

Instructions:

1. Ensure that all pages are printed.
2. Use Black ball pen only
3. Change in option is not allowed
4. There is no negative marking
5. Use of non-programmable scientific calculator is allowed

1. Number of unknowns in statically determinate problems are

A Not more than 3	B 3 only
C 2	D More than 3
2. The shear strength of mild steel, as compared to its tensile strength, is about

A $\frac{1}{4}$	B $\frac{1}{3}$
C $\frac{1}{8}$	D $\frac{1}{2}$
3. A simply supported beam with rectangular cross-section is subjected to a central concentrated load. If the width and depth of the beam are doubled, then the deflection at centre of the beam will be reduced to

A 50%	B 25%
C 12.5%	D 6.25%
4. Principal strains occur in the direction of

A principal stresses	B principal planes
C coordinates	D orthogonal planes
5. The radial stress in a thin cylindrical shell is

A negligible	B $\frac{Pr}{t}$
C $\frac{Pr}{2t}$	D $\frac{Pr}{4t}$
6. An orthotropic material has

A non-homogeneous property	B inelastic properties
C different properties in three perpendicular directions	D same properties in orthogonal directions
7. In a beam AB (end A is fixed), the reacting moment $M/2$ at the end A due to application of moment at B is known as

A carry over moment	B distribution moment
C stiffness moment	D fixed end moment
8. The fixed end in a conjugate beam is taken in actual beam is

A simply supported	B free end
C fixed	D hinged
9. Slope and deflection of beams of varying flexural rigidity may be easily computed by the method of

A Macaulay	B Mohr
C Conjugate beam	D Moment distribution
10. The kinematic indeterminacy is determined using _____ for pin jointed plain frames

A $2j - r$	B $3j - r$
C $4j - r$	D $6j - r$
11. The stiffness coefficient K_{ij} indicates

A force at 'i' due to a unit deformation at 'j'	B deformation at 'j' due to a unit force at 'i'
C deformation at 'i' due to a unit	D force at 'j' due to a unit deformation at

26. Box type structure of caisson has the shape of
 A rectangle B hexagon
 C triangle D slit
27. The factor safety for pier foundation on rock bed is generally taken as
 A 1.5 to 2 B 5 to 8
 C 2 to 3 D 3 to 5
28. Dynamic formulae cannot be used to obtain carrying capacity in
 A Dry sands B Saturated sands
 C Dry gravels D Saturated clays
29. In the region of 'made up soil', the type of foundation most suitable is
 A isolated footing B pile foundation
 C combined footing D stepped foundation
30. For efficient dissipation of the energy, the Froude number of the incoming flow should be between
 A 2 to 4 B 4.5 to 9
 C 9 to 11 D 11.5 to 13
31. The critical slope in an open channel is
 A directly proportional to N B directly proportional to N^2
 C inversely proportional to N D inversely proportional to N^2
32. Pitot tube is used to measure
 A pressure head B velocity head
 C discharge coefficient D velocity variation
33. Rotameter is used to measure
 A velocity through the pipe B discharge through the pipe
 C velocity profile through the pipe D static pressure in the pipe
34. Concept of boundary layer was first introduced by
 A Von-Karman B Nikuradse
 C Bernoulli D Prandtl
35. The total energy line in a pipe flow is always higher than hydraulic gradient line. The vertical distance between the two represents
 A a datum head B pressure head
 C the velocity head D piezometric head
36. A hydraulic model of a spillway is constructed with a scale 1:16. If the prototype discharge is 2048 cumec, then the corresponding discharge for which the model should be tested is
 A 1 cumec B 2 cumec
 C 4 cumec D 8 cumec
37. A well is considered to be good if it is sunk into
 A Clay B Sand
 C Coarse gravel D Silt
38. Humidity is measured by
 A hydrometer B hyetometer
 C anemometer D hygrometer
39. Infiltration rate is always
 A more than the infiltration capacity B less than the infiltration capacity
 C equal to or less than the infiltration capacity D equal to or more than the infiltration capacity

40. 'Bank Storage' in a dam reservoir
 A increases the computed reservoir capacity B decreases the computed reservoir capacity
 C sometimes increases and sometimes decreases the computed reservoir capacity D has no effect on the computed reservoir capacity
41. The ratio of the 'average width' to the 'axial length' of a drainage basin is called
 A compactness coefficient B ratio factor
 C form factor D runoff factor
42. Hydraulic jump is an example of
 A rapidly varied flow B spatially varied flow
 C gradually varied flow D unsteady flow
43. The contraction joints in a gravity dam are provided
 A to ensure proper transfer of stresses B to eliminate stress concentrations
 C to prevent cracks in the dam that may develop due to temperature changes D to facilitate the construction of dam in stages
44. Cross drainage works are not required when the canal is completely
 A a ridge canal B a contour canal
 C side slope canal D carrier canal
45. The weight of silt carried by the river per unit volume of water is termed as
 A silt grade B silt factor
 C silt ratio D silt charge
46. The crest level of barrage is kept
 A almost at the river bed level with large gates B high with no gates
 C high with large gates D low with no gates
47. The suction pressure on an ogee spillway is caused when the head on the spillway is
 A equal to the design head B < the design head
 C > the design head D \geq the design head
48. The ratio of maximum sewage flow to average sewage flow for mains up to 1 m diameter is
 A 1.5 B 2
 C 3 D 4
49. Lead poisoning occurs when the lead content in water is
 A 50 – 100 ppm B 30 – 50 ppm
 C 3 – 5 ppm D 0.3 – 0.5 ppm
50. Bleaching powder is
 A lime B chloride of lime
 C hypo-chlorite of lime D hypo-chloride of lime
51. Beds of granular activated carbon can be made to act
 A as filters B as adsorbent
 C both as filter and adsorbent D as coagulants
52. The lowest point on the inside surface of a sewer is known as
 A discharge point B invert
 C silting point D sewer point
53. In plain settling tank, suspended solids are reduced from
 A 10 to 20% B 20 to 40%
 C 40 to 70% D 70 to 90%

54. The principal air pollutant responsible for leaching and discoloration on building materials is
 A NO₂ B Ozone
 C Oxidants D SO₂
55. _____ is a primary air pollutant
 A Oxides of nitrogen B Ozone
 C Formaldehyde D Peroxy Acetyl Nitrate
56. If D.O concentration falls down to zero in any natural drainage, it indicates the zone of
 A Degradation B Active decomposition
 C Recovery D Cleaner Water
57. The visible plume, which is in form of fan or cone with well defined cone and dragged or diffused bottom is called
 A looping B conning
 C lofting D fumigation
58. The standard concentration of carbon monoxide adopted by Environmental Protection Agency (EPA) is _____ ppm (1 hour, Not more than once per year)
 A 20 B 25
 C 30 D 35
59. _____ are used only for removing coarse dusts (> 1-2 μ range) where high efficiency is not required.
 A Spray tower B Cyclone scrubber
 C Venturi scrubber D Packed scrubber
60. The rate of change of radius of transition curve is variable in
 A cubic parabola B lemniscate
 C Both (A) and (B) D spiral
61. Soundness test is performed to know the behavior of aggregate against
 A weathering action B corrosion
 C fatigue D creep
62. IRC has recommended Vehicle Damage Factor (VDF) for the initial traffic volume of 1000 CV/day (commercial vehicles per day) in plain terrain is
 A 1.5 B 2.5
 C 3.5 D 4.5
63. The minimum camber, as recommended by Indian Road Congress, for water bound macadam surface road is
 A 1.7 to 2% B 2 to 2.5%
 C 2.5 to 3% D 3 to 4%
64. The time by which activity completion time can be delayed without affecting the start of succeeding activities, is known as
 A Duration B Total float
 C Free float D Interfering float
65. The lane distribution factor for four lanes single carriage-way is _____ in both directions.
 A 100% B 75%
 C 60% D 40%
66. In traffic engineering, _____ is the number of vehicles occupying a unit length of the moving lane of a roadway at a given instant.
 A Traffic volume B Headway
 C Traffic density D Space mean speed
67. The sign 'Overtaking Prohibited' is an example of
 A Regulatory sign B Cautionary sign
 C Informatory sign D Warning sign

68. The maximum length of vehicle that can be used on Indian Roads is
 A 8 m B 12 m
 C 13 m D 14 m
69. The combined movement of merging and diverging of traffic streams moving in the same general direction is called
 A at grade B rotary
 C intersecting D weaving
70. _____ percentile speed shows the vehicles whose speed may cause interference with traffic stream.
 A 15th B 50th
 C 85th D 98th
71. _____ change the length of green signal interval, in accordance with the actual volumes on the particular approach of the intersection.
 A Co-ordinated traffic signals B Vehicle actuated signals
 C Flashing signals D Linked traffic signals
72. FAA recommends that the runway length after having been corrected for elevation and temperature should be further increased at the rate of _____ for every 1% of effective gradient.
 A 10% B 20%
 C 30% D 40%
73. The normal landing case require that aircraft should come to a stop within _____ of the landing distance.
 A 40% B 50%
 C 60% D 70%
74. In Railway Engineering, the flanges of wheels are in the shape of a cone with a slope of about
 A 1 in 20 B 1 in 25
 C 1 in 30 D 1 in 35
75. Latitude and departure of a station with respect to the preceding station is called
 A consecutive coordinate B cylindrical coordinate
 C cartesian coordinate D spherical coordinate
76. Radiation plane table surveying is the best suited when
 A distances are long but accessible B distances are short and accessible
 C distances are long and inaccessible D distances are short but inaccessible
77. The drainage layer is
 A Surface course B Subbase
 C Base Course D Subgrade
78. _____ is an operation of levelling in which a line of levels is run to determine the approximate elevations along a route
 A Reciprocal levelling B Profile levelling
 C Check levelling D Fly levelling
79. When the length of any chord of a curve is less than peg interval, it is known as
 A Sub chord B Small chord
 C Normal chord D Short chord
80. Froude's transition curve is
 A Bernoulli's lemniscate B Cubic Parabola
 C Cubic spiral D Ellipse

81. The possible value(s) of determinant of an elementary matrix is/are
- | | | | |
|---|---|---|------------|
| A | 1 | B | ± 1 |
| C | 0 | D | any number |
82. If $AB = I$, where I is the identity matrix, then
- | | | | |
|---|--------------|---|--------------------|
| A | $BA = I$ | B | $A^{-1} = B$ |
| C | $B^{-1} = A$ | D | $B^{-1}A^{-1} = I$ |
83. Which form of numbers from given below is not an indeterminate form?
- | | | | |
|---|------------|---|-----------------|
| A | 1^∞ | B | 0^0 |
| C | ∞^0 | D | ∞^∞ |
84. A local minimum value point of $f(x) = \frac{1}{3}x^3 - 2x^2 + 3x$ is
- | | | | |
|---|---|---|----|
| A | 3 | B | -1 |
| C | 1 | D | -3 |
85. For the backward difference operator ∇ , $\nabla^2 y_2$ is
- | | | | |
|---|---------------------------|---|-----------------------------------|
| A | $\nabla y_2 - \nabla y_1$ | B | $\nabla y_3 - \nabla y_2$ |
| C | $y_3 - 2y_2 + y_1$ | D | $\nabla y_{5/2} - \nabla y_{3/2}$ |
86. If (x_0, y_0) is a local extreme value of $u = f(x, y)$, then at (x_0, y_0) , which of the following statements is incorrect?
- | | | | |
|---|------------------------|---|-------------------------|
| A | $u_x = 0$ | B | $u_y = 0$ |
| C | $u_x = 0$ or $u_y = 0$ | D | $u_x = 0$ and $u_y = 0$ |
87. For $u = \tan^{-1}\left(\frac{y}{x}\right)$, $\frac{\partial u}{\partial x} =$ _____
- | | | | |
|---|------------------------|---|------------------------|
| A | $\frac{y}{x^2 + y^2}$ | B | $\frac{x}{x^2 + y^2}$ |
| C | $\frac{-x}{x^2 + y^2}$ | D | $\frac{-y}{x^2 + y^2}$ |
88. For the function $u = x^3 \phi(y/x)$ the value of $x^2 u_{xx} + 2xy u_{xy} + y^2 u_{yy}$ is
- | | | | |
|---|------|---|------|
| A | u | B | $2u$ |
| C | $3u$ | D | $6u$ |
89. For $\vec{r} = x\hat{i} + y\hat{j} + z\hat{k}$, $\text{div}(\vec{r}) =$ _____
- | | | | |
|---|-------------------------------|---|-------------------------------|
| A | 0 | B | 3 |
| C | $\hat{i} + \hat{j} - \hat{k}$ | D | $\hat{i} + \hat{j} + \hat{k}$ |
90. For an analytic function $f(z) = u(x, y) + iv(x, y)$, the correct option is
- | | | | |
|---|-------------------------------|---|------------------------------|
| A | $u_z = -v_y$ and $u_y = -v_x$ | B | $u_z = v_y$ and $u_y = -v_x$ |
| C | $u_z = v_y$ and $u_y = v_x$ | D | $u_z = -v_y$ and $u_y = v_x$ |
91. What is the order of zero of $f(z) = \frac{(z^2-1)(z-1)}{z^6+1}$ at $z = 1$?
- | | | | |
|---|---|---|---|
| A | 1 | B | 2 |
|---|---|---|---|

92. Let E be the event that a student will appear in PG CET examination and F be the event that a student will appear in GATE examination. If $P(E) = 0.70$, $P(F) = 0.50$ and $P(E \cap F) = 0.30$, then what is the probability that the student will appear in one of the examination?
- A 0.40 B 1.00
C 0.90 D 0.85
93. In a random experiment of rolling a die, A is the event of turning odd number and B is the event of turning prime number on the die in a single role. Then $P(B/A) =$ _____
- A $\frac{1}{2}$ B $\frac{2}{3}$
C $\frac{1}{3}$ D $\frac{3}{4}$
94. $\int_0^{\ln 2} e^{e^x} e^{2x} dx =$ _____
- A $e^2 - e$ B e^2
C $2e^2$ D $e^2 - 2e$
95. If $L\{f(t)\} = \bar{f}(s)$ then $L\left\{\frac{f(t)}{t}\right\}$ is _____
- A $\int_s^\infty \bar{f}(u) du$ B $\frac{\bar{f}(s)}{s}$
C $-\frac{d}{ds} \bar{f}(s)$ D $s\bar{f}(s)$
96. $L\{H(t-2)e^{t-2}\} = \frac{\quad}{\quad}$. Here $H(t-a)$ is Heaviside step function.
- A $\frac{e^{-2s}}{s-1}$ B $\frac{e^{2s}}{s-1}$
C $\frac{s-2}{e^{-2s}}$ D $\frac{s-2}{e^{2s}}$
97. A coin is tossed 5 times. What is the probability of getting three head?
- A $\frac{5}{48}$ B $\frac{5}{16}$
C $\frac{15}{48}$ D $\frac{25}{48}$
98. For the differential equation $\frac{d^2y}{dx^2} - 6y = x^2 + 2$, its particular integral is _____
- A $\frac{1}{6}x^2 - \frac{7}{18}$ B $-\frac{1}{6}x^2 + \frac{7}{18}$
C $\frac{1}{6}x^2 + \frac{7}{18}$ D $-\frac{1}{6}x^2 - \frac{7}{18}$
99. $\frac{\partial^2 u}{\partial x^2} = c^2 \frac{\partial^2 u}{\partial y^2}$ is _____
- A one dimensional wave equation B two dimensional wave equation
C one dimensional Laplace equation D two dimensional Laplace equation
100. The line integral $\frac{1}{2} \int_C (x dy - y dx)$, for a simple closed curve C represents _____
- A length of the curve B area bounded by the curve
C half the length of the curve D none