76/26

Question Booklet Alpha Code

A

Question Booklet Sl. No.

A

Total Number of Questions : 100 **Time : 90 Minutes**

Maximum Marks : 100

INSTRUCTIONS TO CANDIDATES

1. The Question Paper will be given in the form of a Question Booklet. There will be four versions of Question Booklets with Question Booklet Alpha Code viz. **A, B, C** & **D**.
2. The Question Booklet Alpha Code will be printed on the top left margin of the facing sheet of the Question Booklet.
3. The Question Booklet Alpha Code allotted to you will be noted in your seating position in the Examination Hall.
4. If you get a Question Booklet where the alpha code does not match to the allotted alpha code in the seating position, please draw the attention of the Invigilator IMMEDIATELY.
5. The Question Booklet Serial Number is printed on the top right margin of the facing sheet. If your Question Booklet is un-numbered, please get it replaced by new Question Booklet with same alpha code.
6. The Question Booklet will be sealed at the middle of the right margin. Candidate should not open the Question Booklet, until the indication is given to start answering.
7. Immediately after the commencement of the examination, the candidate should check that the Question Booklet supplied to him/her contains all the 100 questions in serial order. The Question Booklet does not have unprinted or torn or missing pages and if so he/she should bring it to the notice of the Invigilator and get it replaced by a complete booklet with same alpha code. This is most important.
8. A blank sheet of paper is attached to the Question Booklet. This may be used for rough work.
9. **Please read carefully all the instructions on the reverse of the Answer Sheet before marking your answers.**
10. Each question is provided with four choices **(A), (B), (C)** and **(D)** having one correct answer. Choose the correct answer and darken the bubble corresponding to the question number using Blue or Black Ball Point Pen in the OMR Answer Sheet.
11. **Each correct answer carries 1 mark and for each wrong answer 1/3 mark will be deducted. No negative mark for unattended questions.**
12. No candidate will be allowed to leave the examination hall till the end of the session and without handing over his/her Answer Sheet to the Invigilator. Candidates should ensure that the Invigilator has verified all the entries in the Register Number Coding Sheet and that the Invigilator has affixed his/her signature in the space provided.
13. Strict compliance of instructions is essential. Any malpractice or attempt to commit any kind of malpractice in the Examination will result in the disqualification of the candidate.

A

1. Modulus of rupture means
   A) Maximum stress at failure during compression
   B) Maximum stress at failure during tension
   C) Maximum stress at failure during bending
   D) Maximum stress at failure during torsion

2. A rectangular barge 16 m $\times$ 5 m has a depth of immersion of 1.5 m when floating in water horizontally. The mass of the barge is
   A) 80 Tonnes
   B) 100 Tonnes
   C) 120 Tonnes
   D) 140 Tonnes

3. Cost of a machinery is Rs. 21,000/-. It is desired to generate the sinking fund by investing in a bank at 10% interest for two years. Then the annual sinking fund will be rupees
   A) 10,500/-
   B) 10,000/-
   C) 23,100/-
   D) 2,100/-

4. An estimate of flexural strength of concrete (f_{cr} in N/mm^2) can be obtained from characteristic compressive strength (f_{ck} in N/mm^2) as
   A) $0.36\sqrt{f_{ck}}$
   B) $0.42\sqrt{f_{ck}}$
   C) $0.70\sqrt{f_{ck}}$
   D) $5000\sqrt{f_{ck}}$

5. A column of length L with both ends hinged has crippling load P. If the length of the column is doubled what would be the changed crippling load ?
   A) 2P
   B) 0.25P
   C) 0.5P
   D) 1.5P

6. A 6 hour unit hydrograph of a catchment of area 126 km^2 is triangular in shape with a base width of 70 hours. A direct runoff hydrograph of this catchment due to 2 cm effective rainfall 6 hour duration will have a peak flow rate in m^3/s of
   A) 12.5
   B) 20.0
   C) 37.5
   D) 60.0

7. Purpose of Anallatic lens in a tacheometer is to obtain
   A) Additive constant equal to zero
   B) Multiplying constant equal to hundred
   C) Erect image
   D) Clear focussing

8. In case of activities in which duration of the activity is uncertain, _____ technique is used.
   A) BAR
   B) CPM
   C) PERT
   D) T & P

9. Maximum bending moment for a fixed beam of length L, loaded with a concentrated load W at the centre is given by
   A) WL/4
   B) WL/8
   C) WL/12
   D) WL/24

10. The ordinate of a mass curve at any time is equal to
   A) The ordinate of flood hydrograph at that time
   B) The sum of ordinates of flood hydrograph upto that time
   C) The area under the flood hydrograph upto that time
   D) The ordinate of the demand curve at that time

11. In Levelling, the Two-Peg method is used to make
   A) Line of collimation parallel to axis of telescope
   B) Line of collimation parallel to axis of bubble tube
   C) Axis of bubble tube perpendicular to vertical axis
   D) None of the above

12. Vee-Bee test is used to determine
   A) Workability of concrete
   B) Consistency of cement
   C) Setting time of cement
   D) Compressive strength of cement

13. Maximum permissible stress in case of compression in columns for medium tensile steel reinforcement is
   A) 130 N/mm^2
   B) 140 N/mm^2
   C) 190 N/mm^2
   D) 230 N/mm^2

14. Two beams AC and CD of lengths 9 m and 10 m respectively are hinged at C. These are supported on rollers at the left end A and right end D. A hinged support is provided at B, 7 m from A. Reactions at the hinge C and the support B when a load of 700 N acts at a point 6 m from D will be respectively
   A) 570 N and 130 N
   B) 420 N and 540 N
   C) 700 N and 0 N
   D) 175 N and 175 N

15. The lift on a body immersed in a fluid stream is
    A) Due to buoyant force
    B) Always in opposite direction to gravity
    C) The resultant fluid force on the body
    D) The force component normal to the approach velocity

16. As per PWD data book, the rate of 10 dm^3 of a certain item was obtained as Rs. 10.70. The cost of 12 m^3 of the same item will be
    A) Rs. 12,840/-
    B) Rs. 10,700/-
    C) Rs. 6,420/-
    D) Rs. 12.84/-

17. A roof that slopes in two directions is called
    A) Hip roof
    B) Shed roof
    C) Gable roof
    D) Mansard roof

18. As per Kerala Municipal Building rules the minimum width required for a stair is
    A) 1.00 m
    B) 1.10 m
    C) 1.20 m
    D) 1.50 m

19. Mark the false statement.
    A) Contour lines of different elevations cannot cross each other
    B) Contour lines can unite to form a single line
    C) Contour lines close together indicate steep slope
    D) Contour lines with higher values inside represents a valley

20. A one-fourth scale model of an automobile is to be tested in a wind tunnel at a speed corresponding to the prototype speed of 60 kmph. The corresponding model speed should be (only inertial and viscous forces need to be considered)
    A) 240 kmph
    B) 120 kmph
    C) 60 kmph
    D) 15 kmph

21. The vertical sides of door and window openings are known as
    A) Soffits
    B) Reveals
    C) Jambs
    D) Intrados

22. Moment of Inertia of a triangular cross section of base width b and height h about an axis passing through the vertex and parallel to the base is given by
    A) $bh^3/36$
    B) $bh^3/24$
    C) $bh^3/12$
    D) $bh^3/4$

23. Design period recommended by GOI manual for storage dams of a water supply scheme is
    A) 150 years B) 100 years C) 50 years D) 20 years

24. Which of the following renders temporary hardness to water ?
    A) Magnesium carbonate B) Magnesium nitrate
    C) Calcium sulphate D) Calcium chloride

25. Which of the following water distribution systems can be extended easily ?
    A) Reticulation system B) Ring system
    C) Interlaced system D) Dead end system

26. Chlorine is most effective as disinfectant of water
    A) If pH of water is slightly less than 7
    B) If pH of water is slightly more than 5
    C) If pH of water is slightly less than 10
    D) At all pH levels

27. The sewer which transports sewage to the point of treatment
    A) Trunk sewer B) Main sewer
    C) Outfall sewer D) Lateral sewer

28. Range of flow velocity adopted for the design of grit removal basin
    A) 25 to 30 cm/s B) 2.5 to 3 cm/s
    C) 2.5 to 3 m/s D) 0.25 to 0.3 cm/s

29. Which of the following is a secondary air pollutant ?
    A) Carbon monoxide (CO) B) Sulphur dioxide (SO_2)
    C) Hydrocarbons D) Sulphuric acid (H_2SO_4)

30. In under reinforced beams, failure
    A) is ductile B) is initiated by yielding of steel
    C) happens after enough warning D) all of the above are correct

31. Maximum horizontal distance between parallel main reinforcement bars in slabs as stipulated by IS456 is
    A) Five times the effective depth of solid slab
    B) 300 mm
    C) Four times the effective depth of solid slab
    D) 450 mm

32. Maximum surface width of crack permissible in members, where cracking in the tensile zone is harmful, is

A) 1 mm B) 0.2 mm C) 0.3 mm D) 4 mm

33. All columns are to be designed for minimum eccentricity of

A) 20 mm B) 50 mm C) 100 mm D) 150 mm

34. In a counterfort retaining wall, heel slab and vertical stem are designed as

A) Simply supported slabs B) Continuous slabs
C) Cantilever slabs D) Ties

35. Steel sections suitable for indeterminate frames which form collapse mechanisms

A) Slender B) Semi compact
C) Compact D) Plastic

36. Permissible stresses for select grade timber is _____ times that of standard timber.

A) 1.25 B) 0.75 C) 1.16 D) 0.84

37. The degree of saturation of a soil sample can vary between

A) 0 and 1 B) 0% and 100%
C) Both A) and B) D) None of the above

38. The maximum particle size for which Darcy's law is generally applicable is

A) 0.2 mm B) 0.5 mm
C) 1.0 mm D) 2.0 mm

39. For a saturated clay layer of thickness H subjected to double drainage conditions, the maximum drainage path length is

A) H B) 2H C) H/2 D) H/4

40. The angle of the failure plane with the major principal plane according to the Mohr-Coulomb failure criterion is

A) $45° + \left(\frac{\phi}{2}\right)$ B) $45° - \left(\frac{\phi}{2}\right)$
C) $45° - \phi$ D) $90° - \phi$

41. For a dry infinite slope composed of purely cohesion-less soil, the maximum stable slope angle is equal to

A) $\beta = \phi$, the angle of internal friction B) $\beta = \phi/2$
C) $\beta = \phi/3$ D) not related to ϕ

42. The ultimate bearing capacity of a shallow foundation on sand is reduced to approximately _____ when the water table rises to the ground surface.
    A) 25% of its original value
    B) 50% of its original value
    C) 75% of its original value
    D) 100% of its original value

43. The efficiency of a pile group may become less than unity primarily due to
    A) Increased pile length
    B) Overlapping stress zones of adjacent piles
    C) Increase in pile diameter
    D) Increase in pile cap thickness

44. IRC suggested average value of perception-reaction time of drivers for calculation of overtaking sight distance is
    A) 1 sec
    B) 1.5 sec
    C) 2 sec
    D) 2.5 sec

45. Valley curves on highways are designed mainly based on
    A) Stopping Sight Distance (SSD)
    B) Overtaking Sight Distance (OSD)
    C) SSD and OSD
    D) Rider comfort and headlight sight distance

46. Which of the following bituminous mixes is a gap-graded mix ?
    A) Stone Matrix Asphalt
    B) Bituminous Concrete
    C) Dense Bituminous Mecadam
    D) Semi Dense Bituminous Concrete

47. A Peak Hour Factor (PHF) close to 1 indicates
    A) Uniform traffic throughout PH
    B) Very low traffic during PH
    C) Highly fluctuating traffic during PH
    D) Frequent traffic congestion during PH

48. Which of the following factors is not considered in determining the orientation of runway ?
    A) Prevailing wind direction
    B) Soil bearing capacity
    C) Topography of the area
    D) Cross wind component

49. According to Greenshields model, the flow-density relationship is
    A) Linear
    B) Logarithmic
    C) Exponential
    D) Parabolic

50. The primary purpose of providing negative cant on railway tracks is to
    A) Increase speed of train on branch line
    B) Maintain required super elevation on main line while accommodating a branch line
    C) Improve drainage on railway track
    D) Eliminate centrifugal force on curves

51. Graph of intensity of rainfall against the time interval is
    A) Hydrograph B) Mass curve C) Hyetograph D) None of the above

52. Which of the following are components of runoff ?
    i. Surface runoff
    ii. Subsurface runoff
    iii. Base flow
    iv. Interflow
    A) i and ii only B) i, ii and iv only C) i, ii and iii only D) i, ii, iii and iv

53. Select the correct statements about SCS Curve Number method for runoff computation :
    i. SCS-CN method is based on the water balance equation and two fundamental hypotheses.
    ii. First hypothesis equates the ratio of the actual amount of direct surface runoff to the maximum potential surface runoff to the ratio of the amount of annual infiltration to the amount of potential maximum retention.
    iii. Second hypothesis relates the initial abstraction to the potential maximum retention.
    A) i and ii only B) i, ii and iii C) i and iii only D) ii and iii only

54. The wetness of the soil prior to the occurrence of rainstorm is known as
    i. Antecedent Moisture Content
    ii. Antecedent Runoff Condition
    iii. Gravimetric Soil Moisture Content
    A) i only B) ii only C) i and ii only D) ii and iii only

55. Lag time of a Unit Hydrograph is
    i. Time period of direct runoff after the end of excess rainfall.
    ii. Time interval between the centre of a unit storm and peak of corresponding hydrograph.
    iii. Total time period of direct runoff due to a rainfall event.
    A) i only B) ii only C) iii only D) i and ii only

56. Component of drop structure helps to prevent backward flow into space between gully wall and side wall

A) Apron B) End sill

C) Head wall extension D) Wing walls

57. When water moves over the soil surface, the air occupied in soil voids exert a pressure on soil particles is known as

A) Hydraulic action B) Abrasion C) Attrition D) Solution

58. Measure of erosivity of rainfall can be quantified using

A) E I_{30} Index B) KE > 25 Index

C) Both A) and B) D) None of the above

59. According to USDA land capability classification, bottom lands subjected to frequent overflow that prevent the normal production of cultivated crops comes under

A) Class – IV B) Class – V C) Class – VI D) Class – VII

60. In US system of soil taxonomy, soils with deep, dark relatively fertile top soil usually formed under grassland vegetation with granular and crumb structure for surface soils are termed as

A) Spodosols B) Inceptisols C) Vertisols D) Mollisols

61. Calculate the peak run off rate for 10 years return period from a micro watershed of 36 ha. The rainfall intensity for the time period equal to Time of concentration is 7.5 cm hr^{-1}. Assume runoff coefficient as 0.5.

A) 0.0375 m^3 sec^{-1} B) 0.375 m^3 sec^{-1}

C) 3.75 m^3 sec^{-1} D) 37.5 m^3 sec^{-1}

62. Which of the following statements are correct with respect to mechanics of wind erosion ?

i. Surface creep is the movement of soil particles of size 0.05 to 0.5 mm by rolling along the land surface.

ii. Saltation is the movement of soil particles in a series of bounces over the soil surface.

iii. About 3 to 38% soil particles are transported through Suspension mechanism.

A) i only B) ii only C) i and ii only D) ii and iii only

63. Estimate the Ruggedness Number for a watershed of area 40 ha having a relief of 50 m and total length of stream segments 4000 m.

A) 0.25 B) 0.5

C) 0.625 D) 1.6

64. The bunds constructed between two contour bunds to limit the horizontal spacing by its maximum extent is named as

A) Marginal bund
B) Lateral bunds
C) Supplemental bunds
D) Shoulder bunds

65. Terrace width when batter slope is 1:1 is

A) WS/100
B) WS/100 – S
C) 2 WS/100 – S
D) 2 WS/200 – S

66. The difference between the time at which the water front reaches a point and tail water recedes from the same point is known as

A) Time of concentration
B) Infiltration opportunity time
C) Recession time
D) Stream flow time

67. Select indirect methods of artificial ground water recharging :

i. Induced recharging.
ii. Recharge pit and shafts.
iii. Pressure injection grouting.
iv. Hydro fracturing.
v. Stream augmentation.

A) i, ii and v only
B) ii, iii and iv only
C) i, iii and iv only
D) All of the above

68. In the land levelling method adapted to very flat land or land with undulating topography, which one of the following is desired to develop a uniform relief ?

A) Plane method
B) Plan inspection method
C) Contour adjustment method
D) Profile method

69. When there is time lag between lowering of two water levels in semi confined aquifer, it is

A) Semiconfined aquifer with delayed yield
B) Semiconfined aquifer with prompt yield
C) Both A) and B)
D) None of the above

70. Select the correct statements about soil moisture measuring instruments :
    i. Electrical resistance measuring method is based on the principle 'change in moisture content of soil produces a change in electrical conductivity in a porous block placed in the soil.'
    ii. Time Domain Reflectometry is based on dielectric constant of water and measures propagation of electromagnetic waves.

    A) i only B) ii only C) Both i and ii D) Neither i and ii

71. Considering assumption made in Hooghoudt's equation for spacing of drains, select the correct statements :
    i. The soil profile is homogenous.
    ii. The hydraulic gradient at any point in the soil profile is equal to the slope of water table above the point, dy/dx.
    iii. There is a permeable layer underlying the drain at a depth, d.
    iv. The origin of the coordinates is assumed to be on the permeable layer below the centre of one of the drains.

    A) i and ii only B) i, ii and iii only C) i, ii and iv only D) iii and iv only

72. The layout of tile drainage system which consists of parallel laterals that enter the main at an angle from both sides is

    A) Random B) Herringbone C) Gridiron D) Interceptor

73. Ratio of difference in hydraulic head to distance between the two points along the path of flow in soils is known as

    A) Hydraulic conductivity B) Horizontal hydraulic conductivity
    C) Hydraulic head D) Hydraulic gradient

74. The design value at which water is to be removed from a drainage area expressed as the depth of water removed per unit of time is

    A) Drainage coefficient B) Drainage design rate
    C) Drainage modulus D) All of the above

75. The vertical distance between the highest water level anticipated in the design and top of the retaining banks, provided to prevent overtopping of structures is

    A) Hydraulic slope B) Hydraulic radius
    C) Freeboard D) Angle of repose

76. Calculate head loss due to friction in a PVC pipe of size 4 inches and 100 m long, when water is flowing at a velocity 3 m sec^{-1}, assume the value of coefficient of friction for PVC pipe as 0.005.

    A) 9.17 m B) 0.23 m C) 18.34 m D) 3.06 m

77. Iso-efficiency lines of pumps are plotted on which curves of a Composite characteristic curve ?
    A) Efficiency curve
    B) BHP curve
    C) Head capacity curve
    D) Performance curve

78. Loss of priming after starting a pump may be due to
    A) Low NPSH available
    B) High NPSH available
    C) Low speed of prime mover
    D) High speed of prime mover

79. Which of the following is the correct sequential arrangement of different components in the head control unit of a drip irrigation system ?
    A) Pump – Bye pass valve – Screen filter – Pressure gauge – Control valve – Venturi unit – Hydro cyclone filter – N R valve
    B) Pump – N R valve – Bye pass valve – Sand filter – Pressure gauge – Control valve – Venturi unit – Screen filter
    C) Pump – N R valve – Bye pass valve – Disc filter – Pressure gauge – Control valve – Venturi unit – Sand filter
    D) N R valve – Pump – Sand filter – Bye pass valve – Pressure gauge – Control valve – Venturi unit – Disc filter

80. The irrigation system consists of a pipe line rotating around a spindle point and supported by a large number of self-propelled towers is known as
    A) Rotating head system
    B) Perforated type system
    C) Rain gun system
    D) Centre pivot system

81. Expression to find out the area irrigated by an emitter in a drip irrigation system if the plant row spacing is L (m), emitter spacing is S (m), % of irrigated area is P and the number of emitters in each emission point is Ne is
    A) $A_i = 100\ N_e/LSP$
    B) $A_i = LS\ N_e/100\ P$
    C) $A_i = 100\ P/LS\ N_e$
    D) $A_i = LSP/100\ N_e$

82. Ratio of volume of water drained to total volume of saturated soil in an unconfined aquifer is
    A) Drainable porosity
    B) Storage coefficient
    C) Hydraulic coefficient
    D) Intrinsic permeability

83. The low head, high discharge pumps commonly used for drainage and locally known as ‘Petti and para’ is a
    A) Centrifugal pump
    B) Submersible pump
    C) Mixed flow pump
    D) Axial flow pump

84. A diffuser type, multi stage, vertical shaft, submersible, centrifugal pump with the pumping element suspended from the discharge line is
    A) Jet Pump
    B) Vertical Turbine Pump
    C) Horizontal Turbine Pump
    D) Axial Flow Pump

85. The actual area irrigated in a year from an outlet is called
    A) Culturable command area
    B) Gross command area
    C) Intensity of irrigation
    D) All of the above

86. The thermal efficiency of the diesel engine approaches to that of petrol engine as
    A) V1/V2 is zero
    B) V3/V2 is zero
    C) V1/V2 is one
    D) V3/V2 is one

87. The piston pin is also called as
    A) Crank pin
    B) Cam pin
    C) Both A) and B)
    D) Wrist pin

88. The secondary fuel filter in fuel supply of diesel engine is made of
    A) Cloth
    B) Paper
    C) Thin wire
    D) Felt

89. Air cooling system generally found in _____ engines.
    A) Multi cylinder
    B) Four cylinder
    C) Two cylinder
    D) Single cylinder

90. The type of pump used in forced feed lubrication system of four cylinder tractor engine is
    A) Gear type
    B) Plunger type
    C) Centrifugal type
    D) Augur type

91. Generally the landside in three bottom tractor drawn mounted type Mould Board plough will be provided at
    A) landside in front bottom only
    B) landside in middle bottom only
    C) landside in rear bottom only
    D) in all the bottoms

92. In an offset disc harrow, usually the angle between two gangs is
    A) At 90°
    B) 180°
    C) Less than 90°
    D) Greater than 90°

93. The size of seed drill is doubled and the speed of operation reduced to 50 percent of operating speed, then the coverage will be
    A) Doubled
    B) Half
    C) Three fourth
    D) Remains same

94. The recommended overlap for cone nozzles varies from
A) 20 – 40%
B) 10 – 20%
C) 5 – 10%
D) 0 – 5%

95. In a combine harvester the ratio of reel peripheral speed to forward speed (reel speed index) should normally be in the range of
A) 1.25 – 1.75
B) 1.25 – 2.0
C) 1.25 – 1.50
D) 1.5 – 2.5

96. After attaining the thermal velocity then density of the particle is greater than the density of the fluid
A) The particle will move downward
B) The particle will move upward
C) The particle will move tangential
D) The particle will neither move upward nor move downward nor move tangential

97. In psychometric chart the dry bulb temperature is situated at
A) Horizontal lines
B) Inclined lines
C) Curved lines
D) Vertical lines

98. The Falling rate drying occurs if _____ than critical moisture content.
A) Equilibrium moisture content is more
B) Initial moisture content is less
C) Bound moisture is more
D) Final moisture content is more

99. Which of the following method causes volumetric heating of food products ?
A) Pulsed electric field
B) Retort processing
C) High pressure processing
D) Microwave/ohmic heating

100. Fouling factor is used
A) In heat exchanger design as safety factor
B) In case of Newtonian fluids
C) When a liquid exchange heat with a gas
D) None of the above

Space for Rough Work