Total No. of Printed Pages : 25

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A

SET-Y

PHD-EE-2023-24
Civil Engineering

10005

Sr. No. .....

Time : **1¼ Hours** Max. Marks : **100** Total Questions : **100**

Roll No. (in figures)_____ (in words) _____

Name _____ Date of Birth_____

Father's Name _____ Mother's Name _____

Date of Examination _____

_____ _____

(Signature of the Candidate) (Signature of the Invigilator)

SEAL

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1. Which one of the following is ***true*** of a statically determinate beam ?

   (1) One end is fixed, and the other end is simply supported

   (2) Both the ends are fixed

   (3) The beam overhangs over two supports

   (4) The beam is supported on three supports

2. Which of the following are examples of indeterminate structures ?

   (i) Fixed beam

   (ii) Continuous beam

   (iii) Two-hinged arch

   (iv) Beam overhanging on both sides

   Select the ***correct*** answer using the codes given below :

   (1) (i), (ii) and (iii) only

   (2) (i), (ii) and (iv) only

   (3) (i), (iii) and (iv) only

   (4) (ii), (iii) and (iv) only

3. Which one of the following is ***correct*** ? A determinate structure :

   (1) Cannot be analyzed without the correct knowledge of modulus of elasticity.

   (2) Must necessarily have roller support at one of its ends.

   (3) Requires only statical equilibrium equations for its analysis.

   (4) Will have zero deflection at its ends.

4. Match the following :

List - I	List - II
P. Slope deflection method	I. Force Method
Q. Moment distribution method	II. Displacement Method
R. Method of three moments	
S. Castigliano's second theorem	

(1) P-I, Q-II, R-I, S-II

(2) P-I, Q-I, R-II, S-II

(3) P-II, Q-II, R-I, S-I

(4) P-II, Q-I, R-II, S-I

5. The IRC recommendation for warning sign is expressed by :

(1) Circle on top

(2) Triangle on top

(3) Rectangle on top

(4) Square on top

6. The displacement method is also referred to as which one of the following ?

(1) Minimum strain energy method

(2) Maxwell-Mohr method

(3) Consistent deformation method

(4) Slope deflection method

7. What is the shape of influence line diagram for the maximum bending moment in respect of a simply supported beam ?

(1) Rectangular

(2) Triangular

(3) Parabolic

(4) Circular

8. A three hinged parabolic arch of span 'l' and rise 'h' is subjected to a u.d.l. of intensity 'w', then the horizontal thrust at the support is :

(1) $wl^2/8h$

(2) wl/h

(3) $wl/8h^2$

(4) $Whl/8$

9. Centre of mass of a body lies at :

(1) outside the system/body

(2) inside the system/body

(3) at centre

(4) at anywhere either inside or outside

10. Two blocks of masses 5 kg and 6 kg are connected by a spring of negligible mass and placed on a horizontal surface (frictionless). An impulse of 20 m/s velocity is given to a heavier block. The velocity of the centre of mass is :

(1) 9.09 m/s

(2) 11.09 m/s

(3) 10.90 m/s

(4) 12.90 m/s

11. A force of magnitude 5 N moves through a distance of 4 mm in a direction, inclined at 60° to the direction of force. The magnitude of the work done by the force is ..... .

(1) $10\sqrt{3}$ N.mm

(2) 0 N.mm

(3) 10 N.mm

(4) 20 N.mm

12. The coefficient of friction does ***not*** depend on :

(a) area of interface of two mating surfaces

(b) roughness of two mating surfaces

(c) the time of contact

Out of these statements :

(1) (a), (b) and (c) are correct

(2) (a) and (b) are correct

(3) (b) and (c) are correct

(4) (a) and (c) are correct

13. The most inconvenient method for parking is :

(1) 30 degree parking

(2) 45 degree parking

(3) Parallel parking

(4) Zero degree parking

14. Temporary hardness in water is due to the presence of :

(1) Carbonates

(2) Sulphates

(3) Chlorides

(4) Dissolved carbon dioxide

15. The factor which influences the design of curves is :

(1) Permissible centrifugal ratio

(2) Speed of vehicle

(3) Maximum permissible super elevation

(4) All of the above

16. A Circular ring of radius 42 cm is cut and bent into the form of a rectangle whose sides are in the ratio of 6 : 5. The small side of the rectangle is :

(1) 80 cm

(2) 30 cm

(3) 120 cm

(4) 60 cm

17. California Bearing Ratio method for design of flexible pavement takes care of mainly :

(1) Traffic intensity

(2) Soil Characteristic

(3) Property of road material

(4) Cement grounding

18. Modulus of rigidity is the ration of :

(1) Linear stress to linear strain

(2) Lateral strain to linear strain

(3) Linear stress to lateral strain

(4) Shear stress to shear strain

19. What are the dimensions of flexural rigidity of a beam element ?

(1) MT

(2) MT^{-2}

(3) ML^3T^{-2}

(4) MLT^{-2}

20. If a simply supported beam of span L carries a point load W at the mid span, then downward deflection under the load will be :

(1) $WL^3/3EI$

(2) $WL^3/8EI$

(3) $WL^3/48EI$

(4) $5/384 . WL^3/3EI$

21. For single angle discontinuous strut is connected to a gusset plate with one rivet only :

(1) Effective length = L, permissible strength = 100 percent

(2) Effective length = L, permissible strength = 80 percent

(3) Effective length = 0.8 L, permissible strength = 100 percent

(4) None of the above

22. The plastic modulus of rectangular beam of width 200 mm and depth 400 mm is :

(1) 2×10^6 mm^3

(2) 5.33×10^6 mm^3

(3) 8×10^6 mm^3

(4) 1.07×10^6 mm^3

23. In cinema theatre, to avoid reverberation, the longitudinal walls should be :

(1) Perfectly parallel

(2) Converging towards screen

(3) Converging towards rear

(4) Should be curvilinear

24. The foundation are placed below ground level, to increase :

(1) Strength

(2) Workability

(3) Stability of structure

(4) All of these

25. Gantt charts indicates :

(1) Comparison of actual progress with the scheduled progress

(2) Balance of work to be done

(3) Progress cost of the project

(4) Inventory cost

26. In the critical path of construction planning, free float can be :

(1) Greater than total float

(2) Equal to total float

(3) Greater than independent float

(4) Less than independent float

27. In PERT analysis, the probability of completion of any activity within its expected time is :

(1) 50% (2) 100%

(3) 75% (4) 99.9%

28. Heat of hydration in cement is mainly due to :

(1) di-calcium silicate

(2) tri-calcium silicate

(3) tri-calcium aluminate

(4) tetra-calcium aluminate ferrite

29. Which of the following represents hardest grade of bitumen ?

(1) 30/40 (2) 60/70

(3) 80/100 (4) 100/120

30. The relation between modulus of rupture (f_{cr}) and characteristic compressive strength (f_{ck}) is :

(1) $f_{cr} = 0.7\ f_{ck}$ (2) $f_{cr} = 0.7\ \sqrt{f}_{ck}$

(3) $f_{cr} = 0.75\ f_{ck}$ (4) $f_{cr} = 0.7/\sqrt{f}_{ck}$

31. The camber value for water bound macadam roads is :

(1) 1.7 to 2% (2) 2 to 2.5%

(3) 2.5 to 3% (4) 3 to 4%

32. The degree of compaction for sand is usually defined in terms of :

(1) Relative density

(2) Standard Proctor test

(3) Modified Proctor test

(4) Nuclear density meter

33. A soil deposit having water content 15%, specific gravity 2.5 and voids ratio 0.5, calculate degree of saturation.

(1) 50% (2) 70%

(3) 75% (4) 90%

34. The self-cleaning velocity for all sewers in India is :

(1) 1.0 m/s to 1.2 m/s

(2) less than 1 m/s

(3) 1.5 m/s to 2.0 m/s

(4) 3.0 m/s to 3.5 m/s

35. The most accurate method of determining the water content in a sample of soil is :

(1) Sand bath method

(2) Calcium carbide method

(3) Oven drying Method

(4) Alcohol method

36. A fluoride concentration of ..... in water is beneficial for the prevention of dental caries in children.

(1) 0.1 to 0.6 p.p.m.

(2) 0.7 to 1.2 p.p.m.

(3) 1.4 to 2.0 p.p.m.

(4) 2.5 to 3.0 p.p.m.

37. The softening point of bitumen can be determined by using :

(1) Viscometer

(2) Ring and ball apparatus

(3) Penetrometer

(4) Briquette mould

38. Which one of the following statements is ***correct*** ?

(1) Grain size is the primary criterion for classification of coarse, as well as fine grained soil.

(2) Grain size is the primary criterion for classification of coarse-grained soil.

(3) Plasticity curve classifies coarse grained soils.

(4) Plasticity characteristics relate to classification of coarse-grained soils.

39. For large cities, the suitable method for forecasting population is :

(1) Arithmetical Increase Method

(2) Geometrical Increase Method

(3) Graphical Method

(4) Comparative Method

40. In a sieve analysis, 70% of the soil mass is retained on ISS 2.00 mm and 60% is finer than ISS 4.00 mm. Determine effective size of the soil mass of its coefficient of curvature $C_c = 2.00$.

(1) 0.50 mm

(2) 1.00 mm

(3) 1.50 mm

(4) 2.00 mm

41. The property of soil due to which water percolates through, it is known as :

(1) Liquidity

(2) Capillarity

(3) Permeability

(4) None of the above

42. Hygroscopic water is defined :

(1) The water held by the soil under capillary action

(2) The readily available water for the used of plants

(3) The water which is absorbed by the particles of dry soil from the atmosphere

(4) Total water content of the soil filled with water

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(1) The number of vehicles per unit length

(2) The number of vehicle moving in a specific direction per lane per day

(3) The number of vehicle passing a given point in on hour

(4) The number of vehicles moving in a specific direction per hour

44. Seepage velocity of water in soil is equal to the :

(1) discharge velocity divided by porosity

(2) discharge velocity multiplied by porosity

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45. For a standard compaction test, the mass of hammer and the drop of hammer are as follows :

(1) 2.60 kg. and 450 mm

(2) 2.60 kg. and 310 mm

(3) 4.89 kg. and 310 mm

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46. A phreatic line is defined as the line within a dam section below which there are :

(1) Positive equipotential lines

(2) Positive hydrostatic pressure

(3) Negative hydrostatic pressure

(4) Negative equipotential lines

47. When the Adiabatic Lapse Rate (ALR) is more than Environment Lapse Rates (ELR). then the ELR can be called as :

(1) Super adiabatic lapse rate

(2) Sub adiabatic lapse rate

(3) Dry adiabatic lapse rate

(4) Wet adiabatic rate

48. IRC recommendation for maximum width of a vehicle is :

(1) 1.75 m (2) 2.00 m

(3) 2.44 m (4) 4.88 m

49. A clay layer of thickness 10 cm and initial void ratio 0.5 undergoes settlement so that the final void ratio is 0.2. The settlement of the layer in cm is :

(1) 1 (2) 1.5

(3) 2 (4) 2.5

50. The shear strength of a soil :

(1) is directly proportional to the angle of internal friction of the soil

(2) is inversely proportional to the angle of internal friction of soil

(3) decreases with increase in normal stress

(4) decreases with decrease in normal stress

51. The earth pressure at rest is calculated by using :

(1) Euler's theory

(2) Rankine's theory

(3) Bending theory

(4) Theory of elasticity

52. In which method of disposal of municipal solid waste, the waste is dumped in the soil ?

(1) Incineration

(2) Land filling

(3) Composting

(4) Shredding

53. The coefficient of earth pressure at rest for stiff clay is about :

(1) 0.4 (2) 0.5

(3) 0.6 (4) 0.8

54. Aeration of water is done to remove :

(1) Odour (2) Colour

(3) Bacteria's (4) Turbidity

55. Toughness property of an aggregate can be tested by adopting :

(1) Aggregate crushing strength test

(2) Aggregate impact test

(3) Los Angeles Abrasion test

(4) Angularity number

56. The process of obtaining increased density of soil in a fill by reduction of its pore space by the expulsion of air, is known as :

(1) Soil exploration

(2) Soil stabilization

(3) Soil compaction

(4) Consolidation

57. The effect of cohesion on a soil is to :

(1) reduce both active and passive earth pressure intensities

(2) increase both active and passive earth pressure intensities

(3) reduce active earth pressure intensity but to increase passive earth pressure intensity

(4) increase active earth pressure intensity but to reduce passive earth pressure intensity

58. When was the water (Prevention and Pollution) Act enacted by the Indian Parliament :

(1) 1970 (2) 1974

(3) 1980 (4) 1985

59. Terzaghi's bearing capacity factors are function of

(1) C and ϕ, (2) Only ϕ,

(3) ϕ, and depth of foundation (4) ϕ, depth and width of foundation

60. Failure of the stability of slopes generally occurs along :

(1) Slip plane

(2) A horizontal surface

(3) A curved surface

(4) All the surfaces

61. In Newtonian fluids, the shear stress is :

(1) directly proportional to the viscosity

(2) inversely proportional to the viscosity

(3) directly proportional to the deformation rate

(4) directly proportional to the shear strain

62. Euler number is related to :

(1) Inertia force to pressure force

(2) Inertia force and elastic force

(3) Inertia force and viscous force

(4) Inertia force and gravity force

63. If the diameter of the capillary tube is doubled, the capillary rise will be :

(1) Doubled

(2) Unaffected

(3) Halved

(4) One-fourth

64. The unit of dynamic viscosity in MKS system is :

(1) kgf-sec/m^2

(2) newton-sec/m^2

(3) m^2/sec

(4) stroke

65. The dimensions of surface tension are :

(1) MT^{-2}

(2) MT^2

(3) MLT^{-2}

(4) MLT^2

66. For a total reaction time of 2.5 sec, coefficient of friction 0.35, design speed of 80 km/hr, what is the stopping sight distance on a highway ?

(1) 124 m

(2) 132 m

(3) 76 m

(4) 56 m

67. Following is ***not*** recommended for management of plastic waste :

(1) Autoclave

(2) Deep burial

(3) Incineration

(4) Hydroclave

68. Which of the following relations are ***correct*** ?

I. Absolute pressure = Atmospheric pressure + Gauge pressure

II. Absolute pressure = Atmospheric pressure – Vacuum pressure

III. Absolute pressure = Atmospheric pressure + Vacuum pressure

IV. Absolute pressure = Atmospheric pressure – Gauge pressure

(1) I and IV only

(2) I and II only

(3) II and III only

(4) III and IV only

69. What is the acceptable limit for pH of drinking water ?

(1) 7.5 - 9.5

(2) 9.5 -10.5

(3) 5.5 - 7.5

(4) 6.5 - 8.5

70. Stoke's law deals with :

(1) settling of fine particles

(2) turbulent flow between the parallel plates

(3) laminar flow between the parallel plates

(4) laminar flow in the tubes

71. A rectangular channel section will be most efficient when :

(1) Hydraulic radius is equal to half the depth of flow

(2) Hydraulic radius is equal to the depth of flow

(3) Depth of flow is equal to the bottom width

(4) Depth of flow is equal to half the hydraulic radius

72. The formula for the head loss in conduits is generally known as (where notations carry their usual meanings) :

(1) Hazen-William's formula

(2) Manning's formula

(3) Darcy-Weisbach formula

(4) Nikuradse formula

73. The loss of energy at the exit from a pipe is given as :

(1) $h_E = V^2 / g$ (2) $h_E = V^2 / 3g$

(3) $h_E = V^2 / 2g$ (4) $h_E = 2V^2 / g$

74. The water is flowing in a pipe of cross-section area 19.625 m^2 and perimeter 15.7 m. The hydraulic mean diameter is :

(1) 4 m (2) 5 m

(3) 6 m (4) 7 m

75. The precipitation is measured in terms of :

(1) Intensity of pressure

(2) Depth of water

(3) Quantity of water

(4) Volume of water

76. A rainfall is considered acid rain if the pH of rainwater is :

(1) less than 7.0 (2) less than 5.6

(3) less than 4.5 (4) less than 3.0

77. The graphical representation of average rainfall and rainfall excess (i.e, rainfall minus infiltration) rates over specified areas during successive unit time intervals during a storm is known as :

(1) Hydrograph

(2) Unit hydrograph

(3) Hyetograph

(4) None of the above

78. The rainfall of five successive days were measured as 100 mm, 80 mm, 60 mm, 40 mm and 20 mm respectively. If the storm loss rate for the catchment area is earlier estimated as 50 mm/day, the total surface run off will be :

(1) 50 mm (2) 60 mm

(3) 90 mm (4) 140 mm

79. A device used to control the emission of particulate pollutants smaller than 10-micron size, collection and disposal in dry form at low pressure drop is :

(1) Baffle type separator (2) Fabric filter

(3) Louver type separator (4) Simple gravity settling chambers

80. Roughness index of roads is expressed as :

(1) Size of the stone on the pavement

(2) Number of patches on the pavement

(3) Cumulative deformation of surface per horizontal distance

(4) Type of road surface

81. Direct runoff consists of :

(1) surface runoff, infiltration and percolation

(2) overland flow, evapotranspiration and precipitation over stream

(3) overland flow, prompt interflow and percolation

(4) surface runoff, prompt interflow and precipitation over stream

82. Hydrology deals with :

(1) process of depletion of water resources of land

(2) process of natural science of water

(3) process of various water phases

(4) all of the above

83. Which of the following is a secondary air pollutant ?

(1) Sulphur dioxide

(2) Ozone

(3) Carbon monoxide

(4) Carbon dioxide

84. The hydrograph of short duration can be converted into hydrograph of longer duration by :

(1) unit hydrograph

(2) synthetic unit hydrograph

(3) s-curve method

(4) flood routing

85. Calculate the radius of a rotary curve for a vehicle speed of 40 kmph and coefficient of friction as 0.45 :

(1) 12.73 m (2) 30.5 m

(3) 22.34 m (4) 28 m

86. An aquiclude is :

(1) A non-artesian aquifer

(2) An artesian aquifer

(3) A solid impermeable layer underlying or overlying an aquifer

(4) A large underground water body

87. Prohibitory sign is meant to :

(1) Restrict speed of vehicle

(2) Warn road users of certain hazardous conditions

(3) Prohibit parking of vehicles

(4) Prohibit certain traffic movement

88. If the specific capacity of a well is 1.166 litres/sec, then the discharge from this well under a depression head of 3 m head will be :

(1) 1.66 litre/sec

(2) 3.5 litre/sec

(3) 10.5 litre/sec

(4) None of the above

89. The unit of coefficient of transmissibility is :

(1) m^2/s

(2) m/s

(3) unit less

(4) m/s^2

90. The yield of a well can be obtained by :

(1) a pumping test

(2) recuperating test

(3) a chemical test

(4) either (1) or (2)

91. Sludge bulking can be controlled by :

(1) Chlorination

(2) Coagulation

(3) Aeration

(4) Denitrification

92. Trickle irrigation is also known as :

(1) Micro irrigation

(2) Drip irrigation

(3) Subsurface irrigation

(4) Sprinkler irrigation

93. The density of ash produced in municipal solid waste is :

(1) 700 kg/m^2

(2) 1000 kg/m^3

(3) 450 kg/m^3

(4) 100 kg/m^3

94. Delta (Δ) of a crop means :

(1) Area under the crop

(2) Crop period

(3) Depth of water required by the crop

(4) Crop production

95. In rotary intersection the weaving length is :

(1) The length between the ends of the channel in islands in front of two consecutive entry and exit

(2) The perimeter of the center line of the road circumfering the central island

(3) The distance betwee two opposite roads

(4) The width of the road between the central island and the channel island

96. For irrigation purposes, the pH value of water should be :

(1) Between 3 and 6

(2) Between 6 and 8.5

(3) Between 8.5 and 11

(4) More than 11

97. The silt factor in Lacey's theory is given as :

(1) $f = 4.75\sqrt{m_r}$

(2) $f = 7.45\sqrt{m_r}$

(3) $f = 1.76\sqrt{m_r}$

(4) $f = 1.56\sqrt{m_r}$

98. Lining of Irrigation channels :

(1) May stop leakage water

(2) Creates water logging in near-by areas

(3) Both (1) and (2)

(4) None of the above

99. Canal falls are provided when the available ground slope is :

(1) Flatter than the design bed slope of the canal

(2) Flatter than the side slope of the canal

(3) Steeper than the design bed slope of the canal

(4) Steeper than the side slope of the canal

100. Standard EDTA solution is used to determinate the :

(1) Turbidity in water

(2) Dissolved oxygen in water

(3) Residual chlorine in water

(4) Hardness in water

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(1) 2.60 kg. and 450 mm

(2) 2.60 kg. and 310 mm

(3) 4.89 kg. and 310 mm

(4) 4.89 kg. and 450 mm

6. A phreatic line is defined as the line within a dam section below which there are :

(1) Positive equipotential lines

(2) Positive hydrostatic pressure

(3) Negative hydrostatic pressure

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7. When the Adiabatic Lapse Rate (ALR) is more than Environment Lapse Rates (ELR). then the ELR can be called as :

(1) Super adiabatic lapse rate

(2) Sub adiabatic lapse rate

(3) Dry adiabatic lapse rate

(4) Wet adiabatic rate

8. IRC recommendation for maximum width of a vehicle is :

(1) 1.75 m

(2) 2.00 m

(3) 2.44 m

(4) 4.88 m

9. A clay layer of thickness 10 cm and initial void ratio 0.5 undergoes settlement so that the final void ratio is 0.2. The settlement of the layer in cm is :

(1) 1

(2) 1.5

(3) 2

(4) 2.5

10. The shear strength of a soil :

(1) is directly proportional to the angle of internal friction of the soil

(2) is inversely proportional to the angle of internal friction of soil

(3) decreases with increase in normal stress

(4) decreases with decrease in normal stress

11. A rectangular channel section will be most efficient when :

(1) Hydraulic radius is equal to half the depth of flow

(2) Hydraulic radius is equal to the depth of flow

(3) Depth of flow is equal to the bottom width

(4) Depth of flow is equal to half the hydraulic radius

12. The formula for the head loss in conduits is generally known as (where notations carry their usual meanings) :

(1) Hazen-William's formula

(2) Manning's formula

(3) Darcy-Weisbach formula

(4) Nikuradse formula

13. The loss of energy at the exit from a pipe is given as :

(1) $h_E = V^2/g$ (2) $h_E = V^2/3g$

(3) $h_E = V^2/2g$ (4) $h_E = 2V^2/g$

14. The water is flowing in a pipe of cross-section area 19.625 m^2 and perimeter 15.7 m. The hydraulic mean diameter is :

(1) 4 m (2) 5 m

(3) 6 m (4) 7 m

15. The precipitation is measured in terms of :

(1) Intensity of pressure

(2) Depth of water

(3) Quantity of water

(4) Volume of water

16. A rainfall is considered acid rain if the pH of rainwater is :

(1) less than 7.0

(2) less than 5.6

(3) less than 4.5

(4) less than 3.0

17. The graphical representation of average rainfall and rainfall excess (i.e, rainfall minus infiltration) rates over specified areas during successive unit time intervals during a storm is known as :

(1) Hydrograph

(2) Unit hydrograph

(3) Hyetograph

(4) None of the above

18. The rainfall of five successive days were measured as 100 mm, 80 mm, 60 mm, 40 mm and 20 mm respectively. If the storm loss rate for the catchment area is earlier estimated as 50 mm/day, the total surface run off will be :

(1) 50 mm

(2) 60 mm

(3) 90 mm

(4) 140 mm

19. A device used to control the emission of particulate pollutants smaller than 10-micron size, collection and disposal in dry form at low pressure drop is :

(1) Baffle type separator

(2) Fabric filter

(3) Louver type separator

(4) Simple gravity settling chambers

20. Roughness index of roads is expressed as :

(1) Size of the stone on the pavement

(2) Number of patches on the pavement

(3) Cumulative deformation of surface per horizontal distance

(4) Type of road surface

21. Sludge bulking can be controlled by :

(1) Chlorination

(2) Coagulation

(3) Aeration

(4) Denitrification

22. Trickle irrigation is also known as :

(1) Micro irrigation

(2) Drip irrigation

(3) Subsurface irrigation

(4) Sprinkler irrigation

23. The density of ash produced in municipal solid waste is :

(1) 700 kg/m^2

(2) 1000 kg/m^3

(3) 450 kg/m^3

(4) 100 kg/m^3

24. Delta (Δ) of a crop means :

(1) Area under the crop

(2) Crop period

(3) Depth of water required by the crop

(4) Crop production

25. In rotary intersection the weaving length is :

(1) The length between the ends of the channel in islands in front of two consecutive entry and exit

(2) The perimeter of the center line of the road circumfering the central island

(3) The distance betwee two opposite roads

(4) The width of the road between the central island and the channel island

26. For irrigation purposes, the pH value of water should be :

(1) Between 3 and 6

(2) Between 6 and 8.5

(3) Between 8.5 and 11

(4) More than 11

27. The silt factor in Lacey's theory is given as :

(1) $f = 4.75\sqrt{m_r}$

(2) $f = 7.45\sqrt{m_r}$

(3) $f = 1.76\sqrt{m_r}$

(4) $f = 1.56\sqrt{m_r}$

28. Lining of Irrigation channels :

(1) May stop leakage water

(2) Creates water logging in near-by areas

(3) Both (1) and (2)

(4) None of the above

29. Canal falls are provided when the available ground slope is :
(1) Flatter than the design bed slope of the canal
(2) Flatter than the side slope of the canal
(3) Steeper than the design bed slope of the canal
(4) Steeper than the side slope of the canal

30. Standard EDTA solution is used to determinate the :
(1) Turbidity in water
(2) Dissolved oxygen in water
(3) Residual chlorine in water
(4) Hardness in water

31. Which one of the following is ***true*** of a statically determinate beam ?
(1) One end is fixed, and the other end is simply supported
(2) Both the ends are fixed
(3) The beam overhangs over two supports
(4) The beam is supported on three supports

32. Which of the following are examples of indeterminate structures ?
(i) Fixed beam
(ii) Continuous beam
(iii) Two-hinged arch
(iv) Beam overhanging on both sides
Select the ***correct*** answer using the codes given below :
(1) (i), (ii) and (iii) only
(2) (i), (ii) and (iv) only
(3) (i), (iii) and (iv) only
(4) (ii), (iii) and (iv) only

33. Which one of the following is ***correct*** ? A determinate structure :

(1) Cannot be analyzed without the correct knowledge of modulus of elasticity.

(2) Must necessarily have roller support at one of its ends.

(3) Requires only statical equilibrium equations for its analysis.

(4) Will have zero deflection at its ends.

34. Match the following :

List - I	**List - II**
P. Slope deflection method	I. Force Method
Q. Moment distribution method	II. Displacement Method
R. Method of three moments	
S. Castigliano's second theorem	

(1) P-I, Q-II, R-I, S-II

(2) P-I, Q-I, R-II, S-II

(3) P-II, Q-II, R-I, S-I

(4) P-II, Q-I, R-II, S-I

35. The IRC recommendation for warning sign is expressed by :

(1) Circle on top

(2) Triangle on top

(3) Rectangle on top

(4) Square on top

36. The displacement method is also referred to as which one of the following ?

(1) Minimum strain energy method

(2) Maxwell-Mohr method

(3) Consistent deformation method

(4) Slope deflection method

37. What is the shape of influence line diagram for the maximum bending moment in respect of a simply supported beam ?

(1) Rectangular

(2) Triangular

(3) Parabolic

(4) Circular

38. A three hinged parabolic arch of span 'l' and rise 'h' is subjected to a u.d.1. of intensity 'w', then the horizontal thrust at the support is :

(1) $wl^2/8h$

(2) wl/h

(3) $wl/8h^2$

(4) $Whl/8$

39. Centre of mass of a body lies at :

(1) outside the system/body

(2) inside the system/body

(3) at centre

(4) at anywhere either inside or outside

40. Two blocks of masses 5 kg and 6 kg are connected by a spring of negligible mass and placed on a horizontal surface (frictionless). An impulse of 20 m/s velocity is given to a heavier block. The velocity of the centre of mass is :

(1) 9.09 m/s

(2) 11.09 m/s

(3) 10.90 m/s

(4) 12.90 m/s

41. The earth pressure at rest is calculated by using :

(1) Euler's theory

(2) Rankine's theory

(3) Bending theory

(4) Theory of elasticity

42. In which method of disposal of municipal solid waste, the waste is dumped in the soil ?

(1) Incineration

(2) Land filling

(3) Composting

(4) Shredding

43. The coefficient of earth pressure at rest for stiff clay is about :

(1) 0.4

(2) 0.5

(3) 0.6

(4) 0.8

44. Aeration of water is done to remove :

(1) Odour

(2) Colour

(3) Bacteria's

(4) Turbidity

45. Toughness property of an aggregate can be tested by adopting :

(1) Aggregate crushing strength test

(2) Aggregate impact test

(3) Los Angeles Abrasion test

(4) Angularity number

46. The process of obtaining increased density of soil in a fill by reduction of its pore space by the expulsion of air, is known as :

(1) Soil exploration

(2) Soil stabilization

(3) Soil compaction

(4) Consolidation

47. The effect of cohesion on a soil is to :

(1) reduce both active and passive earth pressure intensities

(2) increase both active and passive earth pressure intensities

(3) reduce active earth pressure intensity but to increase passive earth pressure intensity

(4) increase active earth pressure intensity but to reduce passive earth pressure intensity

48. When was the water (Prevention and Pollution) Act enacted by the Indian Parliament :

(1) 1970 (2) 1974

(3) 1980 (4) 1985

49. Terzaghi's bearing capacity factors are function of

(1) C and ϕ, (2) Only ϕ,

(3) ϕ, and depth of foundation (4) ϕ, depth and width of foundation

50. Failure of the stability of slopes generally occurs along :

(1) Slip plane

(2) A horizontal surface

(3) A curved surface

(4) All the surfaces

51. In Newtonian fluids, the shear stress is :

(1) directly proportional to the viscosity

(2) inversely proportional to the viscosity

(3) directly proportional to the deformation rate

(4) directly proportional to the shear strain

52. Euler number is related to :

(1) Inertia force to pressure force

(2) Inertia force and elastic force

(3) Inertia force and viscous force

(4) Inertia force and gravity force

53. If the diameter of the capillary tube is doubled, the capillary rise will be :

(1) Doubled

(2) Unaffected

(3) Halved

(4) One-fourth

54. The unit of dynamic viscosity in MKS system is :

(1) kgf-sec/m^2

(2) newton-sec/m^2

(3) m^2/sec

(4) stroke

55. The dimensions of surface tension are :

(1) MT^{-2}

(2) MT^{2}

(3) MLT^{-2}

(4) MLT^{2}

56. For a total reaction time of 2.5 sec, coefficient of friction 0.35, design speed of 80 km/hr, what is the stopping sight distance on a highway ?

(1) 124 m

(2) 132 m

(3) 76 m

(4) 56 m

57. Following is ***not*** recommended for management of plastic waste :

(1) Autoclave

(2) Deep burial

(3) Incineration

(4) Hydroclave

58. Which of the following relations are ***correct*** ?

I. Absolute pressure = Atmospheric pressure + Gauge pressure

II. Absolute pressure = Atmospheric pressure – Vacuum pressure

III. Absolute pressure = Atmospheric pressure + Vacuum pressure

IV. Absolute pressure = Atmospheric pressure – Gauge pressure

(1) I and IV only

(2) I and II only

(3) II and III only

(4) III and IV only

59. What is the acceptable limit for pH of drinking water ?

(1) 7.5 - 9.5

(2) 9.5 -10.5

(3) 5.5 - 7.5

(4) 6.5 - 8.5

60. Stoke's law deals with :

(1) settling of fine particles

(2) turbulent flow between the parallel plates

(3) laminar flow between the parallel plates

(4) laminar flow in the tubes

61. For single angle discontinuous strut is connected to a gusset plate with one rivet only :

(1) Effective length = L, permissible strength = 100 percent

(2) Effective length = L, permissible strength = 80 percent

(3) Effective length = 0.8 L, permissible strength = 100 percent

(4) None of the above

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(1) di-calcium silicate
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(1) $f_{cr} = 0.7\, f_{ck}$
(2) $f_{cr} = 0.7\, \sqrt{f}_{ck}$
(3) $f_{cr} = 0.75\, f_{ck}$
(4) $f_{cr} = 0.7/\sqrt{f}_{ck}$

71. A force of magnitude 5 N moves through a distance of 4 mm in a direction, inclined at 60° to the direction of force. The magnitude of the work done by the force is ..... .

(1) $10\sqrt{3}$ N.mm
(2) 0 N.mm
(3) 10 N.mm
(4) 20 N.mm

72. The coefficient of friction does ***not*** depend on :

(a) area of interface of two mating surfaces
(b) roughness of two mating surfaces
(c) the time of contact

Out of these statements :

(1) (a), (b) and (c) are correct
(2) (a) and (b) are correct
(3) (b) and (c) are correct
(4) (a) and (c) are correct

73. The most inconvenient method for parking is :

(1) 30 degree parking
(2) 45 degree parking
(3) Parallel parking
(4) Zero degree parking

74. Temporary hardness in water is due to the presence of :

(1) Carbonates
(2) Sulphates
(3) Chlorides
(4) Dissolved carbon dioxide

75. The factor which influences the design of curves is :

(1) Permissible centrifugal ratio

(2) Speed of vehicle

(3) Maximum permissible super elevation

(4) All of the above

76. A Circular ring of radius 42 cm is cut and bent into the form of a rectangle whose sides are in the ratio of 6 : 5. The small side of the rectangle is :

(1) 80 cm

(2) 30 cm

(3) 120 cm

(4) 60 cm

77. California Bearing Ratio method for design of flexible pavement takes care of mainly :

(1) Traffic intensity

(2) Soil Characteristic

(3) Property of road material

(4) Cement grounding

78. Modulus of rigidity is the ration of :

(1) Linear stress to linear strain

(2) Lateral strain to linear strain

(3) Linear stress to lateral strain

(4) Shear stress to shear strain

79. What are the dimensions of flexural rigidity of a beam element ?

(1) MT

(2) MT^{-2}

(3) ML^3T^{-2}

(4) MLT^{-2}

80. If a simply supported beam of span L carries a point load W at the mid span, then downward deflection under the load will be :

(1) $WL^3/3EI$

(2) $WL^3/8EI$

(3) $WL^3/48EI$

(4) $5/384 . WL^3/3EI$

81. Direct runoff consists of :

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(4) 28 m

86. An aquiclude is :

(1) A non-artesian aquifer

(2) An artesian aquifer

(3) A solid impermeable layer underlying or overlying an aquifer

(4) A large underground water body

87. Prohibitory sign is meant to :

(1) Restrict speed of vehicle

(2) Warn road users of certain hazardous conditions

(3) Prohibit parking of vehicles

(4) Prohibit certain traffic movement

88. If the specific capacity of a well is 1.166 litres/sec, then the discharge from this well under a depression head of 3 m head will be :

(1) 1.66 litre/sec

(2) 3.5 litre/sec

(3) 10.5 litre/sec

(4) None of the above

89. The unit of coefficient of transmissibility is :

(1) m^2/s

(2) m/s

(3) unit less

(4) m/s^2

90. The yield of a well can be obtained by :

(1) a pumping test

(2) recuperating test

(3) a chemical test

(4) either (1) or (2)

91. The camber value for water bound macadam roads is :

(1) 1.7 to 2%
(2) 2 to 2.5%
(3) 2.5 to 3%
(4) 3 to 4%

92. The degree of compaction for sand is usually defined in terms of :

(1) Relative density
(2) Standard Proctor test
(3) Modified Proctor test
(4) Nuclear density meter

93. A soil deposit having water content 15%, specific gravity 2.5 and voids ratio 0.5, calculate degree of saturation.

(1) 50%
(2) 70%
(3) 75%
(4) 90%

94. The self-cleaning velocity for all sewers in India is :

(1) 1.0 m/s to 1.2 m/s
(2) less than 1 m/s
(3) 1.5 m/s to 2.0 m/s
(4) 3.0 m/s to 3.5 m/s

95. The most accurate method of determining the water content in a sample of soil is :

(1) Sand bath method
(2) Calcium carbide method
(3) Oven drying Method
(4) Alcohol method

96. A fluoride concentration of ..... in water is beneficial for the prevention of dental caries in children.

(1) 0.1 to 0.6 p.p.m.
(2) 0.7 to 1.2 p.p.m.
(3) 1.4 to 2.0 p.p.m.
(4) 2.5 to 3.0 p.p.m.

97. The softening point of bitumen can be determined by using :

(1) Viscometer
(2) Ring and ball apparatus
(3) Penetrometer
(4) Briquette mould

98. Which one of the following statements is ***correct*** ?

(1) Grain size is the primary criterion for classification of coarse, as well as fine grained soil.
(2) Grain size is the primary criterion for classification of coarse-grained soil.
(3) Plasticity curve classifies coarse grained soils.
(4) Plasticity characteristics relate to classification of coarse-grained soils.

99. For large cities, the suitable method for forecasting population is :

(1) Arithmetical Increase Method
(2) Geometrical Increase Method
(3) Graphical Method
(4) Comparative Method

100. In a sieve analysis, 70% of the soil mass is retained on ISS 2.00 mm and 60% is finer than ISS 4.00 mm. Determine effective size of the soil mass of its coefficient of curvature $C_c = 2.00$.

(1) 0.50 mm

(2) 1.00 mm

(3) 1.50 mm

(4) 2.00 mm

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Civil Engineering

10007

Sr. No. .....

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Father's Name _____ Mother's Name _____

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(Signature of the Candidate) (Signature of the Invigilator)

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3. Keeping in view the transparency of the examination system, carbonless OMR Sheet is provided to the candidate so that a copy of OMR Sheet may be kept by the candidate.
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5. The candidate ***must not*** do any rough work or writing in the OMR Answer-Sheet. Rough work, if any, may be done in the question booklet itself. Answers ***must not*** be ticked in the question booklet.
6. ***There will be no negative marking. Each correct answer will be awarded one full mark. Cutting, erasing, overwriting and more than one answer in OMR Answer-Sheet will be treated as incorrect answer.***
7. Use only **Black** or **Blue Ball Point Pen** of good quality in the OMR Answer-Sheet.
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28. If the specific capacity of a well is 1.166 litres/sec, then the discharge from this well under a depression head of 3 m head will be :

(1) 1.66 litre/sec

(2) 3.5 litre/sec

(3) 10.5 litre/sec

(4) None of the above

29. The unit of coefficient of transmissibility is :

(1) m^2/s (2) m/s

(3) unit less (4) m/s^2

30. The yield of a well can be obtained by :

(1) a pumping test

(2) recuperating test

(3) a chemical test

(4) either (1) or (2)

31. A rectangular channel section will be most efficient when :

(1) Hydraulic radius is equal to half the depth of flow

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(2) Number of patches on the pavement

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41. A force of magnitude 5 N moves through a distance of 4 mm in a direction, inclined at 60° to the direction of force. The magnitude of the work done by the force is ..... .

(1) $10\sqrt{3}$ N.mm

(2) 0 N.mm

(3) 10 N.mm

(4) 20 N.mm

42. The coefficient of friction does ***not*** depend on :

(a) area of interface of two mating surfaces

(b) roughness of two mating surfaces

(c) the time of contact

Out of these statements :

(1) (a), (b) and (c) are correct

(2) (a) and (b) are correct

(3) (b) and (c) are correct

(4) (a) and (c) are correct

43. The most inconvenient method for parking is :

(1) 30 degree parking

(2) 45 degree parking

(3) Parallel parking

(4) Zero degree parking

44. Temporary hardness in water is due to the presence of :

(1) Carbonates

(2) Sulphates

(3) Chlorides

(4) Dissolved carbon dioxide

45. The factor which influences the design of curves is :

(1) Permissible centrifugal ratio

(2) Speed of vehicle

(3) Maximum permissible super elevation

(4) All of the above

46. A Circular ring of radius 42 cm is cut and bent into the form of a rectangle whose sides are in the ratio of 6 : 5. The small side of the rectangle is :

(1) 80 cm

(2) 30 cm

(3) 120 cm

(4) 60 cm

47. California Bearing Ratio method for design of flexible pavement takes care of mainly

(1) Traffic intensity

(2) Soil Characteristic

(3) Property of road material

(4) Cement grounding

48. Modulus of rigidity is the ration of :

(1) Linear stress to linear strain

(2) Lateral strain to linear strain

(3) Linear stress to lateral strain

(4) Shear stress to shear strain

49. What are the dimensions of flexural rigidity of a beam element ?

(1) MT

(2) MT^{-2}

(3) ML^3T^{-2}

(4) MLT^{-2}

50. If a simply supported beam of span L carries a point load W at the mid span, then downward deflection under the load will be :

(1) $WL^3/3EI$

(2) $WL^3/8EI$

(3) $WL^3/48EI$

(4) $5/384 . WL^3/3EI$

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(1) 1.7 to 2%

(2) 2 to 2.5%

(3) 2.5 to 3%

(4) 3 to 4%

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(1) 0.50 mm

(2) 1.00 mm

(3) 1.50 mm

(4) 2.00 mm

61. Which one of the following is ***true*** of a statically determinate beam ?

(1) One end is fixed, and the other end is simply supported

(2) Both the ends are fixed

(3) The beam overhangs over two supports

(4) The beam is supported on three supports

62. Which of the following are examples of indeterminate structures ?

(i) Fixed beam

(ii) Continuous beam

(iii) Two-hinged arch

(iv) Beam overhanging on both sides

Select the ***correct*** answer using the codes given below :

(1) (i), (ii) and (iii) only

(2) (i), (ii) and (iv) only

(3) (i), (iii) and (iv) only

(4) (ii), (iii) and (iv) only

63. Which one of the following is ***correct*** ? A determinate structure :

(1) Cannot be analyzed without the correct knowledge of modulus of elasticity.

(2) Must necessarily have roller support at one of its ends.

(3) Requires only statical equilibrium equations for its analysis.

(4) Will have zero deflection at its ends.

64. Match the following :

List - I	**List - II**
P. Slope deflection method	I. Force Method
Q. Moment distribution method	II. Displacement Method
R. Method of three moments	
S. Castigliano's second theorem	

(1) P-I, Q-II, R-I, S-II

(2) P-I, Q-I, R-II, S-II

(3) P-II, Q-II, R-I, S-I

(4) P-II, Q-I, R-II, S-I

65. The IRC recommendation for warning sign is expressed by :

(1) Circle on top

(2) Triangle on top

(3) Rectangle on top

(4) Square on top

66. The displacement method is also referred to as which one of the following ?

(1) Minimum strain energy method

(2) Maxwell-Mohr method

(3) Consistent deformation method

(4) Slope deflection method

67. What is the shape of influence line diagram for the maximum bending moment in respect of a simply supported beam ?

(1) Rectangular

(2) Triangular

(3) Parabolic

(4) Circular

68. A three hinged parabolic arch of span 'l' and rise 'h' is subjected to a u.d.l. of intensity 'w', then the horizontal thrust at the support is :

(1) $wl^2/8h$

(2) wl/h

(3) $wl/8h^2$

(4) Whl/8

69. Centre of mass of a body lies at :

(1) outside the system/body

(2) inside the system/body

(3) at centre

(4) at anywhere either inside or outside

70. Two blocks of masses 5 kg and 6 kg are connected by a spring of negligible mass and placed on a horizontal surface (frictionless). An impulse of 20 m/s velocity is given to a heavier block. The velocity of the centre of mass is :

(1) 9.09 m/s
(2) 11.09 m/s
(3) 10.90 m/s
(4) 12.90 m/s

71. The property of soil due to which water percolates through, it is known as :

(1) Liquidity
(2) Capillarity
(3) Permeability
(4) None of the above

72. Hygroscopic water is defined :

(1) The water held by the soil under capillary action
(2) The readily available water for the used of plants
(3) The water which is absorbed by the particles of dry soil from the atmosphere
(4) Total water content of the soil filled with water

73. Traffic density is defined as :

(1) The number of vehicles per unit length
(2) The number of vehicle moving in a specific direction per lane per day
(3) The number of vehicle passing a given point in on hour
(4) The number of vehicles moving in a specific direction per hour

74. Seepage velocity of water in soil is equal to the :

(1) discharge velocity divided by porosity
(2) discharge velocity multiplied by porosity
(3) discharge velocity divided by permeability
(4) discharge velocity multiplied by permeability

75. For a standard compaction test, the mass of hammer and the drop of hammer are as follows :

(1) 2.60 kg. and 450 mm

(2) 2.60 kg. and 310 mm

(3) 4.89 kg. and 310 mm

(4) 4.89 kg. and 450 mm

76. A phreatic line is defined as the line within a dam section below which there are :

(1) Positive equipotential lines

(2) Positive hydrostatic pressure

(3) Negative hydrostatic pressure

(4) Negative equipotential lines

77. When the Adiabatic Lapse Rate (ALR) is more than Environment Lapse Rates (ELR) then the ELR can be called as :

(1) Super adiabatic lapse rate

(2) Sub adiabatic lapse rate

(3) Dry adiabatic lapse rate

(4) Wet adiabatic rate

78. IRC recommendation for maximum width of a vehicle is :

(1) 1.75 m

(2) 2.00 m

(3) 2.44 m

(4) 4.88 m

79. A clay layer of thickness 10 cm and initial void ratio 0.5 undergoes settlement so that the final void ratio is 0.2. The settlement of the layer in cm is :

(1) 1

(2) 1.5

(3) 2

(4) 2.5

80. The shear strength of a soil :

(1) is directly proportional to the angle of internal friction of the soil

(2) is inversely proportional to the angle of internal friction of soil

(3) decreases with increase in normal stress

(4) decreases with decrease in normal stress

81. Sludge bulking can be controlled by :

(1) Chlorination

(2) Coagulation

(3) Aeration

(4) Denitrification

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(1) Between 3 and 6

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(1) $f = 4.75\sqrt{m_r}$

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(1) Inertia force to pressure force

(2) Inertia force and elastic force

(3) Inertia force and viscous force

(4) Inertia force and gravity force

93. If the diameter of the capillary tube is doubled, the capillary rise will be :

(1) Doubled

(2) Unaffected

(3) Halved

(4) One-fourth

94. The unit of dynamic viscosity in MKS system is :

(1) kgf-sec/m^2

(2) newton-sec/m^2

(3) m^2/sec

(4) stroke

95. The dimensions of surface tension are :

(1) MT^{-2}

(2) MT^2

(3) MLT^{-2}

(4) MLT^2

96. For a total reaction time of 2.5 sec, coefficient of friction 0.35, design speed of 80 km/hr, what is the stopping sight distance on a highway ?

(1) 124 m

(2) 132 m

(3) 76 m

(4) 56 m

97. Following is ***not*** recommended for management of plastic waste :

(1) Autoclave

(2) Deep burial

(3) Incineration

(4) Hydroclave

98. Which of the following relations are ***correct*** ?

I. Absolute pressure = Atmospheric pressure + Gauge pressure

II. Absolute pressure = Atmospheric pressure – Vacuum pressure

III. Absolute pressure = Atmospheric pressure + Vacuum pressure

IV. Absolute pressure = Atmospheric pressure – Gauge pressure

(1) I and IV only

(2) I and II only

(3) II and III only

(4) III and IV only

99. What is the acceptable limit for pH of drinking water ?

(1) 7.5 - 9.5

(2) 9.5 -10.5

(3) 5.5 - 7.5

(4) 6.5 - 8.5

100. Stoke's law deals with :

(1) settling of fine particles

(2) turbulent flow between the parallel plates

(3) laminar flow between the parallel plates

(4) laminar flow in the tubes

Total No. of Printed Pages : 25

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D

SET-Y

PHD-EE-2023-24

Civil Engineering

10004

Sr. No. .....

Time : **1¼ Hours** Max. Marks : **100** Total Questions : 100

Roll No. (in figures)_____ (in words) _____

Name _____ Date of Birth_____

Father's Name _____ Mother's Name _____

Date of Examination _____

_____ _____

(Signature of the Candidate) (Signature of the Invigilator)

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2. The candidates ***must return*** the question booklet as well as OMR Answer-Sheet to the Invigilator concerned before leaving the Examination Hall, failing which a case of use of unfair-means / mis-behaviour will be registered against him / her, in addition to lodging of an FIR with the police. Further the answer-sheet of such a candidate will not be evaluated.
3. Keeping in view the transparency of the examination system, carbonless OMR Sheet is provided to the candidate so that a copy of OMR Sheet may be kept by the candidate.
4. Question Booklet along with answer key of all the A, B, C & D code shall be got uploaded on the University Website immediately after the conduct of Entrance Examination. Candidates may raise valid objection/complaint if any, with regard to discrepancy in the question booklet/answer key within 24 hours of uploading the same on the University Website. The complaint be sent by the students to the Controller of Examinations by hand or through email. Thereafter, no complaint in any case, will be considered.
5. The candidate ***must not*** do any rough work or writing in the OMR Answer-Sheet. Rough work, if any, may be done in the question booklet itself. Answers ***must not*** be ticked in the question booklet.
6. ***There will be no negative marking. Each correct answer will be awarded one full mark. Cutting, erasing, overwriting and more than one answer in OMR Answer-Sheet will be treated as incorrect answer.***
7. Use only **Black** or **Blue Ball Point Pen** of good quality in the OMR Answer-Sheet.
8. *Before answering the questions, the candidates should ensure that they have been supplied correct and complete booklet. Complaints, if any, regarding misprinting etc. will not be entertained* **30** *minutes after starting of the examination.*

SEAL

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(1) Effective length = L, permissible strength = 100 percent
(2) Effective length = L, permissible strength = 80 percent
(3) Effective length = 0.8 L, permissible strength = 100 percent
(4) None of the above

32. The plastic modulus of rectangular beam of width 200 mm and depth 400 mm is :

(1) 2×10^6 mm^3
(2) 5.33×10^6 mm^3
(3) 8×10^6 mm^3
(4) 1.07×10^6 mm^3

33. In cinema theatre, to avoid reverberation, the longitudinal walls should be :

(1) Perfectly parallel

(2) Converging towards screen

(3) Converging towards rear

(4) Should be curvilinear

34. The foundation are placed below ground level, to increase :

(1) Strength

(2) Workability

(3) Stability of structure

(4) All of these

35. Gantt charts indicates :

(1) Comparison of actual progress with the scheduled progress

(2) Balance of work to be done

(3) Progress cost of the project

(4) Inventory cost

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(1) Greater than total float

(2) Equal to total float

(3) Greater than independent float

(4) Less than independent float

37. In PERT analysis, the probability of completion of any activity within its expected time is :

(1) 50%

(2) 100%

(3) 75%

(4) 99.9%

38. Heat of hydration in cement is mainly due to :

(1) di-calcium silicate

(2) tri-calcium silicate

(3) tri-calcium aluminate

(4) tetra-calcium aluminate ferrite

39. Which of the following represents hardest grade of bitumen ?

(1) 30/40 (2) 60/70

(3) 80/100 (4) 100/120

40. The relation between modulus of rupture (f_{cr}) and characteristic compressive strength (f_{ck}) is :

(1) $f_{cr} = 0.7\ f_{ck}$ (2) $f_{cr} = 0.7\ \sqrt{f}_{ck}$

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42. Euler number is related to :

(1) Inertia force to pressure force

(2) Inertia force and elastic force

(3) Inertia force and viscous force

(4) Inertia force and gravity force

43. If the diameter of the capillary tube is doubled, the capillary rise will be :

(1) Doubled

(2) Unaffected

(3) Halved

(4) One-fourth

44. The unit of dynamic viscosity in MKS system is :

(1) kgf-sec/m^2

(2) newton-sec/m^2

(3) m^2/sec

(4) stroke

45. The dimensions of surface tension are :

(1) MT^{-2}

(2) MT^2

(3) MLT^{-2}

(4) MLT^2

46. For a total reaction time of 2.5 sec, coefficient of friction 0.35, design speed of 80 km/hr, what is the stopping sight distance on a highway ?

(1) 124 m

(2) 132 m

(3) 76 m

(4) 56 m

47. Following is ***not*** recommended for management of plastic waste :

(1) Autoclave

(2) Deep burial

(3) Incineration

(4) Hydroclave

48. Which of the following relations are ***correct*** ?

I. Absolute pressure = Atmospheric pressure + Gauge pressure

II. Absolute pressure = Atmospheric pressure – Vacuum pressure

III. Absolute pressure = Atmospheric pressure + Vacuum pressure

IV. Absolute pressure = Atmospheric pressure – Gauge pressure

(1) I and IV only

(2) I and II only

(3) II and III only

(4) III and IV only

49. What is the acceptable limit for pH of drinking water ?

(1) 7.5 - 9.5

(2) 9.5 -10.5

(3) 5.5 - 7.5

(4) 6.5 - 8.5

50. Stoke's law deals with :

(1) settling of fine particles

(2) turbulent flow between the parallel plates

(3) laminar flow between the parallel plates

(4) laminar flow in the tubes

51. Direct runoff consists of :

(1) surface runoff, infiltration and percolation

(2) overland flow, evapotranspiration and precipitation over stream

(3) overland flow, prompt interflow and percolation

(4) surface runoff, prompt interflow and precipitation over stream

52. Hydrology deals with :

(1) process of depletion of water resources of land

(2) process of natural science of water

(3) process of various water phases

(4) all of the above

53. Which of the following is a secondary air pollutant ?

(1) Sulphur dioxide (2) Ozone

(3) Carbon monoxide (4) Carbon dioxide

54. The hydrograph of short duration can be converted into hydrograph of longer duration by :

(1) unit hydrograph

(2) synthetic unit hydrograph

(3) s-curve method

(4) flood routing

55. Calculate the radius of a rotary curve for a vehicle speed of 40 kmph and coefficient of friction as 0.45 :

(1) 12.73 m (2) 30.5 m

(3) 22.34 m (4) 28 m

56. An aquiclude is :

(1) A non-artesian aquifer

(2) An artesian aquifer

(3) A solid impermeable layer underlying or overlying an aquifer

(4) A large underground water body

57. Prohibitory sign is meant to :

(1) Restrict speed of vehicle

(2) Warn road users of certain hazardous conditions

(3) Prohibit parking of vehicles

(4) Prohibit certain traffic movement

58. If the specific capacity of a well is 1.166 litres/sec, then the discharge from this well under a depression head of 3 m head will be :

(1) 1.66 litre/sec

(2) 3.5 litre/sec

(3) 10.5 litre/sec

(4) None of the above

59. The unit of coefficient of transmissibility is :

(1) m^2/s

(2) m/s

(3) unit less

(4) m/s^2

60. The yield of a well can be obtained by :

(1) a pumping test

(2) recuperating test

(3) a chemical test

(4) either (1) or (2)

61. The property of soil due to which water percolates through, it is known as :

(1) Liquidity (2) Capillarity

(3) Permeability (4) None of the above

62. Hygroscopic water is defined :

(1) The water held by the soil under capillary action

(2) The readily available water for the used of plants

(3) The water which is absorbed by the particles of dry soil from the atmosphere

(4) Total water content of the soil filled with water

63. Traffic density is defined as :

(1) The number of vehicles per unit length

(2) The number of vehicle moving in a specific direction per lane per day

(3) The number of vehicle passing a given point in on hour

(4) The number of vehicles moving in a specific direction per hour

64. Seepage velocity of water in soil is equal to the :

(1) discharge velocity divided by porosity

(2) discharge velocity multiplied by porosity

(3) discharge velocity divided by permeability

(4) discharge velocity multiplied by permeability

65. For a standard compaction test, the mass of hammer and the drop of hammer are as follows :

(1) 2.60 kg. and 450 mm

(2) 2.60 kg. and 310 mm

(3) 4.89 kg. and 310 mm

(4) 4.89 kg. and 450 mm

66. A phreatic line is defined as the line within a dam section below which there are :

(1) Positive equipotential lines

(2) Positive hydrostatic pressure

(3) Negative hydrostatic pressure

(4) Negative equipotential lines

67. When the Adiabatic Lapse Rate (ALR) is more than Environment Lapse Rates (ELR). then the ELR can be called as :

(1) Super adiabatic lapse rate

(2) Sub adiabatic lapse rate

(3) Dry adiabatic lapse rate

(4) Wet adiabatic rate

68. IRC recommendation for maximum width of a vehicle is :

(1) 1.75 m (2) 2.00 m

(3) 2.44 m (4) 4.88 m

69. A clay layer of thickness 10 cm and initial void ratio 0.5 undergoes settlement so that the final void ratio is 0.2. The settlement of the layer in cm is :

(1) 1 (2) 1.5

(3) 2 (4) 2.5

70. The shear strength of a soil :

(1) is directly proportional to the angle of internal friction of the soil

(2) is inversely proportional to the angle of internal friction of soil

(3) decreases with increase in normal stress

(4) decreases with decrease in normal stress

71. The earth pressure at rest is calculated by using :

(1) Euler's theory

(2) Rankine's theory

(3) Bending theory

(4) Theory of elasticity

72. In which method of disposal of municipal solid waste, the waste is dumped in the soil :

(1) Incineration

(2) Land filling

(3) Composting

(4) Shredding

73. The coefficient of earth pressure at rest for stiff clay is about :

(1) 0.4 (2) 0.5

(3) 0.6 (4) 0.8

74. Aeration of water is done to remove :

(1) Odour (2) Colour

(3) Bacteria's (4) Turbidity

75. Toughness property of an aggregate can be tested by adopting :

(1) Aggregate crushing strength test

(2) Aggregate impact test

(3) Los Angeles Abrasion test

(4) Angularity number

76. The process of obtaining increased density of soil in a fill by reduction of its pore space by the expulsion of air, is known as :

(1) Soil exploration

(2) Soil stabilization

(3) Soil compaction

(4) Consolidation

77. The effect of cohesion on a soil is to :

(1) reduce both active and passive earth pressure intensities

(2) increase both active and passive earth pressure intensities

(3) reduce active earth pressure intensity but to increase passive earth pressure intensity

(4) increase active earth pressure intensity but to reduce passive earth pressure intensity

78. When was the water (Prevention and Pollution) Act enacted by the Indian Parliament :

(1) 1970 (2) 1974

(3) 1980 (4) 1985

79. Terzaghi's bearing capacity factors are function of

(1) C and ϕ, (2) Only ϕ,

(3) ϕ, and depth of foundation (4) ϕ, depth and width of foundation

80. Failure of the stability of slopes generally occurs along :

(1) Slip plane

(2) A horizontal surface

(3) A curved surface

(4) All the surfaces

81. Which one of the following is ***true*** of a statically determinate beam ?

(1) One end is fixed, and the other end is simply supported

(2) Both the ends are fixed

(3) The beam overhangs over two supports

(4) The beam is supported on three supports

82. Which of the following are examples of indeterminate structures ?

(i) Fixed beam

(ii) Continuous beam

(iii) Two-hinged arch

(iv) Beam overhanging on both sides

Select the ***correct*** answer using the codes given below :

(1) (i), (ii) and (iii) only

(2) (i), (ii) and (iv) only

(3) (i), (iii) and (iv) only

(4) (ii), (iii) and (iv) only

83. Which one of the following is ***correct*** ? A determinate structure :

(1) Cannot be analyzed without the correct knowledge of modulus of elasticity.

(2) Must necessarily have roller support at one of its ends.

(3) Requires only statical equilibrium equations for its analysis.

(4) Will have zero deflection at its ends.

84. Match the following :

List - I	**List - II**
P. Slope deflection method	I. Force Method
Q. Moment distribution method	II. Displacement Method
R. Method of three moments	
S. Castigliano's second theorem	

(1) P-I, Q-II, R-I, S-II

(2) P-I, Q-I, R-II, S-II

(3) P-II, Q-II, R-I, S-I

(4) P-II, Q-I, R-II, S-I

85. The IRC recommendation for warning sign is expressed by :

(1) Circle on top

(2) Triangle on top

(3) Rectangle on top

(4) Square on top

86. The displacement method is also referred to as which one of the following ?

(1) Minimum strain energy method

(2) Maxwell-Mohr method

(3) Consistent deformation method

(4) Slope deflection method

87. What is the shape of influence line diagram for the maximum bending moment in respect of a simply supported beam ?

(1) Rectangular

(2) Triangular

(3) Parabolic

(4) Circular

88. A three hinged parabolic arch of span 'l' and rise 'h' is subjected to a u.d.l. of intensity 'w', then the horizontal thrust at the support is :

(1) $wl^2/8h$

(2) wl/h

(3) $wl/8h^2$

(4) $Whl/8$

89. Centre of mass of a body lies at :

(1) outside the system/body

(2) inside the system/body

(3) at centre

(4) at anywhere either inside or outside

90. Two blocks of masses 5 kg and 6 kg are connected by a spring of negligible mass and placed on a horizontal surface (frictionless). An impulse of 20 m/s velocity is given to a heavier block. The velocity of the centre of mass is :

(1) 9.09 m/s

(2) 11.09 m/s

(3) 10.90 m/s

(4) 12.90 m/s

91. A force of magnitude 5 N moves through a distance of 4 mm in a direction, inclined at 60° to the direction of force. The magnitude of the work done by the force is

(1) $10\sqrt{3}$ N.mm

(2) 10 N.mm

(3) 5 N.mm

(4) 20 N.mm

92. The coefficient of friction does ***not*** depend on :

(a) area of interface of two mating surfaces

(b) roughness of two mating surfaces

(c) the time of contact

Out of these statements :

(1) (a), (b) and (c) are correct

(2) (a) and (b) are correct

(3) (b) and (c) are correct

(4) (a) and (c) are correct

93. The most inconvenient method for parking is :

(1) 30 degree parking

(2) 45 degree parking

(3) Parallel parking

(4) Zero degree parking

94. Temporary hardness in water is due to the presence of :

(1) Carbonates

(2) Sulphates

(3) Chlorides

(4) Dissolved carbon dioxide

95. The factor which influences the design of curves is :

(1) Permissible centrifugal ratio

(2) Speed of vehicle

(3) Maximum permissible super elevation

(4) All of the above

96. A Circular ring of radius 42 cm is cut and bent into the form of a rectangle whose sides are in the ratio of 6 : 5. The small side of the rectangle is :

(1) 80 cm

(2) 30 cm

(3) 120 cm

(4) 60 cm

97. California Bearing Ratio method for design of flexible pavement takes care of mainly :

(1) Traffic intensity

(2) Soil Characteristic

(3) Property of road material

(4) Cement grounding

98. Modulus of rigidity is the ration of :

(1) Linear stress to linear strain

(2) Lateral strain to linear strain

(3) Linear stress to lateral strain

(4) Shear stress to shear strain

99. What are the dimensions of flexural rigidity of a beam element ?

(1) MT

(2) MT^{-2}

(3) ML^3T^{-2}

(4) MLT^{-2}

100. If a simply supported beam of span L carries a point load W at the mid span, then downward deflection under the load will be :

(1) $WL^3/3EI$

(2) $WL^3/8EI$

(3) $WL^3/48EI$

(4) $5/384 \cdot WL^3/3EI$

Answer keys of PHD-EE-2023-24 (CIVIL ENGG.) entrance exam dated 22.03.2024				
Q. NO.	A	B	C	D
1	3	3	2	1
2	1	3	3	2
3	3	1	2	1
4	3	1	3	3
5	2	2	1	1
6	4	2	3	2
7	3	2	1	3
8	1	3	3	1
9	4	3	1	3
10	3	4	2	4
11	3	1	4	3
12	4	2	4	1
13	1	3	4	3
14	4	2	1	1
15	2	2	2	3
16	4	2	4	2
17	3	3	3	2
18	4	3	2	2
19	3	2	2	1
20	3	3	3	1
21	2	1	4	1
22	3	2	4	2
23	2	1	2	3
24	3	3	3	2
25	1	1	4	2
26	3	2	3	2
27	1	3	4	3
28	3	1	2	3
29	1	3	1	2
30	2	4	4	3
31	3	3	1	2
32	1	1	2	3
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36	2	4	2	3
37	2	3	3	1
38	2	1	3	3
39	1	4	2	1
40	1	3	3	2
41	3	4	3	3
42	3	4	4	1
43	1	4	1	3
44	1	1	4	1
45	2	2	2	1
46	2	4	4	1
47	2	3	3	3
48	3	2	4	2
49	3	2	3	4
50	4	3	3	1

Answer keys of PHD-EE-2023-24 (CIVIL ENGG.) entrance exam dated 22.03.2024				
Q. NO.	A	B	C	D
51	4	3	3	4
52	4	1	1	4
53	4	3	3	2
54	1	1	1	3
55	2	1	3	4
56	4	1	2	3
57	3	3	2	4
58	2	2	2	2
59	2	4	1	1
60	3	1	1	4
61	3	2	3	3
62	1	3	1	3
63	3	2	3	1
64	1	3	3	1
65	1	1	2	2
66	1	3	4	2
67	3	1	3	2
68	2	3	1	3
69	4	1	4	3
70	1	2	3	4
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94	3	1	1	4
95	1	3	1	2
96	2	2	1	4
97	3	2	3	3
98	1	2	2	4
99	3	1	4	3
100	4	1	1	3