

KEY FOR PHDCS (Entrance Test held dated on 07.01.2024)

Q. NO.	ANS.
1	1
2	4
3	3
4	2
5	1
6	1
7	4
8	1
9	3
10	3
11	1
12	3
13	4
14	3
15	3
16	1
17	2
18	3
19	4
20	3
21	1
22	2
23	2
24	3
25	2
26	1
27	1
28	3
29	2
30	3

Q. NO.	ANS.
31	3
32	1
33	4
34	1
35	2
36	3
37	2
38	3
39	4
40	3
41	4
42	2
43	1
44	3
45	1
46	1
47	4
48	2
49	1
50	2
51	3
52	3
53	4
54	3
55	2
56	1
57	1
58	1
59	1
60	1

Q. NO.	ANS.
61	3
62	1
63	2
64	2
65	2
66	2
67	1
68	3
69	2
70	1
71	2
72	3
73	1
74	2
75	3
76	1
77	3
78	2
79	3
80	2
81	4
82	4
83	2
84	4
85	1
86	1
87	4
88	3
89	3
90	4

Q. NO.	ANS.
91	1
92	4
93	2
94	3
95	4
96	3
97	1
98	4
99	2
100	2

P. V. A.  
(Prof. P.V. (20/11/11))

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(Ph.D. Candidate)

**Ph. D. (Computer Science)  
Entrance Test, July, 2023**

*Time : 3 Hours*

*Maximum Marks : 100*

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**GENERAL INSTRUCTIONS**

1. All questions are **compulsory**. Each question carries 1 mark.
2. No cell phones, calculators, books, slide-rules, notebooks or written notes, etc. will be allowed inside the examination hall.
3. You should follow the instructions given by the Centre Superintendent and by the Invigilator at the examination venue. If you violate the instructions, you will be disqualified.
4. Any candidate found copying or receiving or giving assistance in the examination will be disqualified.
5. The Question Booklet and the OMR Response Sheet (Answer Sheet) would be supplied to you by the Invigilators. After the examination is over, you should hand over the OMR Response Sheet and Question Booklet to the Invigilator before leaving the examination hall. Any candidate who does not return the OMR Response Sheet will be disqualified and the University may take further action against him/her.
6. All rough work is to be done on the question paper itself and not on any other paper. Scrap paper is not permitted. For arriving at answers you may work in the margins, make some markings or underline in the test booklet itself.
7. The University reserves the right to cancel the result of any candidate who impersonates or uses/adopts other malpractices or uses any unfair means. The University may also follow a procedure to verify the validity of scores of all examinees uniformly. If there is substantial indication that your performance is not genuine, the University may cancel your result.

**How to fill up the information on the OMR Response Sheet  
(Examination Answer Sheet)**

1. Write your complete Enrolment No. in 10 digits. This should correspond to the enrolment number indicated by you on the OMR Response Sheet. Also write your correct name, address with pin code in the space provided. Put your signatures on the OMR Response Sheet with date. Ensure that the Invigilator in your examination hall also puts his signatures with date on the OMR Response Sheet at the space provided.
2. On the OMR Response Sheet student's particulars are to be filled in by blue/black ball pen also. Use blue/black ball pen for writing the Enrolment No. and Examination Centre Code as well as for blackening the circle bearing the correct answer number against the serial number of the question.
3. Do not make any stray remarks on this sheet.
4. Write correct information in numerical digits in Enrolment No. and Examination Centre Code Columns. The corresponding circle should be dark enough and should be filled in completely.
5. Each question is followed by four probable answers which are numbered (1), (2), (3) and (4). You should select and show only one answer to each question considered by you as the most appropriate or the correct answer. Select the most appropriate answer. Then by using blue/black ball pen, blacken the circle bearing the correct answer number against the serial number of the question.
6. No credit will be given if more than one answer is given for one question. Therefore, you should select the most appropriate answer.
7. You should not spend too much time on one question. If you find any particular question difficult, leave it and go to the next. If you have time left after answering all the questions, you may go back to the unanswered question.
8. There is no negative marking for wrong answers.

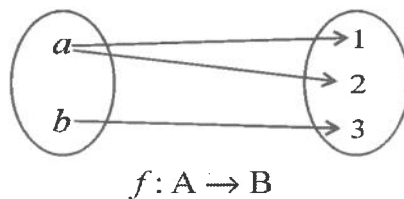
1. Let function  $f: \mathbb{R} \rightarrow \mathbb{R}$  be defined by  $f(x) = 3x - 4$ . Then  $f^{-1}(x)$  is given by :

- (1)  $\frac{(X+4)}{3}$  (2)  $\left(\frac{X}{3}\right) - 4$   
 (3)  $3X + 4$  (4)  $4X - 3$

2. If  $A = \{1, 2, 3\}$ , then which of the following is relation reflexive but not symmetric on A ?

- (1)  $\{(1, 1), (1, 2)\}$  (2)  $\{(1, 1), (1, 2), (2, 1), (2, 2)\}$   
 (3)  $\{(1, 1), (2, 2), (3, 3)\}$  (4)  $\{(1, 1), (2, 2), (2, 3), (3, 3)\}$

3. In following diagram function (f) is .....



- (1) many-one into function (2) many-one onto function  
 (3) not a function (4) one-one onto function

4. If A and B are two sets such that  $n(A) = 400$ ,  $n(B) = 300$  and  $n(A \cup B) = 500$ , then the value of  $n(A \cap B)$  is .....

- (1) 100 (2) 200  
 (3) 150 (4) 300

5. Given  $A = \{1, 2, 3\}$ ,  $B = \{7, 8\}$  and  $R = \{(1, 7), (2, 7), (3, 7), (1, 8), (3, 8)\}$ , then .....

- (1)  $R^{-1} = \{(7, 1), (7, 2), (7, 3), (8, 1), (8, 3)\}$   
 (2)  $R^{-1} = \{(1, 7), (2, 7), (3, 7), (8, 1), (8, 3)\}$   
 (3)  $R^{-1} = \{(7, 1), (7, 2), (7, 3), (1, 8), (3, 8)\}$   
 (4)  $R^{-1} = \{(7, 1), (7, 2), (3, 7), (1, 8), (3, 8)\}$

6. For any two sets A and B ;  $(A \cap B)'$  is .....
- (1)  $A' \cup B'$  (2)  $A' \cap B'$   
 (3)  $A \cap B'$  (4)  $A' \cap B$
7. Given function  $f : \mathbb{N} \rightarrow \mathbb{N}$  as  $f(1) = 3$  and  $f(n) = 2f(n-1)$ , then  $f(5) = \dots\dots$
- (1) 36 (2) 12  
 (3) 60 (4) 48
8. Out of 40 people who read Book or Newspaper, 30 reads Newspaper and 14 reads Book. Find the number of people who only read Newspaper :
- (1) 26 (2) 16  
 (3) 10 (4) 20
9. If  $\begin{vmatrix} 2x & 5 \\ 8 & x \end{vmatrix} = \begin{vmatrix} 6 & -2 \\ 7 & 3 \end{vmatrix}$ , then the value of x is .....
- (1)  $\pm 3$  (2)  $- 3$   
 (3)  $\pm 6$  (4)  $- 6$
10. If A is a square matrix of order 3 and  $|A| = -4$ , then  $|\text{adj } A|$  is equal to .....
- (1) 5 (2) 6  
 (3) 16 (4)  $- 8$
11. If  $A = \begin{bmatrix} 2 & x & -3 \\ 0 & 2 & 5 \\ 1 & 1 & 3 \end{bmatrix}$ , then  $A^{-1}$  exists' if .....
- (1)  $x \neq -\frac{8}{5}$  (2)  $x \neq -\frac{5}{8}$   
 (3)  $x \neq -8$  (4)  $x \neq -5$

12. If A is an invertible matrix of order 2, then  $|A^{-1}|$  is equal to .....

(1)  $|A|$  (2) 1

(3)  $\frac{1}{|A|}$  (4) 2

13. If A and B are invertible square matrices of size  $n \times n$ , then which of the following is not true ?

(1)  $|AB| = (|A|)(|B|)$  (2)  $|A| = 5(|B|)$

(3)  $|A'| = \frac{1}{|B'|}$  (4)  $|A + B| = |A| + |B|$

14. If A and B are matrices of some order, then  $AB' - BA'$  is .....

(1) null matrix (2) unit matrix

(3) skew symmetric matrix (4) symmetric matrix

15. If  $A = \begin{bmatrix} k & 8 \\ 4 & 2k \end{bmatrix}$  is a singular matrix, then the value of  $k$  is .....

(1)  $\pm 5$  (2)  $\pm 6$

(3)  $\pm 4$  (4)  $\pm 0$

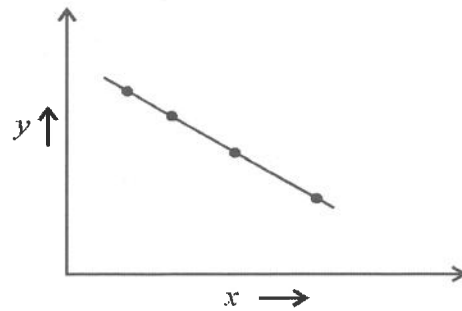
16. A committee of 4 persons is to be chosen from a group of 10 persons. What is the probability that a particular person 'XYZ' is in the committee ?

(1)  $\frac{2}{5}$  (2)  $\frac{3}{7}$

(3)  $\frac{2}{7}$  (4)  $\frac{5}{11}$



21. Consider the following graph :



The expected value of a correlation coefficient between  $x$  and  $y$  for the graph above would be .....

- (1)  $-1$                                       (2)  $-0.5$   
(3)  $0$                                          (4)  $1$
22. The mean value of standard normal distribution is .....
- (1)  $-1$                                       (2)  $0$   
(3)  $1$                                          (4)  $2$
23. The end points of a confidence interval are called .....
- (1) Confidence coefficients              (2) Confidence limits  
(3) Error of estimation                  (4) Parameters
24. The process of making estimates about the population parameter from a sample is called .....
- (1) Statistical decision                    (2) Statistical independence  
(3) Statistical inference                  (4) Statistical hypothesis
25. The estimator is said to be ....., if the mean of the estimator is not equal to the mean of the population parameter.
- (1) Negatively biased                    (2) Biased  
(3) Unbiased                                (4) Positively biased



26. A formula or rule used for estimating the parameter of interest is called as .....
- (1) Estimator (2) Estimate  
(3) Interval estimate (4) Estimation
27. A single value used to estimate a population is called .....
- (1) Point estimate (2) Level of significance  
(3) Confidence limits (4) Interval estimate
28. The level of confidence is denoted by .....
- (1)  $\alpha$  (2)  $\beta$   
(3)  $1 - \alpha$  (4)  $1 - \beta$
29. A statistician calculates 95% confidence interval for  $\mu$  when  $\sigma$  is known. The confidence interval is ₹ 18,000 to ₹ 22,000, the amount of the sample mean is .....
- (1) ₹ 18,000 (2) ₹ 20,000  
(3) ₹ 22,000 (4) ₹ 40,000
30. Which of the following probability distribution describes the number of successes in a fixed number of Bernoulli trials, where each trial has the same probability of success ?
- (1) Normal distribution (2) Poisson distribution  
(3) Binomial distribution (4) Exponential distribution
31. The exponential distribution is often used to model the time between events in a Poisson process. What does the Poisson process represent ?
- (1) A continuous random variable  
(2) A discrete random variable  
(3) A process with constant probability of events occurring  
(4) A process with variable probability of events occurring

32. In a uniform distribution, all values between a minimum ( $a$ ) and maximum ( $b$ ) are equally likely. What is the probability density function (PDF) with in this range ?

(1)  $\frac{1}{(b-a)}$

(2)  $\frac{(b-a)}{2}$

(3)  $(b-a)$

(4)  $\frac{2}{(b-a)}$

33. What is the mean (average) of a standard normal distribution (Z-distribution) ?

(1) 0

(2) 1

(3)  $\pi$

(4)  $\sqrt{2}$

34. Which distribution has a “Skewed” shape with a long tail on one side and is often used to model income, stock prices, or other financial data ?

(1) Poisson distribution

(2) Uniform distribution

(3) Exponential distribution

(4) Log-normal distribution

35. In a binomial distribution, what does the “ $n$ ” represent in the formula  ${}^n C_r p^r q^{n-r}$  ?

(1) The number of successes

(2) The number of trials

(3) The probability of success

(4) The mean of the distribution

36. The normal distribution is symmetric and described by two parameters : mean ( $\mu$ ) and .....

(1) Skewness

(2) Median

(3) Standard deviation ( $\sigma$ )

(4) Variance

37. Which one of the following is an iterative method ?

(1) Gauss-Seidel

(2) Gauss-Jordan

(3) Factorization

(4) Gauss Elimination

38. Find the positive root of the equation  $x^3 - 4x - 9 = 0$  using Regula-Falsi method and correct to 4 decimal places :

- (1) 2.8506                                      (2) 2.9570  
(3) 2.7065                                      (4) 2.4605

39. Find the value of Z after Ist Iteration to solve the following equations using Gauss-Seidel method :

$$27x + 6y - z = 85$$

$$6x + 15y + 2z = 72$$

$$x + y + 54z = 110$$

- (1) 0    (2) 1.72  
(3) 1.88    (4) 1.91

40. To solve a set of linear algebraic equations using Gauss Elimination method, triangularization leads to which of the following types of matrix ?

- (1) Singular matrix                              (2) Diagonal matrix  
(3) Lower triangular matrix                      (4) Upper triangular matrix

41. Selection of the following method is one point method :

- (1) Secant method                                      (2) Bisection method  
(3) Regula-Falsi method                                      (4) Newton-Raphson method

42. Let  $f(2) = 6$ ,  $f'(2) = -\frac{1}{2}$  and  $f''(2) = 10$ . Find most accurate approximation of  $f(2.2)$ , using Taylor's polynomial approximation :

- (1) 8.2    (2) 6.1  
(3) 7.3    (4) 5.9

43. Which of the following matrix do not have inverse ?

- (1) Singular matrix                                      (2) Linear matrix  
(3) Non-singular matrix                                      (4) Unidentified matrix

44. If  $\Delta f(x) = f(x+h) - f(x)$ , then for constant  $h$ , then the value of  $\Delta h$  will be .....

- (1)  $f(x+h) - f(x)$                       (2)  $f(h) - f(0)$   
(3) 0    (4) 1

45. The expression  $(E - 1) 2^x$  evaluates to .....

- (1)  $2^x(2^h - 1)$                       (2)  $2^{-x}(2^{-h} + 1)$   
(3)  $2^{x-h} - 2^{-x}$                       (4)  $2^{-x}(2^h + 1)$

46. Which of the following is a valid relation between  $\Delta, \nabla$  and  $E$  ?

- (1)  $\nabla = \frac{\Delta}{E}$                               (2)  $\Delta = \frac{\nabla}{E}$   
(3)  $\Delta = \frac{E}{\nabla}$                               (4)  $\nabla = \frac{E}{\Delta}$

47. .... is the approximate value of  $\int_0^1 \frac{dx}{1+x}$  using Trapezoidal rule.

- (1) 1    (2) 2  
(3) 0.5    (4) 0.75

48. By ..... rule,  $\int_a^b f(x) dx = \frac{h}{3}[f_0 + 4f_1 + f_2]$ , where  $h = \frac{b-a}{2}$ .

- (1) Trapezoidal                              (2) Simpson's  
(3) Newton-Raphson's                      (4) Bisection

49. Error in composite Trapezoidal rule is of order .....

- (1)  $h^2$     (2)  $h^3$   
(3)  $h^4$     (4)  $h$

50. Which of the following rules requires lesser number of points for evaluation of the full integral of a Gaussian function ?

- (1) Simpson's rule                      (2) Trapezoidal rule  
(3) Newton's rule                      (4) Raphson's rule

51. Consider the following function :

$$F(A, B, C, D) = \Sigma (0, 1, 4, 5, 8, 9, 12, 13)$$

The simplified function would be :

- (1)  $F = \bar{A}$                       (2)  $F = B$   
(3)  $F = \bar{C}$                       (4)  $F = C\bar{D}$

52. What is the length of single error correcting code for detecting error is 16 bit data ?

- (1) 3                      (2) 4  
(3) 5                      (4) 6

53. While implementing looping in assembly programming, which flag will be checked to find termination of loop ?

- (1) Carry flag                      (2) Overflow flag  
(3) Parity flag                      (4) Zero flag

54. In order to transfer a complete block of data from a hard disk to memory, which of the following I/O techniques will be used ?

- (1) Programmed I/O                      (2) Interrupt driven I/O  
(3) Direct memory access                      (4) Dedicated transfer mode

55. How many RAM chips of size  $256 K \times 4$  bit are needed to build a memory of 1 M word, with the size of 1 word being 32 bits ?

- (1) 16                      (2) 32  
(3) 64                      (4) 8

56.  $\sim \forall_n P(x) = \dots\dots\dots$

- (1)  $\exists_x \sim P(x)$  (2)  $\sim \exists_x P(x)$   
(3)  $\forall_x P(x)$  (4)  $\sim \forall_x P(x)$

57.  $\sim (A \wedge B) = \dots\dots\dots$

- (1)  $\sim A \vee \sim B$  (2)  $\sim A \wedge B$   
(3)  $B \wedge A$  (4)  $A \vee B$

58. If  $A = \{1, 2, 3, 4, 5\}$  and  $B = \{3, 5, 6, 7\}$ , then  $A - B = \dots\dots\dots$

- (1)  $\{1, 2, 4\}$  (2)  $\{6, 7\}$   
(3)  $\{3, 5, 6\}$  (4)  $\{3, 5\}$

59.  $\dots\dots\dots$  number of permutations are there of the letters, taken all at a time, of the word 'ASSESES'.

- (1)  $\frac{8!}{5! 2! 1!}$  (2)  $\frac{5!}{8! 2! 1!}$   
(3)  $\frac{2!}{5! 8! 1!}$  (4)  $\frac{1!}{5! 8! 2!}$

60. If  $G$  is a  $(p, q)$  graph, then sum of the degrees of the vertices of  $G$  is  $\dots\dots\dots$

- (1) Twice the number of edges (2) The number of edges  
(3) The number of vertices (4) Twice the number of vertices

61. Consider the following statements in relation to Object Oriented Programming (OOP):

I: An abstract method must be contained in an abstract class.

II: An abstract method always have statements inside it.

Choose the correct option :

- (1) Both I and II are true. (2) Both I and II are false.  
(3) I is true and II is false. (4) I is false and II is true.

62. Consider the following statements relating to structure in C++ :

I : Structure is a user defined data type.

II : A structure is similar to records.

III : In C++ array of structure cannot be declared.

Choose the correct option :

- (1) Both I and II are true but III is false.
- (2) II is false III is true.
- (3) Both I and III are true but II is false .
- (4) All I, II and III are false.

63. Consider the following statements :

I : XML is case-sensitive.

II : HTML is not case-sensitive.

III : In HTML end tag can be omitted but in XML end tag cannot be omitted.

Choose the correct option :

- (1) All I, II and III are false.
- (2) All I , II and III are true.
- (3) I and II are false but III is true.
- (4) II and III are true but I is false.

64. In servlet programming data sent with the ..... method is appended to the URL.

- (1) POST
- (2) GET
- (3) SERVICE
- (4) APPEND

65. The process of representing an object along a circular path is called .....

- (1) Translation
- (2) Rotation
- (3) Scaling
- (4) Reflection

66. Match the Column X with their corresponding description in Column Y :

Column X	Column Y
(i) Relational Model	(a) Represents data of entities, attributes, and relationships.
(ii) Entity-Relationship Model	(b) Structures data in a tree-like format.
(iii) Hierarchical Model	(c) Stores data using tables with rows and columns.
(iv) NoSQL Database	(d) Optimized for handling complex relationships, like social networks.
(v) Graph Model	(e) Allows flexible, schema-less data storage.

**Codes :**

	(i)	(ii)	(iii)	(iv)	(v)
(1)	(c)	(a)	(b)	(d)	(e)
(2)	(c)	(a)	(b)	(e)	(d)
(3)	(a)	(c)	(b)	(d)	(e)
(4)	(c)	(a)	(e)	(d)	(b)

67. Normalization is the process of organizing data in a relational database to reduce ..... and improve Data Integrity.

- |                     |                      |
|---------------------|----------------------|
| (1) Data Redundancy | (2) Data Consistency |
| (3) Data Accuracy   | (4) Data Security    |

68. In supervised learning for classification what is the role of the labelled dataset ?

- (1) It server as the test data.
- (2) It provides the input features.
- (3) It contains both input features and corresponding output labels.
- (4) It is used for model validation.



69. Which of the following is an example of an “Unsupervised” machine learning technique commonly used in Big Data Analysis ?
- (1) Linear Regression                      (2) K-means clustering  
(3) Decision Trees                              (4) Support Vector Machines (SVM)
70. Given a relation “Employees” with attributes (EmpID, Salary), what is the result of the query :
- $\pi_{\text{-salary}}(\text{Employees})$  if there are 200 tuples in the “Employees” relation ?
- (1) 200  
(2) 400  
(3) Depends on the values of salaries  
(4) 2
71. In paging, every address generated by the CPV is divided into 2 parts ..... and .....
- (1) Frame bit, Page number  
(2) Page number, Page offset  
(3) Page offset, Frame bit  
(4) Frame offset, Page offset
72. On a system, where there are multiple operating systems, the decision to load a particular operating system is done by .....
- (1) Process Control Block (PCB)      (2) File Control Block (FCB)  
(3) Boot loader                              (4) Bootstrap
73. A deadlock can be broken by .....
- (1) aborting one or more processes to break the circular wait  
(2) aborting all the resources in the system abruptly  
(3) Preempt all resources from all processes  
(4) Run the process at background

74. In UNIX, which one of the following system call creates a new process ?
- (1) Create (2) Fork  
(3) New (4) Process\_new
75. Semaphore is a/an ..... to solve the critical section problem.
- (1) Hardware of the system (2) Special program written for it  
(3) Integer variable (4) Character constant
76. The roadmap that is followed to build an timely, high quality software system is known as .....
- (1) Software process (2) Gantt chart  
(3) PERT chart (4) Bar chart
77. .... is not an approach to agile software development.
- (1) Scrum (2) Extreme programming  
(3) Waterfall model (4) SAFE
78. A ..... is a document that is created when a detailed description of all aspects of the software to be built must be specified before the commencement of the project.
- (1) Test specification (2) Software requirements  
(3) Detailed design (4) Bibliography
79. .... focuses on the degree to which the implementation follows the design and the resulting system meets its requirements and performance goals.
- (1) Quality of Code (2) Quality of Design  
(3) Quality of Conformance (4) Stress testing
80. .... is a test case design philosophy that uses the control structure described as part of component level design to derive testcases.
- (1) Blackbox testing (2) Glass box testing  
(3) Model based testing (4) Regression testing

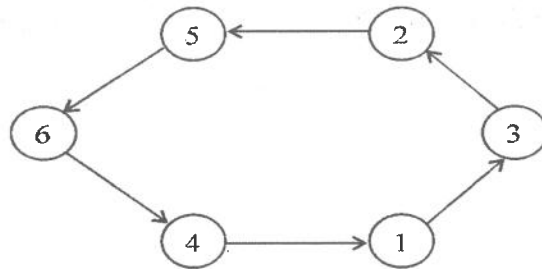
81. For the following pair of statements, what is the correct matching ?

List I	List II
(A) Connected components	(i) Greedy
(B) All pair shortest path	(ii) Divide and Conquer
(C) Quick sort	(iii) Dynamic programming
(D) Minimum weight spanning tree	(iv) Depth-First Search

**Codes :**

	(A)	(B)	(C)	(D)
(1)	iv	iii	i	ii
(2)	iv	ii	i	iii
(3)	iii	iv	ii	i
(4)	iv	iii	ii	i

82. Let a Directed Acyclic Graph is as given below. Which of the following is a topological ordering ?



- |                      |                                      |
|----------------------|--------------------------------------|
| (1) 6, 5, 4, 3, 2, 1 | (2) 6, 4, 5, 3, 1, 2                 |
| (3) 6, 4, 5, 3, 2, 1 | (4) No topological ordering possible |

83. Which of the following is true for the maximum and minimum number of nodes in a binary tree of height 6 ?

- |                           |                            |
|---------------------------|----------------------------|
| (1) 63 and 6 respectively | (2) 127 and 7 respectively |
| (3) 31 and 7 respectively | (4) 128 and 6 respectively |

84. Let the following pairs of traversals are applied on a binary tree. Which of these pairs identify a binary tree uniquely ?

- (i) Preorder and Postorder
- (ii) Level order and Preorder
- (iii) Preorder and Inorder
- (iv) Postorder and Inorder

**Codes :**

- (1) (i) only
- (2) (ii) only
- (3) (iii) only
- (4) Both (iii) and (iv)

85. Consider the following statements :

- (i) The smallest element in a max-heap is always at a leaf node.
- (ii) The second largest element in a max-heap is always a child of the root node.
- (iii) A binary search tree can be constructed from a max-heap in  $O(n)$  time.

Which of the above statements is/are true ?

- (1) (i) and (ii) only
- (2) (i) and (iii) only
- (3) (ii) and (iii) only
- (4) (i), (ii) and (iii)

86. Which of the following can be used to prove that a particular language is non-regular ?

- (1) Pumping Lemma
- (2) Deterministic Finite Automata
- (3) Non-deterministic Finite Automata
- (4) Turing machine

87. The Halting problem of Turing machine is .....

- (1) Decidable problem
- (2) Solvable in finite time
- (3) Decision problem
- (4) Undecidable problem

88. Which of the following statements are true for an NP class of problems ?

- (i) A set of decision problems that are solvable by a non-deterministic turing machine.
- (ii) A set of decision problem which are solvable in polynomial time, however, the order of that polynomial is 100 or more.
- (iii) A set of decision problems verifiable in polynomial time by a deterministic turing machine.

**Codes :**

- (1) Only (i) is true.
- (2) Both (i) and (ii) are true.
- (3) Both (i) and (iii) are true.
- (4) All (i), (ii) and (iii) are true.

89. Consider the following context free grammar :

$S \rightarrow aSa$

$S \rightarrow bSb$

$S \rightarrow \epsilon$

What kind of strings this grammar will produce ?

- (1)  $a^n b^n$
- (2)  $(ab)^n (ba)^n$
- (3) Palindrome
- (4) Strings with equal  $a$ 's and  $b$ 's

90. Which of the following is true for LL parser ?

- (1) It parses the words from left to left.
- (2) It can parse only irregular languages.
- (3) These parsers are difficult to construct and are not used by any compiler.
- (4) A set of  $LL(k)$  languages are properly contained in the set of  $LL(kh)$  languages.

91. Consider the following statements relating to Huffman coding :

I : The Huffman tree is a tree in which the leaves of the tree are the symbols.

II : Huffman coding assigns longer codes to the symbols that occur more frequently.

Choose the correct option :

- (1) I is true and II is false.                      (2) Both I and II are true.  
(3) Both I and II are false.                      (4) I is false and II is true.

92. Consider the following statements relating to Data Link Layer (DLL) of OSI model :

I : Logical Link Control (LLC) is a sublayer of DLL.

II : Media Access Control (MAC) layer does not belong to DLL.

Choose the correct option :

- (1) Both I and II are false.                      (2) Both I and II are true.  
(3) I is false and II is true.                      (4) I is true and II is false.

93. Consider the following statements relating to data communication :

I : Attenuation is the gain to energy of a signal during propagation.

II : Bit rate is the number of bits transferred per minute.

Choose the correct option :

- (1) Both I and II are true.                      (2) Both I and II are false.  
(3) I is true and II is false.                      (4) I is false and II is true.

94. Routing is the primary job of which layer of OSI model ?

- (1) Data Link Layer                                      (2) Physical Layer  
(3) Network Layer                                      (4) Session Layer

95. In CSMA/CA, CA stands for :

- (1) Collision Advance                                      (2) Code Advance  
(3) Collision Aggregation                                      (4) Collision Avoidance

96. Which of the following statement(s) is true about a perception ?

- (1) A neural network that contains feedback.
- (2) An auto-associative neural network.
- (3) A single layer feedforward neural network with preprocessing.
- (4) A two layer auto-associative neural network.

97. Let A and B are two fuzzy sets with membership function :

$$\mu_A(x) = \{0.3, 0.4, 0.7, 0.8, 1.0\}$$

$$\mu_B(x) = \{0.5, 0.6, 0.4, 0.7, 0.9\}$$

What will be the value of  $\mu_A \cap \mu_B$  ?

- (1) {0.3, 0.4, 0.4, 0.7, 0.9}
- (2) {0.5, 0.6, 0.7, 0.8, 1.0}
- (3) {0.8, 1.0, 0.1, 0.5, 0.9}
- (4) {0.2, 0.2, 0.3, 0.1, 0.1}

98. Which of the following terms is not related to genetic algorithm ?

- (1) Selection
- (2) Mutation
- (3) Reproduction
- (4) Evolution

99. An AI (Artificial Intelligence) agent performs which of the following functions ?

- (1) Maps the goal-sequences to an action.
- (2) Maps the percept sequences to an action.
- (3) Maps the environment sequences to an action.
- (4) Works without direct inference from any external factor like human.

100. Which of the following is used by adversarial search problems ?

- (1) Cooperative environment
- (2) Competitive environment
- (3) Neither competitive nor cooperative environment
- (4) Both cooperative and competitive environment

***Space for Rough Work***  
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