe is known as
(A) Slope failure (B) Face failure
(C) Base failure (D) Toe failure

Ans. (C)

Q.112 Rankine's theory of active earth pressure assumes
(A) Soil mass is homogeneous, dry and cohesionless.
(B) Ground surface is a plane which may be horizontal or inclined.
(C) Back of the wall is vertical and smooth.
(D) All of these

Ans. (D)

Q.113 If the plasticity index of a soil mass is zero, the soil is
(A) Sand (B) Silt
(C) Clay (D) Clayey silt

Ans. (A)

Q.114 If S, L and R are the arc length, long chord and radius of the sliding circle then the perpendicular distance of the line of the resultant cohesive force, is given by
(A) $a = \frac{S.R}{L}$ (B) $a = \frac{S.L}{R}$
(C) $a = \frac{L.R}{S}$ (D) $a = \frac{S}{R.L}$

Ans. (A)

Q.115 Settlement occurs in short time for the foundation resting on
(A) Coarse grained soil
(B) Fine grained soil
(C) Mixed soil
(D) Not related to type of soil

Ans. (A)

Q.116 The factors leading to the failure of slopes are classified as
(A) Increase in the shear stress
(B) Decrease in the shear strength of the soil
(C) No shear stress in the failure plain
(D) Both (A) and (B)

Ans. (D)

Q.117 For determining the moisture content of a soil sample, the available data are: Weight of container = 260 g, Weight of soil sample = 320 g with container and weight of soil sample (dried) = 310 g with container. The moisture content of the soil sample is
(A) 15% (B) 18%
(C) 20% (D) 25%

Ans. (C)

Q.118 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)

Q.119 The Westergaard Analysis is used for
(A) Sandy soils
(B) Cohesive soils
(C) Stratified soils
(D) Clayey soils

Ans. (C)

Q.120 If L and B are the length and breadth of a footing, e the eccentricity along the length and P and Q are the axial force and bearing capacity of the soil, then, to avoid tension

(A) $BL = \frac{P}{Q}\left(1+\frac{6e}{L}\right)$

(B) $BL = \frac{Q}{P}\left(1+\frac{6e}{L}\right)$

(C) $BL = \frac{P}{Q}\left(1-\frac{6e}{L}\right)$

(D) $BL = \frac{P}{Q}\left(1-\frac{3e}{L}\right)$

Ans. (C)

Q.121 The direct shear test suffers from the following disadvantage:
(A) Drain condition cannot be controlled
(B) Pore water pressure cannot be measured
(C) Shear stress on the failure plane is not uniform
(D) The area under the shear and vertical loads does not remain constant throughout the test

Ans. (C)

Q.122 The equation $\tau = C + \sigma \tan \phi$ is given by
(A) Rankine (B) Terzaghi
(C) Mohr (D) Coulomb

Ans. (D)

Q.123 A phreatic line is defined as the line within a dam section below which there are
(A) Positive equipotential lines
(B) Atmospheric pressure
(C) Positive hydrostatic pressure
(D) Negative hydrostatic pressure

Ans. (C)

Q.124 What is the maximum settlement allowed for isolated foundations for RCC structures on sand?
(A) 40 mm (B) 50 mm
(C) 75 mm (D) 100 mm

Ans. (B)

Q.125 The maximum gross pressure the soil can carry safely without shear failure is called
(A) Net safe bearing capacity
(B) Safe bearing capacity
(C) Gross safe bearing capacity
(D) Net ultimate bearing capacity

Ans. (B)

Q.126 For determining the ultimate bearing capacity of soil, the recommended size of a square bearing plate to be used in load plate test should be 30 to 75 cm square with a minimum thickness of
(A) 10 mm (B) 16 mm
(C) 25 mm (D) 32 mm

Ans. (C)

Q.127 A cohesionless soil attains quick condition due to
(A) Head causing upward flow is equal to the stress from the top
(B) When the vertical load increases
(C) When water volume is reduced
(D) None of these

Ans. (A)

Q.128 The length/diameter ratio of cylindrical specimens used in triaxial test, is generally
(A) 1.0 (B) 1.5
(C) 2.0 (D) 2.5

Ans. (C)

Q.129 In the Standard Penetration Test what is the driving depth of the sample for which the number of hammer blows are counted?
(A) 100 mm (B) 150 mm
(C) 200 mm (D) 300 mm

Ans. (B)

Q.130 What is the mass of the hammer in modified proctor test?
(A) 2.5 kg (B) 3.93 kg
(C) 4.89 kg (D) 6.1 kg

Ans. (C)

Q.131 What is the Ruling Design speed in plain terrain for State Highways?
(A) 120 KMPH (B) 100 KMPH
(C) 80 KMPH (D) 65 KMPH

Ans. (B)

Q.132 The basic equation relating to speed of vehicle (V), the radius of curve (R), the super-elevation (e) and the coefficient friction (μ) is

(A) $e+\mu=\frac{V^2}{127R}$ (B) $e+\mu=\frac{R^2}{127R}$

(C) $e-\mu=\frac{V^2}{127R}$ (D) $e-\mu=\frac{R.V^2}{127}$

Ans. (A)

Q.133 What is the ruling minimum radius for National Highway in plain terrain?
(A) 155 m (B) 230 m
(C) 360 m (D) 400 m

Ans. (C)

Q.134 What is the radius of the curve at 80 KMPH beyond which no super-elevation is needed for the value of 2.5% camber?
(A) 950 m (B) 1100 m
(C) 1400 m (D) 1800 m

Ans. (B)

Q.135 What is the type of curve adopted for the transition curve in India?
(A) Clothoid (B) Cubic parabola
(C) Cubic spiral (D) Lemniscate

Ans. (B)

Q.136 The wall constructed for the stability of an excavated portion of a road on the hill side, is known as
(A) Retaining wall (B) Breast wall
(C) Parapet wall (D) All of these

Ans. (B)

Q.137 What is the extra width of pavement in hairpin bend for two lane carriageways?
(A) 2.0 m (B) 1.5 m
(C) 1.2 m (D) 0.9 m

Ans. (*)

Q.138 What is the reason for providing adequately long transitional curve between two reverse curves?
(A) Intervisibility of the curve
(B) Accommodating sight distance between two curves
(C) For effective drainage
(D) For accommodating super-elevation run off

Ans. (D)

Q.139 What is the exceptional gradient in plain terrain?
(A) 1 in 20 (B) 1 in 15
(C) 1 in 12 (D) 1 in 16.7

Ans. (B)

Q.140 For the designing of valley curves, the height of headlight above the road surface is assumed at
(A) 0.15 m above the road surface
(B) 1.2 m above the road surface
(C) 0.75 m above the road surface
(D) 1.5 m above the road surface

Ans. (C)

Q.141 What is the perception and break reaction time taken together in India?
(A) 1.5 seconds (B) 2.0 seconds
(C) 2.5 seconds (D) 3.5 seconds

Ans. (C)

Q.142 What is the level of driver's eye and the object height between two points for the Safe Stopping Distance?

(A) 1.2 m and 0.15 m
(B) 0.9 m and 0.15 m
(C) 0.75 m and 0.3 m
(D) 0.90 m and 0.6 m

Ans. (A)

Q.143 What are the intersections known as where traffic is controlled on the minor road by STOP of GIVEWAY signs and markings?
(A) Rotary intersection
(B) T junction
(C) Priority intersections
(D) Staggered junction

Ans. (C)

Q.144 What is the type of interchange when two high volume and high speed roads intersect each other where through traffic on both roads are unimpeded?
(A) Diamond interchange
(B) Clover leaf interchange
(C) Rotary interchange
(D) Directional interchange

Ans. (B)

Q.145 What is the Vehicle Damaged Factor for vehicle having single axle with dual wheel type weighs 118 kN when the weight of the standard axle of same configuration of wheels is 80 kN?
(A) 3.535 (B) 3.20
(C) 4.733 (D) 6.515

Ans. (C)

Q.146 Calculate cumulative traffic in million standard axle for per day commercial vehicles is 1000 in the year of completion for a two lane two way road, VDF of 3.9, growth rate of 5% and design period of 15 years.
(A) 15.36 msa (B) 23.53 msa
(C) 23.03 msa (D) 30.73 msa

Ans. (D)

Q.147 Which layer in flexible pavement crust functions as a drainage cum strength layer?
(A) Wet Mix Macadam
(B) Water Bound Macadam
(C) Sub-grade
(D) Granular Sub-base

Ans. (D)

Q.148 What test in undertaken to evaluate the toughness of stones used in road projects?
(A) Los Angeles Abrasion Test
(B) Aggregate Impact Test
(C) Aggregate Crushing Test
(D) Soundness Test

Ans. (B)

Q.149 At a road junction, 16 cross conflict points are severe, if
(A) Both are one-way roads
(B) One is two-way road and other is one-way road
(C) Both are two-way roads
(D) Both are four lane roads

Ans. (C)

Q.150 Tie bars in cement concrete pavements are at
(A) Expansion joints
(B) Contraction joints
(C) Warping joints
(D) Longitudinal joints

Ans. (D)

Q.151 Dowel bars in the plain jointed rigid pavement are provided
(A) Providing continuity to slab
(B) Preventing differential settlement
(C) For transferring of load from one panel to the next
(D) Increasing flexural strength of concrete

Ans. (C)

Q.152 What is the shape of the cautionary signs?
(A) Octagonal (B) Circular
(C) Rectangular (D) Triangle

Ans. (D)

Q.153 Which of the following represents hardest grade of bitumen?

(A) $\frac{30}{40}$ (B) $\frac{40}{60}$

(C) $\frac{60}{70}$ (D) $\frac{80}{100}$

Ans. (A)

Q.154 In highway construction on super-elevated curves, the rolling shall proceed from
(A) Sides towards the centre
(B) Centre towards the sides
(C) Lower edge towards the upper edge
(D) Upper edge towards the lower edge

Ans. (C)

Q.155 What is the value of rigidity factor for an average type pressure greater than 7 kg/cm^2?
(A) 1.0 (B) > 1
(C) < 1 (D) 0

Ans. (C)

Q.156 When the path travelled along the road surface is more than the circumferential movement of the wheels due to their rotation is called
(A) Slip (B) Skid
(C) Rolling (D) Traction

Ans. (B)

Q.157 Softening point of bitumen to be used for read construction at a place where maximum temperature is 40°C should be
(A) Less than 40°C
(B) Greater than 40°C
(C) Equal to 40°C
(D) None of these

Ans. (B)

Q.158 In CBR test the value of CBR is calculated at
(A) 2.5 mm penetration only
(B) 5.0 mm penetration only
(C) 7.5 mm penetration only
(D) Both 2.5 mm and 5.0 mm penetrations

Ans. (D)

Q.159 If the radii of a compound curve and a reverse curve are respectively the same, the length of common tangent?
(A) Of compound curve will be more
(B) Of reverse curve will be more
(C) Of both curves will be equal
(D) None of these

Ans. (C)

Q.160 To compensate the loss of tractive force of vehicles along curves of radius R, the percentage reduction of gradient, is

(A) $\frac{50}{R}$ (B) $\frac{75}{R}$

(C) $\frac{100}{R}$ (D) $\frac{125}{R}$

Ans. (B)

Q.161 Fundamental principle of surveying:
1. Working from part to whole.
2. Working from whole to part.
3. Establishing any point by at least two independent measurements.

(A) Only 1 (B) Both 1 and 3
(C) Only 3 (D) Both 2 and 3

Ans. (D)

Q.162 What is the use of two vertical cross hairs?
(A) To check plumbness of vertical staffs
(B) Required for Tachometry
(C) Required for levelling operations
(D) None of these

Ans. (C)

Q.163 Type of lens used for aberration free images
(A) Convex
(B) Plano convex
(C) Plano concave
(D) Compound lens

Ans. (C)

Q.164 The maximum tolerance in a 20 m chain is
(A) ±1 mm (B) ±2 mm
(C) ±3 mm (D) ±5 mm

Ans. (D)

Q.165 Dimensions of the embankment was measured with 20 m chain and the volume was calculated as 400 cum. It was then found that the chain

was 8 cm too long. The true volume of the embankment is
(A) 395.24 (B) 403.2
(C) 404.82 (D) 401.6

Ans. (C)

Q.166 The correction of sag is always
(A) Additive
(B) Substractive
(C) Zero
(D) Depends on the atmospheric temperature

Ans. (B)

Q.167 The permissible error in changing for measurement with chain on rough or Hilly ground is
(A) 1 in 100 (B) 1 in 250
(C) 1 in 500 (D) 1 in 1000

Ans. (B)

Q.168 The angle of intersection of plane mirrors of an optical square is
(A) 30° (B) 45°
(C) 60° (D) 90°

Ans. (B)

Q.169 The process of rotating the telescope about the vertical axis in horizontal plane is known as
(A) Transiting (B) Reversing
(C) Swinging (D) Centring

Ans. (C)

Q.170 The instrument used for accurate centring of plane table surveying is
(A) Spirit level
(B) Alidade
(C) Plumbing fork
(D) Trough compass

Ans. (C)

Q.171 What is the simplest way of using plane table?
(A) Radiation (B) Intersection
(C) Traversing (D) Resection

Ans. (A)

Q.172 Which line is tangential to the level line at a point?
(A) Datum line (B) Vertical line
(C) Horizontal line (D) Plumb line

Ans. (C)

Q.173 Which term is used for the surface to which elevations are referred?
(A) Level surface
(B) Level line
(C) Horizontal plane
(D) Datum

Ans. (D)

Q.174 If the RL of the BM is 100.00 m, the back sight is 1.435 m and the fore sight is 1.620 m, the RL of the forward station is
(A) 98.380 (B) 99.815
(C) 98.565 (D) 100.185

Ans. (B)

Q.175 For a close travers, sum of latitudes is –0.46 m and sum of departures is –0.22 m. What is the closing error?
(A) 0.475 (B) 0.226
(C) –0.680 (D) –0.240

Ans. (*)

Q.176 A surface whose elevation is known or assumed is known as
(A) Level surface
(B) Reduced level
(C) Datum surface
(D) Horizontal plane

Ans. (C)

Q.177 The degree of precision required for establishment of bench marks (K is the distance in kilometres):
(A) $\pm 100\sqrt{K}$ (B) $\pm 24\sqrt{K}$
(C) $\pm 12\sqrt{K}$ (D) $\pm 4\sqrt{K}$

Ans. (A)

Q.178 In the method of repetition for measuring horizontal angles, to rotate the instrument without changing the reading:

(A) Lower clamp screw is tightened and upper clamp is loosened.
(B) Lower clamp screw is loosened and upper clamp is tightened.
(C) Any one of the clamp screw is loosened.
(D) Both the clamp screw are loosened.

Ans. (B)

Q.179 The adjustment of horizontal cross hair is required particularly when the instrument is used for
(A) Levelling
(B) Prolonging a straight line
(C) Measurement of horizontal angle
(D) All of these

Ans. (A)

Q.180 In electronic theodolite, the horizontal and vertical circles made of
(A) Glass having specially coded graduations read by photo diodes
(B) Special metal read electronically
(C) Steel plates with specially coded graduations
(D) Plastic with coded graduations

Ans. (B)

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