# SECTION I (COMPUTER SCIENCE & ENGINEERING)

1. An Internet Service Provider (ISP) has the following chunk of CIDR-based IP addresses available with it:245.248.128.0/20. The ISP wants to give half of this chunk of addresses to Organization IKU, and a quarter to Organization GBU, while retaining the remaining with itself. Which of the following is a valid allocation of addresses to IKU and GBU?
(A) 245.248.128.0/21 and 245.248.128.0/22
(B) 245.248.136.0/21 and 245.248.128.0/22
(C) 245.248.132.0/22 and 245.248.132.0/21
(D) 245.248.136.0/22 and 245.248.132.0/21

2. Frames of 1000 bits are sent over a 10^6 bps duplex link between two hosts. The propagation time is 25ms. Frames are to be transmitted into this link to maximally pack them in transit (within the link). What is the minimum number of bits (i) that will be required to represent the sequence numbers distinctly? Assume that no time gap needs to be given between transmissions of two frames.

   (A) i=2
   (B) i=3
   (C) i=4
   (D) i=5

3. The bandwidth of the line is 1.5 Mbps with round trip time(RTT) as 45 milliseconds. If the size of each packet is 1 KB(kilobytes), then what is the propagation delay in Stop and wait protocol?
(A) 22.5
(B) 10.0
(C) 10.8
(D) 11

4. Consider a network with five nodes, N1 to N5, as shown below. The network uses a a Distance Vector Routing Distance Vector Routing protocol. Once the routes have stabilized, the distance vectors at different nodes are as following.N1:(0, 1, 7, 8, 4)N2:(1, 0, 6, 7, 3)N3:(7, 6, 0, 2, 6)N4:(8, 7, 2, 0, 4)N5:(4, 3, 6, 4, 0)Each distance vector is the distance of the best known path at that instance to nodes, N1 to N5, where the distance to itself is 0. Also, all links are symmetric and the cost is identical in both directions. In each round, all nodes exchange their distance vectors with their respective neighbours. Then all nodes update their distance vectors. In between two rounds, any change in cost of a link will cause the two incident nodes to change only that entry in their distance vectors. The cost of link N2-N3 reduces to 2 (in both directions). After the next round of update what will be the new distance vector at node, N3?
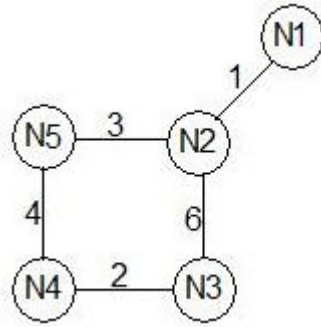
(A) (7, 2, 0, 2, 5)
(B) (3, 2, 0, 2, 6)
(C)(3, 2, 0, 2, 5)
(D) (7, 2, 0, 2, 6)

5. The technique of temporarily delaying outgoing acknowledgements so that they can be hooked onto the next outgoing data frame is called _____

(A) piggybacking
(B) cyclic redundancy check
(C) fletcher's checksum
(D) parity check

6. Transmission delay does not depend on
(A) Packet length
(B) Distance between the routers
(C) Transmission rate
(D) All of the above

7. What is infix expression for the following postfix expression "z y x * w v u ^/ t * − s * + "

(A)   z + (y * x - (w / v ^ u) * t)*s
(B)   z + (y * x - (w ^ v / u) * t)*s
(C)   z + y * x - (w ^ v / u * t)*s
(D)   All of the above

8. Time complexity of the following code segment is
```
for(index = 0; index< n - 1 ; index++)
{
        min = index ;
        for(k = index + 1; k < n ; k ++)
        {
                if(l[min] > l[k])
                        min = k ;
        }
        if( min != index){
                int temp = l [index];
                l[index] = l[min];
                l[min] = temp ;
        }
}
```

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(A) O(n)
(B) O(n2)
(C) O(n3)
(D) All of the above

9.   If the array is already sorted, which of these algorithms will exhibit the best performance
     (A) Merge Sort
     (B) Insertion Sort
     (C) Quick Sort
     (D) Heap Sort

10. A sorting algorithm which can prove to be a best time algorithm in one case and a worst time algorithm at other time?

     (A) Selection Sort
     (B) Heap Sort
     (C) Quick Sort
     (D) All of the above

11. The following algorithm may used to delete a node from a doubly linked list.

     i.   If the list is empty, flash UNDERFLOW message and exit the process.
     ii.   If a single node exits in the list, set the left and right pointers of the list as NULL.
     iii. Else if the left most node in the list is to be deleted, delete the node and update the left pointer of the list.
     iv.   Else if the right most node in the list is to be deleted, delete the node and update the right pointer to the list.
     v.   Else repeat thru Step (vii) till the end of the list.
     vi.   Obtain the next node in the list and record its predecessor (when proceed from left to right)/successor (when proceed from right to left). Check for the existence of the node for which information is given.
     vii. Delete the node from the desired place of the list.
     viii. Restore the deleted node to the free area.

     (A) Deletes all the nodes with given information
     (B) Only deletes a single node
     (C) Only deletes a desired node
     (D) All of the above

12. Time complexity of the following algorithm

     Step 1: [Initialization] Duplicate = N [Number of elements in the list]
     Step 2: [Set flag] Status = 0
     Step 3: [Check and remove duplicates]
             Repeat thru Step 8 for I = 0, 1, 2 …N – 2
     Step 4: Repeat thru Step 8 for J = I+1, I+2 …N – 1

Step 5: If Array [I] = Array [J]
            N = N – 1

Step 6: Repeat for K = J, J+1 … N – 1
            Array [K] = Array [K+1]
Step 7: [Set flag] Status = 1
Step 8: J = J – 1
Step 9: If Status = 0
            Output "No duplicate is found"
Step 10: [Find total duplicates in the list]
            Duplicate = Duplicate – N
Step 11: [Return the total duplicates in the list]
            Return (Duplicate)

(A) O(n)
(B) O(n2)
(C) O(n3)
(D) All of the above

13. What is number of moves when we move the entire disks from Peg 1 to Peg 3, when number of disks are n=4.

```
void hanoi_tower(char peg1, char peg2, char  peg3, int n)
{
        if( n <= 0)
                printf("\n Illegal entry ");
        if(n == 1)
                printf("\n Move Disk from %c to %c", peg1, peg3);
        else{
                hanoi_tower(peg1, peg3, peg2, n-1);
                hanoi_tower(peg1, peg2, peg3, 1);
                hanoi_tower(peg2, peg1, peg3, n-1);
        }
}
```

(A) 7
(B) 15
(C) 16
(D) All of the above

14. Consider the following recursive C function. Let len be the length of the string s and num be the number of characters printed on the screen, give the relation between num and len where len is always greater than 0. Then what will be printed?

```
#include<stdio.h>
void abc(char *);
void abc(char *s)
{
   if(s[0] == '\0')
      return;
   abc(s + 1);
   abc(s + 1);
```

```c
   printf("%c", s[0]);
}

int main()
{
   char str[]="xyz";
   abc(str);
   return 0;
}
```

   (A) x
   (B) xyz
   (C) xyzxyzx
   (D) zzyzzyx

15.   Guess the output of the following program

```c
# include<stdio.h>
int fun(int a[],int n)
{
 int x;
 if(n == 1)
   return a[0];
 else
   x = fun(a, n-1);
 if(x < a[n-1])
   return x;
 else
   return a[n-1];
}

int main()
{
 int arr[] = {120, 100, 300, 500, 1000};
 printf(" %d ", fun(arr, 5));
 getchar();
 return 0;
}
```

(A) 120
(B) 100
(C) 300
(D) 1000

16.   The number of edges in a simple, n-vertex, directed complete graph is
   (A) n*(n-2)
   (B) n*(n-1)
   (C) n*(n-1)/2
   (D) n*(n-1)*(n-2)

17. The goal of hashing is to produce a search that takes
    (A) O(ln 1) time
    (B) O(n2) time
    (C) O(n log n) time
    (D) All of the above

18. The number of leaf nodes in a complete binary tree of depth d is 2^d then what will be total number of nodes in tree?

    (A) 2^d
    (B) 2^(d–1)+1
    (C) 2^(d+1)+1
    (D) 2^d+1

19. AVL trees have LL, LR, RR, RL rotations to balance the tree to maintain the balance factor (LR : Insert node in Right sub tree of Left sub tree of node A, etc). Among rotations the following are single and double rotations.

    (A) LL, RL and LR, RR
    (B) LL, RR and LR, RL
    (C) LR, RR and LL, RL
    (D) LR, RL and LR, RL

20. When preorder traversing a tree resulted F A E K C D H G B ; the in-order traversal would return

    (A) F A E K C D B H G
    (B) F E A K D C H B G
    (C) E A F K H D C B G
    (D) E A C K F H D B G

21. The logic function implementation in the following design is

    (A) AND
    (B) NAND
    (C) NOR
    (D) EXOR
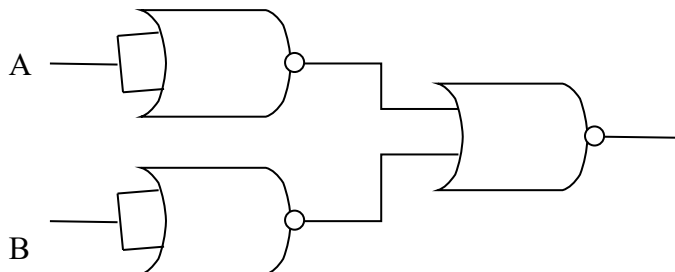
22. What is a Circuit?
    (A) Open-loop through which electrons can pass
    (B) Closed-loop through which electrons can pass
    (C) Closed-loop through which Neutrons can pass
    (D) None of the mentioned

23. Which of the following is a type of digital logic circuit?
   (A) Combinational logic circuits
   (B) Sequential logic circuits
   (C) Both Combinational & Sequential logic circuits
   (D) All of the above

24. When can one logic gate drive many other logic gates in Digital Electronics?
   (A) When its output impedance is low and the input impedance is low
   (B) When its output impedance is high and the input impedance is high
   (C) When its output impedance is high and the input impedance is low
   (D) When its output impedance is low and the input impedance is high

25. Which of the following allows simultaneous write and read operations?
   (A) ROM
   (B) EROM
   (C) RAM
   (D) All of the above

26. Which of the following operations is/are performed by the ALU?
   (A) Data manipulation
   (B) Exponential
   (C) Square root
   (D) All of the above

27. Computer address bus is -
   (A) Multidirectional
   (B) Bidirectional
   (C) Unidirectional
   (D) All of the above

28. Which of the following is a way in which the components of a computer are connected to each other?
   (A) Computer parts
   (B) Computer architecture
   (C) Computer hardware
   (D) All of the above

29. Which of the following circuit convert the binary data into a decimal?
   (A) Decoder
   (B) Encoder
   (C) Code converter
   (D) Multiplexer

30. Subtraction in computers is carried out by -
   (A) 1's complement
   (B) 2's complement
   (C) 3's complement
   (D) 9's complement

31. Which of the following register can interact with the secondary storage?
    (A) PC
    (B) IR
    (C) MDR
    (D) MAR

32. Which of the following register keeps track of the instructions stored in the program stored in memory?
    (A) Program Counter
    (B) Accumulator
    (C) Address Register
    (D) Index Register

33. Which of the following phase of the compiler is Syntax Analysis?
    (A) Second
    (B) Third
    (C) First
    (D) All of the above

34. Which of the following concept of FSA is used in the compiler?
    (A) Code optimization
    (B) Code generation
    (C) Lexical analysis
    (D) Parser

35. Let $L1 = \{w \in \{0,1\}* \mid w$ has at least as many occurrences of (110)'s as (011)'s$\}$.
    Let $L2 = \{ \in \{0,1\}* \mid w$ has at least as many occurrences of (000)'s as (111)'s$\}$.

    Which of the following is correct?
    (A) L2 is regular
    (B) L1 and L2 are regular
    (C) L1 is regular but not L2
    (D) All of the above are regular

36. An object module for a group of programs that were compiled separately is handed to a linker. Which of the following about an object module isn't true?
    (A) Relocation bits
    (B) Names and locations of all external symbols denied in the object module
    (C) Object code
    (D) Absolute addresses of internal symbols

37. Which of the following is incorrect?
    (A) The language accepted by finite automata are the languages denoted by regular expression
    (B) Every DFA has a regular expression denoting its language
    (C) For a regular expression r, there does not exists NDFA with L® ant transit that accept
    (D) all of the above

38. In regular expressions, the operator '*' stands for?
   (A) Iteration
   (B) Concatenation
   (C) Selection
   (D) Addition

39. BIOS is used?
   (A) By operating system
   (B) By compiler
   (C) By interpreter
   (D) By application software

40. When does page fault occur?
   (A) The page is present in memory.
   (B) The deadlock occurs.
   (C) The page does not present in memory.
   (D) The buffering occurs.

41. Banker's algorithm is used?
   (A) To prevent deadlock
   (B) To deadlock recovery
   (C) To solve the deadlock
   (D) All of the above

42. What is the full name of the DSM?
   (A) Direct system module
   (B) Direct system memory
   (C) Demoralized system memory
   (D) Distributed shared memory

43. If the page size increases, the internal fragmentation is also?
   (A) Decreases
   (B) Increases
   (C) Remains constant
   (D) All of the above

44. If a page number is not found in the translation lookaside buffer, then it is known as a?

   (A) Translation Lookaside Buffer miss
   (B) Buffer miss
   (C) Translation Lookaside Buffer hit
   (D) All of the above

45. Where are placed the list of processes that are prepared to be executed and waiting?
   (A) Job queue
   (B) Ready queue
   (C) Execution queue
   (D) Process queue

46. What types of commands are required to perform various tasks in DOS?
    (A) External commands
    (B) Internal commands
    (C) Valuable commands
    (D) Primary commands

47. In which of the following formats data is stored in the database management system?

    (A) Image
    (B) Text
    (C) Table
    (D) Graph

48. Which of the following is not an example of DBMS?
    (A) MySQL
    (B) Microsoft Acess
    (C) IBM DB2
    (D) Google

49. What does an RDBMS consist of?
    (A) Collection of Records
    (B) Collection of Keys
    (C) Collection of Tables
    (D) Collection of Field

50. The values appearing in given attributes of any tuple in the referencing relation must likewise occur in specified attributes of at least one tuple in the referenced relation, according to _____ integrity constraint.

    (A) Referential
    (B) Primary
    (C) Referencing
    (D) Specific

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) 1/2

B) 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
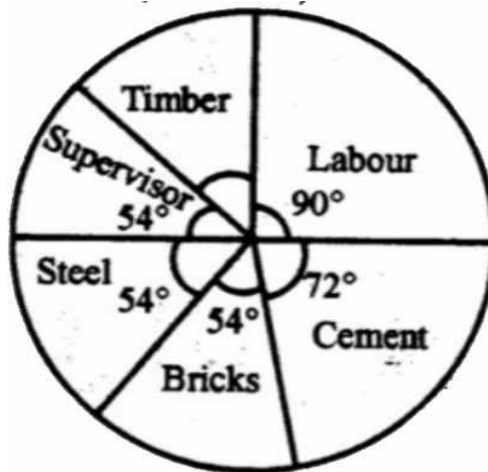
A) 11

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
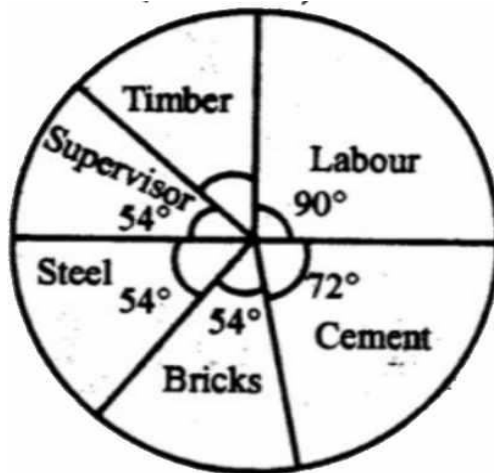
 The amount spent on cement is

    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