

SECTION I (ELECTRONICS AND COMMUNICATION ENGINEERING)

1. The solution of the differential equation $\frac{dy}{dx} + y^2 = 0$ is

A) $y = \frac{1}{x+c}$

B) $y = \frac{-x^3}{3} + c$

C) ce^{-x}

D) unsolvable as the equation is nonlinear.

2. The solution of the following differential equation is given by

$$\frac{d^2y}{dx^2} - 5\frac{dy}{dx} + 6y = 0$$

A) $y = e^{2x} + e^{-3x}$

B) $y = e^{2x} + e^{3x}$

C) $y = e^{-2x} + e^{3x}$

D) $y = e^{-2x} + e^{-3x}$

3. Three coins are tossed at once. What is the probability of getting exactly 2 heads?

A) 1/8

B) 3/8

C) 5/8

D) 1/4

4. What are the eigen values of $\begin{bmatrix} 4 & -2 \\ -2 & 1 \end{bmatrix}$

A) 1, 4

B) 2, 3

C) 0, 5

D) 1, 5

5. What is the rank of the matrix $A = \begin{bmatrix} 1 & 2 & 3 \\ 2 & 3 & 4 \\ 4 & 10 & 18 \end{bmatrix}$

A) 1

B) 2

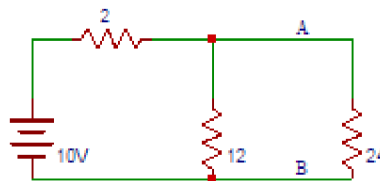
C) 3

D) 4

6. IF $f(0) = 4$ & $f'(x) = \frac{3}{x^2+2}$, the lower bound of $f(2)$ estimated by mean value theorem is:

- A) 0
- B) 7
- C) 12
- D) 5

7. Consider the circuit shown below. Find the equivalent Thevenin's voltage between nodes A and B. Values of resistances are shown in Ω .



- A) 5 V
- B) 10.75 V
- C) 12 V
- D) 8.57

8. If there are 5 branches and 4 nodes in the graph, then the numbers of mesh equations that can be formed are?

- A) 2
- B) 4
- C) 6
- D) 8

9. The basic laws for analyzing an electric circuit are:

- A) Einstein's theory.
- B) Newton's laws.
- C) Faraday's laws.
- D) Kirchhoff's laws.

10. Discrete Fourier Transform is applicable to

- A) Infinite sequences
- B) Finite discrete sequences
- C) Continuous infinite signals
- D) Continuous finite sequences

- 11. Transfer function of a system is defined as the ratio of output to input in**
- A) Z-transform
 - B) Fourier transform
 - C) Laplace transform
 - D) All of these
- 12. In a series RLC circuit, the phase difference between the current in the capacitor and the current in the resistor is?**
- A) 0 degree
 - B) 90 degree
 - C) 180 degree
 - D) 360 degree
- 13. In a series RL circuit, voltage across resistor and inductor are 3 V and 4 V respectively, then what is the applied voltage?**
- A) 7
 - B) 5
 - C) 4
 - D) 3
- 14. An intrinsic semiconductor at absolute zero temperature behaves like**
- A) A perfect conductor
 - B) A perfect Insulator
 - C) A super conductor
 - D) An amplifier
- 15. The depletion width of a Si p-n junction at a reverse bias of 10 V is 2 μm . When the reverse bias is increased to 20 V, the depletion width will be:**
- A) 4.0 μm
 - B) 3.2 μm
 - C) 2.8 μm
 - D) 2.4 μm
- 16. N-channel FETs are preferred to p-channel FETs because**
- A) Holes have higher velocity
 - B) Electrons have higher mobility than holes
 - C) Electrons have higher diffusivity than holes
 - D) Electrons have higher effective mass than holes

17. Field Effect Transistor (FET) is an unipolar device because:

- A) V_{DS} of one polarity is used
- B) V_{GS} of one polarity is used
- C) I_D constitutes either electrons or holes
- D) All the charge carriers flow towards a single pole.

18. What is the value of current when the gate to source voltage is less than the pinch off voltage?

- A) 1 A
- B) 5 A
- C) 100 A
- D) 0 A

19. A BJT is a

- A) Current –Controlled device
- B) Voltage - Controlled device
- C) Power- Controlled device
- D) Field- Controlled device

20. A J-K flip-flop with $J = 1$ and $K = 1$ has a 20 kHz clock input. The Q output is _____.

- A) 20 KHz square wave
- B) 10 KHz square wave
- C) Constantly Low
- D) Constantly High

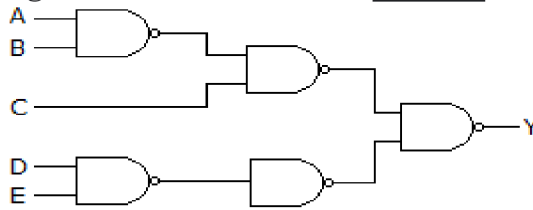
21. Which term applies to the maintaining of a given signal level until the next sampling?

- A) Holding
- B) Aliasing
- C) Shannon frequency sampling
- D) Stair-stepping

22. An analog signal is sampled at 36 kHz and quantized into 256 levels. The time duration of a bit of binary coded signal is

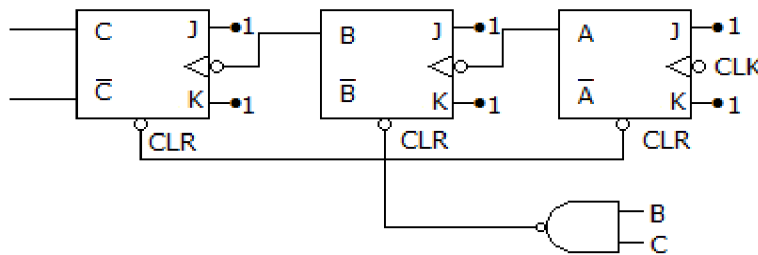
- A) 5.78 μ s
- B) 3.47 μ s
- C) 6.43 ms
- D) 7.86 ms

23. The circuit of the given figure realizes the function _____



- A) $Y=(A'+B')C+(DE)'$
- B) $Y=A'+B'+C+D'+E'$
- C) $Y=(A+B)'+C+(D+E)'$
- D) $Y=AB+C+DE$

24. The given figure shows which type of counter ?



- A) Mod 6
- B) Mod 3
- C) Mod 8
- D) Decade counter

25. Which of the following logic families has the shortest propagation delay?

- A) CMOS
- B) BiCMOS
- C) ECL
- D) 74SXX

26. A digital multiplexer is a combinational circuit that selects _____

- A) One digital information from several sources and transmits the selected one
- B) Many digital information and convert them into one
- C) Many decimal inputs and transmits the selected information
- D) Many decimal outputs and accepts the selected information

27. The logic circuits whose outputs at any instant of time depends not only on the present input but also on the past outputs are called _____

- A) Combinational circuits
- B) Flip-flops
- C) Sequential circuits
- D) Latches

28. Which of the following describes the operation of a positive edge-triggered D flip-flop?

- A) If both inputs are HIGH, the output will toggle.
- B) The output will follow the input on the leading edge of the clock.
- C) When both inputs are LOW, an invalid state exists.
- D) The input is toggled into the flip-flop on the leading edge of the clock and is passed to the output on the trailing edge of the clock.

29. If a capacitor is placed in the feedback path of an Op-amp circuit, then the circuit can act as

- A) Integrator
- B) Differentiator
- C) Multiplier
- D) Divider

30. If an Op-amp has a common mode gain of 0.01 and a differential gain of 10^5 . Its CMRR would be _____.

- A) 0
- B) Infinite
- C) 10^{-3}
- D) 10^7

31. Calculate the value of emitter current for a transistor $\alpha_{dc} = 0.98$, $I_{CBO} = 5\mu A$ and $I_B = 95\mu A$.

- A) 4.5 mA
- B) 5 mA
- C) 3.5 mA
- D) 10 mA

32. What is a Zener diode used as?

- A) Rectifier
- B) Oscillator
- C) Regulator
- D) Filter

33. Ripple factor of the half wave rectifier is nearly _____.

- A) 1.11
- B) 0.87
- C) 1.21
- D) 0.5

34. Which among the following is Volatile?

- A) RAM
- B) ROM
- C) DROM
- D) EPROM

35. Fan-in and Fan-out are the characteristics of _____

- A) Registers
- B) Logic families
- C) Sequential Circuits
- D) Combinational Circuits

36. Where the result of an arithmetic and logical operation are stored?

- A) In Accumulator
- B) In Cache Memory
- C) In ROM
- D) In Instruction Registry

37. ____ is a closed loop system.

- A) Auto-pilot for an aircraft
- B) Direct current generator
- C) Car starter
- D) Electric switch

38. The open-loop control system is one in which

- A) The output is dependent on the control input
- B) The output is independent of the control input
- C) Only system parameters have an effect on the control output
- D) Out is independent to input

39. The frequency at which maximum amplitude ratio is attained is called the _____ frequency.

- A) Corner
- B) Resonant
- C) Cross over
- D) Natural

40. The open loop transfer function of a plant is given as, $G(s) = 1/(s^2-1)$. If the plant is operated in unity feedback configuration, then the lead compensator that can stabilize the control system is:

- A) $10(s+4)/(s+2)$
- B) $10(s+2)/(s+10)$
- C) $10(s+2)/(s+10)$
- D) $10(s-1)/(s+2)$

41. The open loop DC gain of an unity negative feedback system with closed-loop transfer function $\frac{s+4}{s^2+7s+13}$ is

- A) 4/13
- B) 4
- C) 4/9
- D) 13

42. Poynting vector signifies:

- A) Current density vector producing electrostatic field
- B) Power density vector producing electrostatic field
- C) Current density vector producing electromagnetic field
- D) Power density vector producing electromagnetic field

43. The magnitude of open circuit and short circuit input impedances of a transmission line are 100Ω and 25Ω respectively. The characteristic impedance of the line is:

- A) 25Ω
- B) 50Ω
- C) 75Ω
- D) 100Ω

44. Calculate power in each sideband, if power of carrier wave is 176W and there is 60% modulation in amplitude modulated signal?

- A) 13.36 W
- B) 15.84 W
- C) 52 W
- D) 176 W

45. At a given probability of error, binary coherent FSK is inferior to binary coherent PSK by

- A) 6 dB
- B) 3 dB
- C) 2 dB
- D) 0 dB

46. In a communication system, when two finite-power waveforms $x(t)$ and $y(t)$ have the property: $\int x(t)y(t)dt = 0$, then these waveforms are said to be _____.

- A) Identical
- B) Overlap
- C) Similar
- D) Orthogonal

47. Viterbi decoding is one of the most commonly used techniques in modern systems that is used to decode the data encoded by _____.

- A) Block coding
- B) Hamming coding
- C) Convolutional coding
- D) CRC coding

48. The transmission line is distortion less if:

- A) $RL = \frac{L}{GC}$
- B) $RL = GC$
- C) $LG = RC$
- D) $RG = LC$

49. Folded dipole antenna belongs to which type of antenna?

- A) Reflector
- B) Aperture
- C) Lens
- D) Wire

50. The technique OTDR (Optical time domain reflectometry) is used for the measurement of :

- A) Bandwidth
- B) Core diameter
- C) Attenuation
- D) Cladding diameter

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.

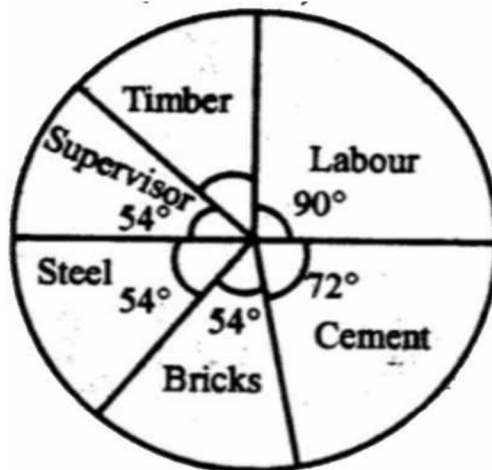
59. Which of the following has same mean median and mode?
- A) 6,5,2,4,3,4,1
 - B) 4,2,2,1,3,2,3
 - C) 2,3,7,3,8,3,2
 - D) 4,3,4,3,4,6,4
60. Resource libraries, economic census, trade shows & associations would be examples of what kind of data sources?
- A) Tertiary
 - B) Secondary
 - C) Primary
 - D) 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

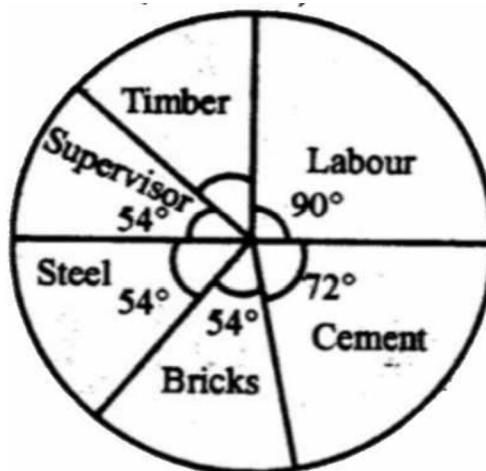
89. The following pie chart comprises the cost of constructing one house. The total cost was Rs. 6 lakhs



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