

SECTION I (CIVIL ENGINEERING)

1. The bending moment is maximum at a section through O where shear force
(A) is constant
(B) is having no relationship with shear force
(C) changes sign passing through section O
(D) is maximum.
2. A two hinged arch is statically indeterminate to
(A) 2nd degree
(B) single degree
(C) nth degree
(D) none of the above.
3. A fixed beam of span 'l' sinks by 'Δ' at the right hand support. If 'EI' is modulus of flexure, the fixed end moment at right support will be
(A) $+ 6EI \Delta/l^2$
(B) $- 3EI \Delta/l^2$
(C) $+ 3EI \Delta/l^2$
(D) $- 6EI \Delta/l^2$.
4. Cantilever method of analyzing the building frames is based upon the assumption
(A) point of contra-flexure in each member lies at its mid span
(B) point of contra-flexure in each member lies at its mid height
(C) both (a) and (b) above
(D) none of the above.
5. The carry over factor for a beam whose far end is guided roller is
(A) 1/2
(B) 0
(C) 1
(D) -1.
6. The ordinate of influence line diagram for bending moment always have a dimension of
(A) force
(B) length
(C) force × length
(D) force / length.

7. A cantilever beam of span 'L' is carrying a uniformly distributed load of intensity w/unit length on the entire span. The deflection at the free end is given by
- (A) $wL^4/6EI$
 - (B) $wL^4/8EI$
 - (C) $5wL^4/384EI$
 - (D) $wL^4/48EI$.
8. Maximum area of tension reinforcement in beams shall not exceed
- (A) 0.04 bD
 - (B) 0.02 bD
 - (C) 0.08 bD
 - (D) 0.10 bD
- Where 'b' is breadth and 'D' is depth of the beam.
9. The load carrying capacity of column designed by working stress method is 500 kN. The collapse load of the column is
- (A) 500.0 kN
 - (B) 662.5 kN
 - (C) 750.0 kN
 - (D) 1100.0 kN.
10. Maximum strains in the extreme fiber in concrete and in tension reinforcement (Fe - 415 grade and $E_s = 200 \text{ kN/mm}^2$) in a balanced section at the limit state of flexure are respectively
- (A) 0.0035
 - (B) 0.002 and 0.0018
 - (C) 0.0035 and 0.0041
 - (D) 0.002 and 0.0031
11. Poisson's ratio for concrete is in the range
- (A) 0.15 to 0.25
 - (B) 0.30 to 0.35
 - (C) 0.50 to 0.65
 - (D) 0.75 to 0.90
12. The wind load 'F' on a roof truss by static wind method of IS: 875 (Part 3) is given by
- (A) $(C_{pe}/C_{pi})AP_d$
 - (B) $(C_{pe} + C_{pi})AP_d$
 - (C) $(C_{pe} - C_{pi})AP_d$
 - (D) none of these

Where C_{pe} and C_{pi} are force coefficients for the exterior and interior of the building.

13. The distance between the centres of the fasteners shall not be less than
- (A) twice the nominal diameter of the fastener
 - (B) twice the diameter of the fastener
 - (C) 2.5 times the nominal diameter of fastener
 - (D) none of the above.
14. In a welded lap joint, the minimum lap should not be less than
- (A) $4t$ or 40 mm whichever is more
 - (B) less than transverse spacing between welds
 - (C) $16t$ to $20t$ or more
 - (D) none of the above
- where 't' is the thickness of the thinner member.
15. A soil has liquid limit of 45% and lies above the A - line when plotted on the plasticity chart. The group symbol of the soil as per IS soil classification is
- (A) CH
 - (B) CI
 - (C) CL
 - (D) MI.
16. A flownet constructed to determine the seepage through an earth dam which is homogeneous but anisotropic, gave 4 flow channels and sixteen equipotential drops. The coefficients of permeability in horizontal and vertical directions are 4.0×10^{-7} m/s and 1.0×10^{-7} m/s, respectively. If the storage head was 20 m, then seepage per unit length of the dam (in m^3/s) would be
- (A) 5.0×10^{-7}
 - (B) 10.0×10^{-7}
 - (C) 20.0×10^{-7}
 - (D) 40.0×10^{-7} .
17. In a compaction test, with increase in compactive effort
- (A) both maximum dry density and optimum moisture content increase
 - (B) both maximum dry density and optimum moisture content decrease
 - (C) maximum dry density increases but optimum moisture content decreases
 - (D) maximum dry density decreases but optimum moisture content increases.
18. In a soil sample of a consolidometer test, pore water pressure is
- (A) minimum at the centre
 - (B) maximum at the top
 - (C) maximum at the bottom
 - (D) maximum at the centre.

19. In a cohesionless soil deposit having unit weight of 1.5 t/m^3 and an angle of internal friction $\phi = 30^\circ$, the active and passive lateral earth pressure intensities (in t/m^2) at a depth of 10 m will be
- (A) 15 and 5
 - (B) 5 and 45
 - (C) 10 and 20
 - (D) 20 and 10.
20. In a plate load test with square plate of size 300 mm on clayey soil, corresponding to an applied vertical load intensity of 10 N/mm^2 , observed settlement is 3 mm. Other things remaining same, settlement of a footing of 3 m x 3 m size will be
- (A) 10 mm
 - (B) 20 mm
 - (C) 30 mm
 - (D) 40 mm.
21. Load carrying capacity of an individual friction pile is 200 kN. Total load carrying capacity of a group of 9 such piles with group efficiency of 0.8 is
- (A) 1440 kN
 - (B) 1640 kN
 - (C) 1800 kN
 - (D) 2000 kN.
22. In a fine silty sand layer, observed value of standard penetration resistance N below the water table is 25, then the corrected penetration resistance value is
- (A) 15
 - (B) 20
 - (C) 12.5
 - (D) 25.
23. As per IRC recommendations, the maximum limit of super elevation for mixed traffic in plane terrain is
- (A) 1 in 15
 - (B) 1 in 12.5
 - (C) 1 in 10
 - (D) equal to camber.
24. The function of an expansion joint in rigid pavement is to
- (A) relieve warping stresses
 - (B) relieve shrinkage stresses
 - (C) resist stresses due to expansion
 - (D) allow free expansion.

25. Bitumen of grade 80/100 means
- (A) its penetration value is 8 to 10 mm
 - (B) its penetration value is 100 mm
 - (C) its penetration value is 8 mm
 - (D) its penetration value is 8 to 10 cm.
26. Benkelman beam deflection method is used for design of
- (A) rigid overlay on rigid pavement
 - (B) flexible overlay on flexible pavement
 - (C) flexible overlay on rigid pavement
 - (D) rigid overlay on flexible pavement.
27. Transition curves are provided on the approach to horizontal curves in order to
- (A) increase jerk to allowable levels
 - (B) minimize the length of horizontal curve
 - (C) simplify layout & construction of horizontal curve
 - (D) reduce jerk to allowable levels.
28. The minimum value of CBR (%) required for granular sub-base as per Ministry of Surface Transport (MOST) specifications is
- (A) 5
 - (B) 10
 - (C) 15
 - (D) 20.
29. The equation $\begin{bmatrix} 2 & -2 \\ 1 & -1 \end{bmatrix} \begin{bmatrix} X1 \\ X2 \end{bmatrix} = \begin{bmatrix} 0 \\ 0 \end{bmatrix}$ has
- (A) no solution
 - (B) only one solution $\begin{bmatrix} X1 \\ X2 \end{bmatrix} = \begin{bmatrix} 0 \\ 0 \end{bmatrix}$
 - (C) non-zero unique solution
 - (D) multiple solutions.
30. If $x = a(\phi + \sin \phi)$ and $y = a(1 - \cos \phi)$, then dy/dx will be equal to
- (A) $\sin\left(\frac{\phi}{2}\right)$
 - (B) $\cos\left(\frac{\phi}{2}\right)$
 - (C) $\tan\left(\frac{\phi}{2}\right)$
 - (D) $\cot\left(\frac{\phi}{2}\right)$.

31. The partial differential equation $\frac{du}{dt} + u \frac{du}{dx} = \frac{d^2u}{dx^2}$ is a
- (A) linear equation of order 2
 - (B) non-linear equation of order 1
 - (C) linear equation of order 1
 - (D) non-linear equation of order 2.
32. The solution for differential equation $\frac{dy}{dx} = x^2y$ with the condition that $y = 1$ at $x = 0$ is
- (A) $y = e^{\frac{1}{2x}}$
 - (B) $\ln(y) = \frac{x^3}{3} + 4$
 - (C) $\ln(y) = \frac{x^2}{3}$
 - (D) $y = e^{\frac{x^3}{3}}$.
33. Two independent random variable X and Y are uniformly distributed in the interval $[-1, 1]$. The probability that $\max [X, Y]$ is less than $\frac{1}{2}$ is
- (A) $\frac{3}{4}$
 - (B) $\frac{9}{16}$
 - (C) $\frac{1}{4}$
 - (D) $\frac{2}{3}$.
34. Newton-Raphson method is used to compute a root of the equation $x^2 - 13 = 0$ with 3.5 as the initial value. The approximation after one iteration is
- (A) 3.575
 - (B) 3.677
 - (C) 3.667
 - (D) 3.607.
35. MPN (most probable number) index is a measure of which one of the following
- (A) B. O. D
 - (B) hardness
 - (C) D. O. content
 - (D) coliform bacteria.

36. Coagulants, used in water treatment, function better when the raw water is
- (A) acidic
 - (B) alkaline
 - (C) neutral
 - (D) none of these.
37. In a rapid gravity filter working with regard to water, quality gets affected due to
- (A) cracking of filter
 - (B) mud balls formation
 - (C) air binding
 - (D) all of these.
38. The effective size of sand particles used in slow sand filters is
- (A) 0.25 to 0.35 mm
 - (B) 0.35 to 0.65 mm
 - (C) 0.60 to 1.00 mm
 - (D) 1.00 to 1.80 mm.
39. The maximum velocity in a sewer of diameter 'd' will be obtained when depth of flow is equal to
- (A) d
 - (B) 0.5d
 - (C) 0.808d
 - (D) 0.95d.
40. Activated sludge is the
- (A) aerated sludge in the aeration unit
 - (B) sludge settled in the humus tank
 - (C) sludge in the secondary tank after aeration and rich in microbial mass
 - (D) sludge in the secondary tank after aeration and rich in nutrients.
41. Froude number is the ratio of inertia force to
- (A) viscous force
 - (B) gravity force
 - (C) compressive force
 - (D) surface tension force.

42. The power transmitted through a pipeline is maximum when the head lost due to friction in pipe is equal to
- (A) the total supply head
 - (B) half of the total supply head
 - (C) one third of the total supply head
 - (D) one fourth of the total supply head.
43. The Chezy's constant 'C' in the Chezy's equation for mean velocity in open channel
- (A) is a dimensionless constant
 - (B) has a constant value for different type of channels
 - (C) has dimension $L^{1/2}T^{-1}$
 - (D) does not depend on the quality of channel surface.
44. The specific speed of a turbine is defined as the speed of a unit of such a size that it
- (A) delivers unit discharge at unit head
 - (B) delivers unit discharge at unit power
 - (C) produces unit power for unit head
 - (D) none of the above.
45. A hydrograph is a plot of
- (A) rainfall intensity against time
 - (B) stream discharge against time
 - (C) cumulative rainfall against time
 - (D) cumulative runoff against time.
46. The design flood commonly adopted in India for barrage and minor dams is
- (A) probable maximum flood
 - (B) a flood of 50 -100 years return period
 - (C) peak flood
 - (D) standard project flood or a 100-year flood, whichever is higher.
47. The Lacey's silt factor for a particular alluvial is 2.0. The alluvium would comprise
- (A) medium sand of size 0.5 mm
 - (B) coarse sand of size 0.75 mm
 - (C) medium bajri of size 1.3 mm
 - (D) coarse bajri of size 2.4 mm.

48. The downstream slope of earthen dam is critical when
- (A) the reservoir is full
 - (B) steady seepage
 - (C) at the end of construction
 - (D) combination of a, b and c.
49. A level line is a
- (A) horizontal line
 - (B) line parallel to the mean spheroidal surface of earth
 - (C) line passes through centre of cross hair and centre of eye piece
 - (D) line passes through the objective lens and the eye piece of dumpy or tilting level.
50. Given that of a triangulation survey
- D = distance in km
- h = the visible horizon from a station of known elevation above the datum (in metres).
- If there is no obstruction due to intervening ground, then 'h' is equal to
- (A) $0.6735D^2$
 - (B) $6.735D^2$
 - (C) $0.06735D^2$
 - (D) $0.006735D^2$.

SECTION II (RESEARCH METHODOLOGY)

51. Research is
- A) Producing available knowledge again and again
 - B) Finding solution to any problem
 - C) Working in a scientific way to search for truth of any problem.
 - D) None of the above
52. Computed measure of how much scores vary around the mean score.
- A) range
 - B) standard deviation
 - C) normal curve
 - D) skewed distribution
53. Which of the following statements is true?
- A) The mean is a continuous variable.
 - B) The variance and standard deviation of a normal population are equal.
 - C) For large samples, the distribution of scores is approximately normal.
 - D) None of the above
54. Taking someone else's words or ideas and taking credit for them as your own.
- A) cite
 - B) plagiarism
 - C) paraphrase
 - D) credit
55. What steps are involved in a central tendency test?
- A) Addition, subtraction, and division.
 - B) Determination of mean, median, and mode.
 - C) Addition, subtraction, multiplication, and division.
 - D) None of the above
56. Random sampling is also called _____.
- A) Availability sampling
 - B) Probation sampling
 - C) Probability sampling
 - D) Prospect sampling
57. What is the Median of the following data sample?
2, 7, 4, 8, 9, 10, 6, 12, 13
- A) 8
 - B) 11
 - C) 9
 - D) 10
58. Which of the following statements is CORRECT?
- A) Research is a hurried activity.
 - B) Research starts with a problem and ends with a problem.
 - C) Research is not a contributing factor of progress.
 - D) Research is an investigation where you look for answers that are already there.

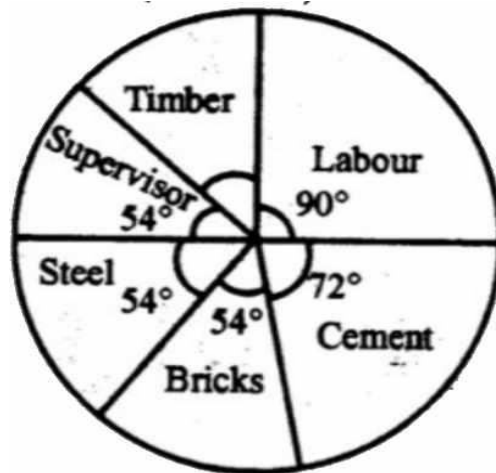
59. Which of the following has same mean median and mode?
- A) 6,5,2,4,3,4,1
 - B) 4,2,2,1,3,2,3
 - C) 2,3,7,3,8,3,2
 - D) 4,3,4,3,4,6,4
60. Resource libraries, economic census, trade shows & associations would be examples of what kind of data sources?
- A) Tertiary
 - B) Secondary
 - C) Primary
 - D) Unprofessional
61. The purpose of correlation research is to:
- A) study the relationship between two or more than two variables
 - B) predict the criterion variable on the basis of predictor variable
 - C) Both (1) and (ii)
 - D) Neither (i) Nor(ii)
62. It is sometimes called “central location” or just “center”. It is a way to describe what’s typical for a set of data. It is called.
- A) Middle destination
 - B) Center fold
 - C) Central Tendency
 - D) Mid frequency
63. Which is NOT a step of the scientific method?
- A) Hypothesis
 - B) Analyse data
 - C) Count items
 - D) Report Findings
64. In order to pursue the research, which of the following is priorly required?
- A) Developing a research design
 - B) Formulating a research question
 - C) Deciding about the data analysis procedure
 - D) Formulating a research hypothesis
65. Every person in the population has an equal chance of being selected -which sampling method
- A) Systematic sampling
 - B) Quota sampling
 - C) Volunteer sampling
 - D) Random sampling

66. When a distribution of scores is skewed, which of the following is the most representative measure of central tendency?
- A) Inference
 - B) Standard deviation
 - C) Mean
 - D) Median
67. An even spread of a variable that is symmetrical about the mean median and mode.
- A) bar graph
 - B) histogram
 - C) scatter graph
 - D) normal distribution
68. A diagram with rectangles showing values or numbers.
- A) Pictogram
 - B) Pie chart
 - C) Bar chart
 - D) Line graph
69. Type of research that solve practical issues is;
- A) Fundamental research
 - B) Exploratory research
 - C) Applied research.
 - D) Empirical research
70. What should not be included in the conclusion?
- A) literature review
 - B) summary
 - C) implication
 - D) major findings
71. A variable that is being manipulated is_____
- A) Independent variable
 - B) dependent variable
 - C) confounding variable
 - D) extraneous variable
72. What is qualitative research?
- A) Observation and description of activities, situations, attitudes, or behaviors of a specific group of people.
 - B) Analysis of numerical data.
 - C) Numerical comparisons and statistical inferences.
 - D) None of above
73. A standard deviation can never be
- A) positive
 - B) negative
 - C) zero
 - D) None

74. The sample standard deviation is denoted by:
- A) s
 - B) p
 - C) Σ
 - D) σ
75. First step of an investigation is _____ .
- A) collection of data.
 - B) presentation of data.
 - C) analysis of data.
 - D) explanation of data.
76. The sum of absolute deviations about median is _____.
- A) the least
 - B) the greatest
 - C) zero
 - D) equal
77. When the value of $r=0$, it is said to be _____.
- A) no correlation.
 - B) positive.
 - C) perfect positive.
 - D) perfect negative.
78. The straight-line trend is represented by the equation _____.
- A) $y=a+bx$
 - B) $y=mx$
 - C) $y=ax/ay$
 - D) $y=a*bx$
79. In discrete and continuous frequency distributions $N=$ ____ .
- A) the sum of frequency.
 - B) number of observations.
 - C) minimum value.
 - D) maximum value.
80. _____ is used to compare the variability of two or more than two series.
- A) Mean.
 - B) Standard deviation.
 - C) Coefficient of variation.
 - D) Mean deviation.
81. The simplest device for ascertaining whether two variables are related is to prepare a dot chart is called _____ .
- A) graphical method.
 - B) scatter diagram method.
 - C) method of least square.
 - D) concurrent deviation method.

82. A bag contains 10 black and 20 white balls; a ball is drawn at random. What is the probability that it is black?
- A) $\frac{1}{2}$
 - B) $\frac{1}{3}$
 - C) 0
 - D) 3
83. Diagrams are for _____
- A) the use of exports.
 - B) better quantitative picture.
 - C) better mental appeal
 - D) the use of imports.
84. Which of the following is not a type of research design?
- A) Experimental design
 - B) Descriptive design
 - C) Correlational design
 - D) Probability design
85. What is a research hypothesis?
- A) A tentative explanation for a phenomenon
 - B) A statement that is proven to be true
 - C) A prediction of what the researcher expects to find
 - D) A statement of fact
86. What is the purpose of a pilot study?
- A) To test the feasibility of the research design
 - B) To test the reliability and validity of the measures
 - C) To determine the appropriate sample size
 - D) To collect preliminary data
87. In five One-Day Internationals, a batsman has scored 31,97,112, 63, and 12 runs. the quality deviation of the info is-
- A) 21.78
 - B) 23.79
 - C) 25.79
 - D) 26.77
88. Determine the mode of the decision received seven days in a row: 11,13,13,17,19,23,25
- A) 11
 - B) 13
 - C) 17
 - D) 23

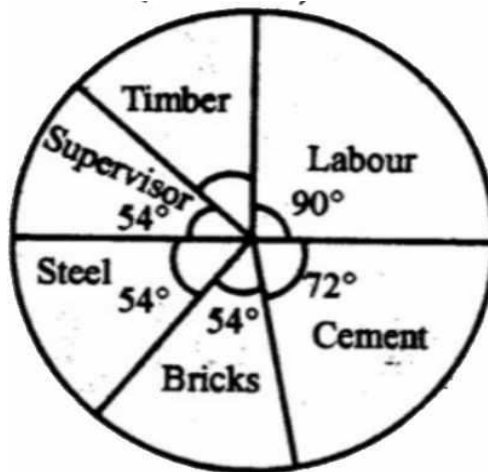
89. The following pie chart comprises the cost of constructing one house. The total cost was Rs. 6 lakhs



The amount spent on cement is

- A) Rs.2,00,000
- B) Rs.1,60,000
- C) Rs.1,20,000
- D) Rs.1,00,000

90. Referring to chart below,



the amount spent on cement, steel and supervision is what percent of the total cost of construction?

- A) 40%
- B) 45%
- C) 50%
- D) 55%

91. Table shows the mobile phones sold on different days by different sellers. Read the table carefully and answer the questions.

| Mobiles Phones Sellers | Day | | | | | | |
|------------------------------|--------|---------|-----------|----------|--------|----------|--------|
| | Monday | Tuesday | Wednesday | Thursday | Friday | Saturday | Sunday |
| P | 40 | 45 | 48 | 28 | 50 | 24 | 20 |
| Q | 90 | 92 | 27 | 12 | 16 | 98 | 26 |
| R | 80 | 36 | 30 | 13 | 28 | 62 | 47 |
| S | 60 | 46 | 12 | 64 | 52 | 34 | 76 |
| T | 48 | 18 | 58 | 69 | 70 | 10 | 15 |

Find the difference of mobile phones sold by P and R together on Monday to the mobile phones sold by S and T on Wednesday.

- A) 60
- B) 50
- C) 80
- D) 20

92. Referring to above table, Find the ratio of mobile phones sold by Q on Tuesday and Saturday together to the mobile phones sold by R on Thursday and Sunday together.

- A) 7 : 19
- B) 19 : 5
- C) 19 : 6
- D) 2 : 5

93. The frequency distribution of a numerical data can be graphically represented by a _____

- A) Histogram
- B) Telegram
- C) Monogram
- D) Anagram

94. Which one of the following is not the graphical representation of statistical data:

- A) Bar graph
- B) Histogram
- C) Frequency polygon
- D) Cumulative frequency distribution

95. In a histogram, each class rectangle is constructed with base as

- A) frequency
- B) class-intervals
- C) range
- D) size of the class

96. What does the command `\documentclass{article}` do in LaTeX?
- A) It sets the document class as an article
 - B) It creates a new section in the document
 - C) It sets the font style of the document
 - D) It creates a new document
97. What does the command `\begin{center}` do in LaTeX?
- A) It creates a new center-aligned section.
 - B) It sets the font size to center aligned.
 - C) It creates a new paragraph.
 - D) It centers the text or content.
98. Which of the following procedures would not be included in a programme of qualitative research?
- A) Assessment of effect size.
 - B) Development of appropriate research questions.
 - C) Clarification of the logic linking the data to research propositions.
 - D) Explanation of criteria for data interpretation.
99. What is the most common method of data collection in quantitative research?
- A) Interviews
 - B) Focus groups
 - C) Observation
 - D) Surveys/questionnaires
100. Which statistical test is used to determine if there is a significant difference between the means of two or more groups in quantitative research?
- A) t-test
 - B) ANOVA (Analysis of Variance)
 - C) Chi-square test
 - D) Regression analysis