HPSC
AE (Civil)

Previous Year Paper
(Irrigation & WRD)
08 Sept, 2024

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Number of Pages in Booklet: **36**

Number of Questions in Booklet : **100**

Time : 2.00 Hours

Maximum Marks: **100**

Master
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INSTRUCTIONS

1. Immediately After The Commencement of The Examination, You Should Check That This Test Booklet Does Not Have Any Unprinted or Torn or Missing Pages or Items, Etc. If So, Get It Replaced By A Complete Test Booklet.
2. Please note that it is the candidate's responsibility to encode and fill in the Roll Number, Test Booklet Series Code (A), (B), (C) or (D) and Question Booklet Number carefully and without any omission or discrepancy at the appropriate places in the OMR Answer Sheet. Any omission/discrepancy will render the OMR Answer sheet liable for rejection.
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4. This Question Booklet contains 100 items (questions). Each item is printed in English and shall have five options ((A), (B), (C), (D) and (E)). If a candidate is attempting a question, he has to darken most appropriate circle from (A), (B), (C) OR (D). However if you are not attempting a question then you have to darken the circle (E)'. If none of the five circle is darkened, one-fourth (0.25) marks shall be deducted.
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9. Any candidate not darkening any of the five circles in more than 10% question shall be disqualified.
10. Sheets for rough work are appended in the Test Booklet at the end.

Q 1. What will be Poisson's ratio, if bulk modulus and modulus of rigidity are 'K' and 'G' respectively?

(A) (3K+4G) / (6K-4G)

(B) (3K-4G) / (6K+4G)

(C) (3K+2G) / (6K-2G)

(D) (3K-2G) / (6K+2G)

(E) Question not attempted

Q 2. A short column of external diameter 'D' and internal diameter 'd' carries an eccentric load 'W'. The greatest eccentricity which the load can have without producing tension on the cross-section of the column would be

(A) (D + d) / 8

(B) $(D^2 + d^2) / (8d)$

(C) $(D^2 + d^2) / (8D)$

(D) $(D^2 - d^2) / (8D)$

(E) Question not attempted

Q 3. In the Euler's formula for buckling load, $P_E = n$, the value of factor 'n' is least in case of a column with

(A) Both ends fixed

(B) One end fixed and other free

(C) One end fixed and other hinged

(D) Both ends hinged

(E) Question not attempted

Q 4. An elastic body, having poisson's ratio 'μ', is subjected to a direct compressive stress σ_x in the longitudinal direction. If the lateral strains in the other two directions are prevented by applying σ_y and σ_z in those directions, then $\sigma_y = \sigma_z$ is equal to

(A) $\sigma_x / (\mu - 1)$

(B) $\mu \sigma_x$

(C) $\sigma_x / (\mu^2 + 1)$

(D) $\mu \sigma_x / (1 - \mu)$

(E) Question not attempted

Q 5. A beam has a solid circular cross-section having diameter 'd'. If a section of the beam is subjected to a shear force 'F', the maximum shear stress in the cross-section is given by

(A) $(16 F) / (3 \pi d^2)$

(B) $(3 F) / (16 \pi d^2)$

(C) $(8 F) / (3 \pi d^2)$

(D) $(4 F) / (3 \pi d^2)$

(E) Question not attempted

Q 6. For three hinged Parabolic arch of uniform cross-section with span 'L' central rise 'h' subjected to uniformly distributed load 'w' per meter on left half span, the horizontal reaction at support is given by

(A) $(w L^2) / (12 h)$

(B) $(w L^2) / (6 h)$

(C) $(w L^2) / (8 h)$

(D) $(w L^2) / (2 h)$

(E) Question not attempted

Q 7. When there is a reduction in amplitude over every cycle of vibration then the body is said to have

(A) free vibration

(B) forced vibration

(C) damped vibration

(D) under damped vibration

(E) Question not attempted

Q 8. As per IS:456-2000, the approximate value of shrinkage strain in concrete is

(A) 0.00003

(B) 0.0003

(C) 0.003

(D) 0.03

(E) Question not attempted

Q 9. In doubly reinforced section, stress in steel in compression is normally –

(A) < 0.87 fy

(B) > 0.87 fy

(C) = 0.87 fy

(D) = fy

(E) Question not attempted

Q 10. In a simply supported slab, alternate bars are curtailed at approximately –

(A) 1/7th of the span

(B) 1/6th of the span

(C) 1/5th of the span

(D) 1/4th of the span

(E) Question not attempted

Q 11. As per IS:13920-2016, lap splices in columns shall not be used for bars of diameter larger than

(A) 20 mm

(B) 25 mm

(C) 32 mm

(D) 16 mm

(E) Question not attempted

Q 12. The expression $E_I(dy^3/dx^3)$ at any section for the beam is equal to

(A) bending moment at the section

(B) shear force at the section

(C) load intensity at the section

(D) slope at the section

(E) Question not attempted

Q 13. A long shaft of diameter 'd' is subjected to twisting moment 'T' at its ends. The maximum normal stress acting at its cross-section is equal to

(A) $(16\ T) / (\pi\ d^3)$

(B) $(32\ T) / (\pi\ d^3)$

(C) $(64\ T) / (\pi\ d^3)$

(D) Zero

(E) Question not attempted

Q 14. Gusset plates are designed to resist

(A) Twisting and bending

(B) shear

(C) shear and bending

(D) shear, bending and twisting

(E) Question not attempted

Q 15. End returns in fillet welds should not be less than

(A) size of the weld

(B) 0.5 times size of the weld

(C) 1.5 times size of the weld

(D) 2 times size of the weld

(E) Question not attempted

Q 16. A simply supported beam of span 'L' carrying uniformly distributed load of intensity 'w' per meter on central 1/3rd span has a maximum bending moment equal to

(A) $(5\ w\ L^2) / 72$

(B) $(5\ w\ L^2) / 36$

(C) $(w\ L^2) / 72$

(D) $(w\ L^2) / 36$

(E) Question not attempted

Q 17. A continuous beam having two equal spans, without any fixed support, carrying uniformly distributed load of intensity ‘w’ per meter on entire beam has a central support reaction equal to

(A) (w L) / 8

(B) (5 w L) / 8

(C) (5 w L) / 4

(D) (w L) / 4

(E) Question not attempted

Q 18. As per IS:456-2000, the Reinforced Concrete in sea-water or exposed directly along the sea-coast shall be having grade, at least

(A) M20

(B) M25

(C) M30

(D) M35

(E) Question not attempted

Q 19. As per IRC:03-1983 no vehicle shall have width exceeding

(A) 3.50 m

(B) 13.00 m

(C) 2.50 m

(D) All the above.

(E) Question not attempted

Q 20. On roads with restricted width or on single lane roads when two-way movement of traffic is permitted, the minimum stopping sight distance should be equal to

(A) 2 x stopping distance

(B) 2.5 x stopping distance

(C) 1 x stopping distance

(D) maximum of the above + lag distance

(E) Question not attempted

Q 21. What will be head light sight distance for a highway with a design speed of 70 kmph, f = 0.35, t =2.5 secs ?

(A) 105.95 m

(B) 55.12 m

(C) 48.65 m

(D) 103.75 m

(E) Question not attempted

Q 22. For flexible pavement design, as per IRC:37-2018, which is the software used?

(A) Open Roads

(B) AutoCAD Civil3D

(C) MxRoads

(D) IITPAVE

(E) Question not attempted

Q 23. The soil subgrade modulus is directly computed from

(A) Standard Penetration Test (SPT) data

(B) California Bearing Ratio (CBR) test data

(C) Plate load bearing test data

(D) Soil particles gradation test data

(E) Question not attempted

Q 24. The radius of relative stiffness for 15 cm thick cement concrete slab, having Ec =3.0 x 10^5 kg/cm^2 , k =3.0 kg/ cm^3, μ =0.15 is

(A) 115.00 cm

(B) 75.25 cm

(C) 78.00 cm

(D) 73.24 cm

(E) Question not attempted

Q 25. The separation layer between PQC slab and DLC layer perform functions

(A) To reduce inter layer friction

(B) Allows relative movement between PQC slab and DLC layer

(C) Prevents reflection cracking

(D) All of the above (A) to (C)

(E) Question not attempted

Q 26. Which is the grading type used for bitumen in the field?

(A) RC , MC, SC

(B) VG-10, VG-20, VG-30, VG- 40

(C) TR-1, RT-2, RT-3

(D) RS, MS, SS

(E) Question not attempted

Q 27. In Marshall Method of mix design, the cylindrical mould used has dimensions:

(A) 10.16 cm diameter and 6.35 cm height

(B) 15.00 cm diameter and 17.5 cm height

(C) 15.00 cm diameter and 2250 cm^3 of volume

(D) None of the above

(E) Question not attempted

Q 28. A falling gradient followed by a rising gradient is known as:

(A) Ruling gradient

(B) Momentum gradient

(C) Pusher gradient

(D) Angular gradient

(E) Question not attempted

Q 29. For a curved railway track having radius of curve R = 1750 m; actual cant provided C_a = 50 mm and permissible cant deficiency C_d = 100 mm, the safe speed on this curve is

(A) 120 kmph

(B) 128.5 kmph

(C) 138.3 kmph

(D) 150.2 kmph

(E) Question not attempted

Q 30. The Passenger Car Unit (PCU) value is not affected by

(A) Vehicle characteristics

(B) Traffic stream characteristics

(C) Pavement material characteristics

(D) Roadway characteristics

(E) Question not attempted

Q 31. A runway having length of 2100 m in standard conditions, is to be provided at 410 m above Mean Sea Level (MSL). What will be the corrected length of runway?

(A) 2500 m

(B) 2300 m

(C) 2200 m

(D) 3000 m

(E) Question not attempted

Q 32. The corner stress in rigid pavement slab, using Kelley's formula for the pavement data given P = 5100 kg, h = 18 cm, a = 15 cm, l = 70.6 cm; is

(A) 35.00 kg/cm^2

(B) 36.07 kg/ cm^2

(C) 40.08 kg/cm^2

(D) 55.06 kg/ cm^2

(E) Question not attempted

Q 33. How many levels of service for a roadway have been suggested by The Highway Capacity Manual (HCM) as well as IRC

(A) Six

(B) Five

(C) Four

(D) Three

(E) Question not attempted

Q 34. The design traffic, in terms of the cumulative number of standard axles for following data is: Data:

Initial traffic = 3800 CV, Traffic Growth Rate = 6 %, Vehicle Damage Factor = 3.20, Lane distribution Factor = 0.75, design life of pavement = 20 years.

(A) 142.45 msa

(B) 125.50 msa

(C) 200.00 msa

(D) 225.00 msa

(E) Question not attempted

Q 35. A rectangular block of wood was measured with a 5-m tape. The tape was found to be 0.01 m too long. If the volume calculated by measurement was 2.8 m^3, the actual volume will be

(A) 2.805 m^3

(B) 2.81 m^3

(C) 2.816 m^3

(D) 2.85 m^3

(E) Question not attempted

Q 36. If the gradient of a sloping ground is 1:25, then the slope of the ground in degrees is

(A) 25^0

(B) 12.5^0

(C) 2.29^0

(D) 1.25^0

(E) Question not attempted

Q 37. The zero graduation in a prismatic compass is marked in the

(A) North end of the circle

(B) East end of the circle

(C) South end of the circle

(D) West end of the circle

(E) Question not attempted

Q 38. To change the reading on the circle while measuring an angle,

(A) Upper clamp is tightened and lower clamp is loosened

(B) Upper clamp is loosened and lower clamp is tightened

(C) Both upper and lower clamps are loosened

(D) Both upper and lower clamps are tightened

(E) Question not attempted

Q 39. If the latitude of a line is 123.65 m and its bearing is 155^0 30', then the length of the line is

(A) 135.88 m,

(B) 271.32 m,

(C) 297.81 m,

(D) 302.65 m

(E) Question not attempted

Q 40. The coordinates of point A of a traverse are (0, 0). If the length of line AB is 100 m and its bearing is N 30^0 E, then the coordinates of B are

(A) (100, 100),

(B) (86.6, 86.6),

(C) (50, 86.6),

(D) (86.6, 50)

(E) Question not attempted

Q 41. The transit rule for adjustment of traverse is eminently suited

(A) Where linear measurements are more precise than angular measurements

(B) Where angular measurements are more precise than linear measurements

(C) Where linear and angular measurements are equal precision

(D) Irrespective of precision in linear and angular measurements

(E) Question not attempted

Q 42. The readings taken with a level are: 0.985, 1.205, 2.935, 1.455, 3.405, 2.450, 3.925, 0.155 and 2.555. Instrument is shifted after 3rd and 7th reading, then the entries in the Intermediate sights would be

(A) 0.985, 1.455, 0.155

(B) 2.935, 3.925, 2.555

(C) 1.205, 3.405, 2.450

(D) none of the above

(E) Question not attempted

Q.43. If in a reciprocal levelling operation, the readings are as follows:

	Staff Reading at A	Staff Reading at B
From near A	1.345 m	1.675 m
From near B	1.485 m	1.875

If distance AB is 800 m then true difference in elevation between A and B is

(A) 0.33 m fall from A to B

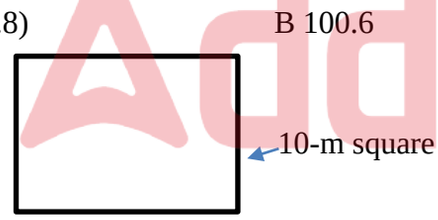
(B) 0.39 m rise from A to B

(C) 0.36 m fall from A to B

(D) 0.36 m rise from A to B

(E) Question not attempted

44. In the figure shown, the contour line of 100 m elevation will intersect AB at



(A) 6.67 m from A

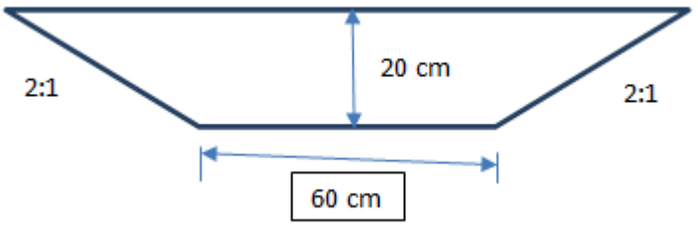
(B) 6.67 m form B

(C) 7.66 m from A

(D) 7.66 m from B

(E) Question not attempted

Q 45. The volume of the single-level section shown for a length of 10 m is



(A) 1 m^3

(B) 1.2 m^3

(C) 1.4 m^3

(D) 2 m^3

(E) Question not attempted

Q 46. Vertical control in surveying means

(A) Using precise levelling instruments

(B) Measuring vertical angles accurately

(C) Establishing accurately benchmarks

(D) Establishing contour lines

(E) Question not attempted

Q 47. A reverse curve is one

(A) With a simple circular curve and transition curve

(B) Where the simple circular curve is set from the second tangent point in the reverse direction

(C) Having two simple circular curves with centres in opposite directions

(D) Having circular and half cubic parabola as a compound curve

(E) Question not attempted

Q 48. Axis-signal correction is applied in Trigonometric levelling to correct for

(A) The inclination of the Earth's axis

(B) The tilt of the instrument axis

(C) The tilt in the horizontal axis of the instrument

(D) Difference in height between the instrument and the signal height

(E) Question not attempted

Q 49. The principle of least square states that the

(A) Sum of the errors from the mean is the minimum

(B) Sum of the squares of the errors from the mean is the minimum

(C) Square root of the sum of the squares of the observations is the most probable value

(D) Sum of squares of observations divided by the square of the number of observations has the least error

(E) Question not attempted

Q 50. Objective of cross sectioning is to find the

(A) gradient of longitudinal section

(B) longitudinal section of a road route

(C) levels of points perpendicular to the route

(D) topographical details of an area

(E) Question not attempted

51. Bentonite is

(A) A chemically weathered volcanic ash

(B) Highly plastic clay

(C) Having montmorrilonite mineral

(D) All the above

(E) Question not attempted

Q 52. A fully saturated soil sample has total volume of 70 cc and the volume of water present in it is 35 cc. The void ratio of soil specimen is

(A) 1.0

(B) 0.5

(C) 0.9

(D) 0.7

(E) Question not attempted

Q 53. The void ratio of a soil mass is 0.7. The porosity of this soil mass will be

(A) 0.41

(B) 0.51

(C) 0.61

(D) 0.71

(E) Question not attempted

Q 54. The plastic limit and plasticity index of a soil is 24 percent and 8 percent respectively. The liquid limit of this soil in percentage is

(A) 16

(B) 32

(C) 50

(D) None of the above

(E) Question not attempted

Q 55. The liquid limit of a fine grained soil is 40 percent and its plastic limit is 15 percent. The soil mass is classified as

(A) CL

(B) CH

(C) MI

(D) CI

(E) Question not attempted

Q 56. At a site ,the ground water table is at a depth of 1m from the ground level. The unit weight of the soil upto 1 m depth is 16 kN/m^3. The saturated unit weight of soil below the water table is 20 kN/m^3 , its effective stress (kP_a) at a depth of 4.0 m from ground level is

(A) 46

(B) 36

(C) 56

(D) None of the above

(E) Question not attempted

Q 57. In a stratified deposit of ground, the co-efficient of permeability for horizontal flow (k_h) and coefficient of permeability for vertical flow (k_v) are related as

(A) $k_h=k_v$

(B) k_h less than k_v

(C) k_h is greater than k_v

(D) None of the above

(E) Question not attempted

Q 58. A saturated soil sample is subjected to total normal stress of 100 kP_a on a plane within it and the pore water pressure at that plane is 30kP_a. The effective shear parameters for the soil mass are c'=20kP_a and φ'= 30^o . The shear strength in terms of effective stress is

(A) 60.41 kP_a

(B) 70.41 kP_a

(C) 50.41 kP_a

(D) None of the above

(E) Question not attempted

Q 59. The intensity of vertical pressure and horizontal shear stress at a point 5 m directly below a 100 kN point load acting at the horizontal ground surface using Boussinesq's equation is

(A) 1.91,0

(B) 0,1.91

(C) 2.91,0

(D) None of the above

(E) Question not attempted

Q 60. A clayey soil is considered to be normally consolidated if

(A) The present overburden pressure is the heighest in the consolidation history of the soil mass

(B) The present overburden pressure is the lowest in the consolidation history of the soil mass

(C) The present overburden pressure is neither highest nor lowest in the consolidation history of the soil mass

(D) None of the above

(E) Question not attempted

Q 61. The load transferred through skin friction ,Qs (kN) in a R.C. Pile of length and diameter of 20 m and 0.5m respectively embedded in cohesive bed (Cu=50kPa, α=0.7) is

(A) 1099.55

(B) 1000.55

(C) 500.55

(D) 675.55

(E) Question not attempted

Q 62. The group efficiency factor of 9 piles in a square pattern (3x3) piles having diameter, d and c/c spacing 3d is

(A) 0.726

(B) 0.706

(C) 0.716

(D) 0.7

(E) Question not attempted

Q 63. A M:30 concrete pile (free headed) of diameter 0.5 m and length 20 m is embedded in a sandy ground having constant modulus of horizontal subgrade reaction (n_h) of 12,000 kN/m^3 , is laterally loaded. The Relative stiffness factor,T of the pile using Reese & Matlock method is

(A) 1.475

(B) 1.745

(C) 1.547

(D) 1.801

(E) Question not attempted

Q 64. In a cohesionless ground, the Standard Penetration Test number at 2.0 m depth from ground surface was found to be 12. The unit weight of the ground was 20 kN/m^3 . The corrected Standard Penetration Test number after applying overburden correction is nearly

(A 15.7

(B) 14.7

(C) 18.7

(D) 17.7

(E) Question not attempted

Q 65. In a cohesionless ground, a plate load test was carried out on a plate size of 30 cmx 30 cm and the ultimate bearing capacity of the ground was found to be 100 kPa. The ultimate bearing capacity of a footing of size 2m x 2 m on the same ground in kPa will be

(A 566.6

(B) 666.6

(C) 466.6

(D) 766.6

(E) Question not attempted

Q 66. The coefficient of volume compressibility, mv and the coefficient of permeability ,k of a saturated clayey ground are $3x10^{-3}$ m^2/kN and $1x10^{-8}$ m/sec respectively. The coefficient of consolidation, Cv in m2/sec is

(A) $3.39x10^{-7}$

(B) $4.37x10^{-7}$

(C) $5.37x10^{-7}$

(D) $6.37x10^{-7}$

(E) Question not attempted

Q 67. The flow velocity of water through the saturated soil mass will remain laminar if its Reynold's number is

(A) $\leq 2{,}000$

(B) 1,900

(C) 1,800

(D) 2,100

(E) Question not attempted

Q 68. Hot wire anemometer is used to measure

(A) Discharge

(B) Instantaneous flow velocity

(C) Pressure intensity

(D) Temperature of fluid

(E) Question not attempted

Q 69. The critical state of flow in a non-rectangular channel (Q is discharge, A is wetted area of flow, T is top width of flow) is expressed by

(A) $Q^2/g = A^3/T$

(B) $Q/g = A^3/T$

(C) $Q^4/g = A^2/T$

(D) $Q^2/g = A/T$

(E) Question not attempted

Q 70. The mild slope profile M 2 occurs for depth

(A) Above normal but below critical

(B) Above critical but below normal

(C) Below normal and below critical

(D) Above normal and above critical

(E) Question not attempted

Q 71. Water is flowing through a pipe at the end of which a nozzle is fitted. The diameter of nozzle is 100 mm and the head of water at the centre of nozzle is 100 m. The coefficient of velocity is 0.95 and mass density of water $\rho = 1000\ kg/m^3$. The force exerted by the jet of water on a fixed vertical plate is

(A) 100 N

(B) 13907.2 N

(C) 198 N

(D) 3000 N

(E) Question not attempted

Q 72. The elementary profile of a gravity dam is

(A) A rectangle

(B) A trapezoidal

(C) A right angled triangle

(D) An equilateral triangle

(E) Question not attempted

Q 73. The loss of energy (ΔE) in a hydraulic jump formed in a rectangular channel considering pre-jump depth as 0.25 m and post-jump depth as 1 m is

(A) $\Delta E = 0.42$ m

(B) $\Delta E = 1$ m

(C) $\Delta E = 0.25$ m

(D) $\Delta E = 13.6$ m

(E) Question not attempted

Q 74. Which of the following is a non-recording rain gauge?

(A) Tipping bucket type rain gauge

(B) Simons rain gauge

(C) Weighing type rain gauge

(D) Float type rain gauge

(E) Question not attempted

Q 75. If the allowable error (ε) in the estimation of rainfall is 10 percent, and coefficient of variation (C v) is 20 percent, then the optimum number of rain gauges (N) is

(A) N = 4

(B) N = 1

(C) N = 10

(D) N = 8

(E) Question not attempted

Q 76. The relation between probability (P) and recurrence interval (T) is given by

(A) P/T = 1

(B) P/T = 0.5

(C) P/T = 1.5

(D) PT = 1

(E) Question not attempted

Q 77. The water stored in the reservoir below the minimum pool level is called

(A) Dead storage

(B) Live storage

(C) Surcharge storage

(D) Valley storage

(E) Question not attempted

Q 78. The discharge passing over an ogee spillway is given by

(A) $Q = C L H^{2}$

(B) $Q = C L H^{3/2}$

(C) $Q = C L H$

(D) $Q = C L^{2} H$

(E) Question not attempted

Q 79. The dimensions of storage coefficient for a confined aquifer is

(A) $M^{0} L^{1} T^{-1}$

(B) $M^{1} L^{1} T^{-2}$

(C) $M^{1} L^{2} T^{-1}$

(D) Dimensionless

(E) Question not attempted

Q 80. For a pumping well, discharge per unit drawdown is called

(A) specific capacity

(B) specific storage

(C) specific yield

(D) unit hydrograph

(E) Question not attempted

Q 81. A canal which is aligned at right angles to the contour is called

(A) Watershed canal

(B) Side slope canal

(C) Contour canal

(D) Canal outlet

(E) Question not attempted

Q 82. For reservoir full condition, the maximum normal stress in a gravity dam is produced

(A) At the toe

(B) At the heel

(C) Within middle third of base

(D) At the centre of base

(E) Question not attempte

Q 83. A gravity dam is having 100 m water depth in the reservoir. The hydrodynamic pressure due to earthquake acts at a height of

(A) 42.44 m above the base

(B) 24.44 m above the base

(C) 18 m above the base

(D) 12 m above the base

(E) Question not attempted

Q 84. A streamlined body is defined as a body about which

(A) The flow is turbulent

(B) The flow is laminar

(C) The flow separation is suppressed

(D) The drag is zero

(E) Question not attempted

Q 85. For a water sample having a total hardness of 200mg/L as $CaCO_3$ and Alkalinity of 250mg/L as $CaCO_3$, the carbonate hardness is _____ mg/L and non carbonate hardness is _____ mg/L.

(A) 200 & 0

(B) 250 & 200

(C) 200 & 200

(D) 0 & 250

(E) Question not attempted

Q 86. The pipe mains carrying water from the source to the reservoir are designed for the

(A) Maximum daily draft

(B) Average daily draft

(C) Minimum daily draft

(D) Maximum weekly draft

(E) Question not attempted

Q 87. A water having pH=11 will have hydroxyl ion concentration equal to

(A) 10^{11}

(B) 10^{-11}

(C) 10^{3}

(D) 10^{-3}

(E) Question not attempted

Q 88. The settling velocity of Inorganic particles in a sedimentation tank of a water treatment plant is governed by

(A) Darcy's law

(B) Dupuit's law

(C) Stoke's law

(D) Theim's law

(E) Question not attempted

Q 89. Which of the following treatments will be indicated for a rural water supply from a deep groundwater source?

(1) Sedimentation (2) Alum dose (3) Potassium permanganate dosing

(4) Bleaching powder application

(A) 1,2 and 3

(B) 1,2 and 4

(C) 3 and 4

(D) 4 alone

(E) Question not attempted

Q 90. The flow velocity in a sewer does not depend on

(A) Its grade

(B) Its length

(C) Its hydraulic mean depth

(D) Its roughness

(E) Question not attempted

Q 91. Temperature variation affect the :

(A) Biological activity of bacteria in sewage

(B) Viscosity of sewage

(C) Solubility of gases in sewage

(D) All of the above

(E) Question not attempted

Q 92. Well oxidized sewage will contain nitrogen, largely in the form of

(A) Nitrites

(B) Nitrates

(C) Free ammonia

(D) Total khjeldah Nitrogen

(E) Question not attempted

Q 93. The microbial utilization of organics is

(A) Zero order reaction

(B) First order reaction

(C) Second order reaction

(D) Third order reaction

(E) Question not attempted

Q 94. For a grit channel if the recommended flow velocity is 0.25m/sec and the detention period is 1 minute then the length of the tank is

(A) 15m

(B) 25m

(C) 225m

(D) 300m

(E) Question not attempted

Q 95. The gas which is evolved in a sludge digestion tank is mainly composed of

(A) Nitrogen

(B) Ammonia

(C) Hydrogen sulphide

(D) Methane

(E) Question not attempted

Q 96. Activated sludge is the:

(A) Aerated sludge in aeration unit

(B) Sludge settled in the humus tank

(C) Sludge in secondary tank after aeration and rich in microbial mass

(D) Sludge in secondary tank after aeration and rich in nutrients

(E) Question not attempted

Q 97. The poisonous gas responsible for causing the catastrophic Bhopal gas tragedy in 1984 in India was

(A) Sulfur dioxide

(B) Methyl isocyanate

(C) Carbon monoxide and methane both

(D) Laughing gas

(E) Question not attempted

Q 98 The liquid that has percolated through the solid waste and has extracted dissolved or suspended materials from it, is called

(A) Refuge

(B) Leachate

(C) Sewage

(D) Particulate

(E) Question not attempted

Q 99. The following reaction take place during anaerobic digestion of organics:

1. Methane production
2. Acid fermentation
3. Alkaline fermentation
4. Acid regression

The correct sequence of these reactions is

(A) 2,4,3,1

(B) 1,2,3,4

(C) 3,1,4,2

(D) 4,3,2,1

(E) Question not attempted

Q 100. Which of the following materials are used as landfill sealants for the control of gas and leachate movements?

1. Sand 2. Lime 3. Bentonite 4. Fly ash 5. Butyl Rubber

Select the correct answer by codes given below:

(A) 1,2 and 3

(B) 4 and 5

(C) 3 and 5

(D) 1,2 and 4

(E) Question not attempted

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Assistant Engineer (Civil) - Irrigation & Water Resources Deptt.

(Held on 08.09.2024)- Morning Session

ANSWER KEY-MASTER SET

Q.No.	Ans Key		Q.No.	Ans Key		Q.No.	Ans Key		Q.No.	Ans Key
1	D		26	B		51	D		76	D
2	C		27	A		52	A		77	A
3	B		28	B		53	A		78	B
4	D		29	C		54	B		79	D
5	A		30	C		55	D		80	A
6	A		31	B		56	A		81	B
7	D		32	B		57	C		82	A
8	B		33	A		58	A		83	A
9	A		34	A		59	A		84	C
10	A		35	C		60	A		85	A
11	C		36	C		61	A		86	A
12	B		37	C		62	A		87	D
13	D		38	B		63	A		88	C
14	C		39	A		64	A		89	D
15	D		40	D		65	B		90	B
16	A		41	B		66	A		91	D
17	C		42	C		67	A		92	B
18	C		43	C		68	B		93	B
19	C		44	A		69	A		94	A
20	A		45	D		70	B		95	D
21	D		46	C		71	B		96	C
22	D		47	C		72	C		97	B
23	C		48	D		73	A		98	B
24	D		49	B		74	B		99	A
25	D		50	C		75	A		100	C