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A

Paper-II

COMPUTER SCIENCE AND APPLICATIONS

Signature and Name of Invigilator

1. (Signature) .....

(Name) .....

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Seat No. | | | | | | | |

(In figures as in Admit Card)

Seat No. .....

(In words)

OMR Sheet No. | | | | | | | |

(To be filled by the Candidate)

APR - 37224

Time Allowed : 2 Hours] **[Maximum Marks : 200**

Number of Pages in this Booklet : **28** Number of Questions in this Booklet : **100**

Instructions for the Candidates

1. Write your Seat No. and OMR Sheet No. in the space provided on the top of this page.
2. This paper consists of **100** objective type questions. Each question will carry *two* marks. *All* questions of Paper II will be compulsory.
3. At the commencement of examination, the question booklet will be given to the student. In the first 5 minutes, you are requested to open the booklet and compulsorily examine it as follows :
   (*i*) To have access to the Question Booklet, tear off the paper seal on the edge of this cover page. Do not accept a booklet without sticker-seal or open booklet.
   (*ii*) Tally the number of pages and number of questions in the booklet with the information printed on the cover page. Faulty booklets due to missing pages/questions or questions repeated or not in serial order or any other discrepancy should not be accepted and correct booklet should be obtained from the invigilator within the period of 5 minutes. Afterwards, neither the Question Booklet will be replaced nor any extra time will be given. The same may please be noted.
   (*iii*) After this verification is over, the OMR Sheet Number should be entered on this Test Booklet.
4. Each question has four alternative responses marked (A), (B), (C) and (D). You have to darken the circle as indicated below on the correct response against each item.
   Example : where (C) is the correct response.

   (A) (B) ● (D)

5. Your responses to the items are to be indicated in the **OMR Sheet given inside the Booklet only.** If you mark at any place other than in the circle in the OMR Sheet, it will not be evaluated.
6. Read instructions given inside carefully.
7. Rough Work is to be done at the end of this booklet.
8. If you write your Name, Seat Number, Phone Number or put any mark on any part of the OMR Sheet, except for the space allotted for the relevant entries, which may disclose your identity, or use abusive language or employ any other unfair means, you will render yourself liable to disqualification.
9. You have to return original OMR Sheet to the invigilator at the end of the examination compulsorily and must not carry it with you outside the Examination Hall. You are, however, allowed to carry the Test Booklet and duplicate copy of OMR Sheet on conclusion of examination.
10. Use only Blue/Black Ball point pen.
11. Use of any calculator or log table, etc., is prohibited.
12. There is no negative marking for incorrect answers.

विद्यार्थ्यांसाठी महत्त्वाच्या सूचना

1. परीक्षार्थींनी आपला आसन क्रमांक या पृष्ठावरील वरच्या कोपऱ्यात लिहावा. तसेच आपणांस दिलेल्या उत्तरपत्रिकेचा क्रमांक त्याखाली लिहावा.
2. सदर प्रश्नपत्रिकेत **100** बहुपर्यायी प्रश्न आहेत. प्रत्येक प्रश्नास **दोन** गुण आहेत. या प्रश्नपत्रिकेतील **सर्व** प्रश्न सोडविणे अनिवार्य आहे.
3. परीक्षा सुरू झाल्यावर विद्यार्थ्याला प्रश्नपत्रिका दिली जाईल. सुरुवातीच्या 5 मिनिटांमध्ये आपण सदर प्रश्नपत्रिका उघडून खालील बाबी अवश्य तपासून पहाव्यात.
   (*i*) प्रश्नपत्रिका उघडण्यासाठी प्रश्नपत्रिकेवर लावलेले सील उघडावे. सील नसलेली किंवा सील उघडलेली प्रश्नपत्रिका स्वीकारू नये.
   (*ii*) पहिल्या पृष्ठावर नमूद केल्याप्रमाणे प्रश्नपत्रिकेची एकूण पृष्ठे तसेच प्रश्नपत्रिकेतील एकूण प्रश्नांची संख्या पडताळून पहावी. पृष्ठे कमी असलेली/कमी प्रश्न असलेली/प्रश्नांचा चुकीचा क्रम असलेली किंवा इतर त्रुटी असलेली सदोष प्रश्नपत्रिका सुरुवातीच्या 5 मिनिटातच पर्यवेक्षकाला परत देऊन दुसरी प्रश्नपत्रिका मागवून घ्यावी. त्यानंतर प्रश्नपत्रिका बदलून मिळणार नाही तसेच वेळही वाढवून मिळणार नाही याची कृपया विद्यार्थ्यांनी नोंद घ्यावी.
   (*iii*) वरीलप्रमाणे सर्व पडताळून पाहिल्यानंतरच प्रश्नपत्रिकेवर ओ.एम.आर. उत्तरपत्रिकेचा नंबर लिहावा.
4. प्रत्येक प्रश्नासाठी (A), (B), (C) आणि (D) अशी चार विकल्प उत्तरे दिली आहेत. त्यातील योग्य उत्तराचा रकाना खाली दर्शविल्याप्रमाणे ठळकपणे काळा/निळा करावा.
   उदा. : जर (C) हे योग्य उत्तर असेल तर,

   (A) (B) ● (D)

5. या प्रश्नपत्रिकेतील प्रश्नांची उत्तरे **ओ.एम.आर. उत्तरपत्रिकेतच दर्शवावीत.** इतर ठिकाणी लिहिलेली उत्तरे तपासली जाणार नाहीत.
6. आत दिलेल्या सूचना काळजीपूर्वक वाचाव्यात.
7. प्रश्नपत्रिकेच्या शेवटी जोडलेल्या कोऱ्या पानावरच कच्चे काम करावे.
8. जर आपण ओ.एम.आर. वर नमूद केलेल्या ठिकाणाव्यतिरिक्त इतर कोठेही नाव, आसन क्रमांक, फोन नंबर किंवा ओळख पटेल अशी कोणतीही खूण केलेली आढळून आल्यास अथवा असभ्य भाषेचा वापर किंवा इतर गैरमार्गाचा अवलंब केल्यास विद्यार्थ्याला परीक्षेस अपात्र ठरविण्यात येईल.
9. परीक्षा संपल्यानंतर विद्यार्थ्याने मूळ ओ.एम.आर. उत्तरपत्रिका पर्यवेक्षकांकडे परत करणे आवश्यक आहे. तथापि, प्रश्नपत्रिका व ओ.एम.आर. उत्तरपत्रिकेची द्वितीय प्रत आपल्याबरोबर नेण्यास विद्यार्थ्यांना परवानगी आहे.
10. फक्त निळ्या किंवा काळ्या बॉल पेनचाच वापर करावा.
11. कॅलक्युलेटर किंवा लॉग टेबल वापरण्यास परवानगी नाही.
12. चुकीच्या उत्तरासाठी गुण कपात केली जाणार नाही.

Computer Science and Applications

Paper II

Time Allowed : 120 Minutes] **[Maximum Marks : 200**

Note : This paper contains **Hundred (100)** multiple choice questions. Each question carrying **Two (2)** marks. Attempt *All* questions.

1. The inference rule deals exclusively with formulas in conjunctive normal forms is called as :

   (A) Resolution rule

   (B) Contingency rule

   (C) Unsatisfiability rule

   (D) Contradiction rule

2. Let A and B be the sets. The symmetric difference between A and B is :

   (A) $A \oplus B = (A - B) \cup (B - A)$

   (B) $A \cup B = (A \oplus B) \cap (B + A)$

   (C) $A \cap B = (B + A) - (B - A)$

   (D) $A \subseteq B = (A - B) \cup (B + A)$

3. A deck of playing cards contains 52 cards, 4 each with face values in the set {A, 2, 3, 4, 5, 6, 7, 8, 9, 10, J, Q, K}. Let us define face values of the top and bottom cards as X and Y. The shuffling algorithm is defined as follows :

   Sh1 : Permute the cards randomly due to that each arrangement occurs with probability 1/52 !

   Sh2 : If $X \neq Y$, flip the biased coin that comes up heads with probability P and go back to Sh1 if heads turns up otherwise stop.

   Each coin flip and each permutation is assumed to be independent of all the other randomization. What value of P will make X and Y independent random variables once this process of shuffling will stops ?

   (A) P = 1/4

   (B) P = 2/3

   (C) P = 1/3

   (D) P = 1/5

4. Identify the number of distinct string of length 2 of the combinations of blue and yellow beads. The both ends of the strings are not marked due to this they are indistinguishable if interchanging the ends of one will results other. Denote b and y as a blue and yellow beads. Let us consider bb, by, yb and yy are the four different strings of length 2 when equivalence between strings is not taken into the consideration. The number of equivalent classes into which the set $s = (bb, by, yb, yy)$ is divided by equivalent relation induced by the group of permutation $[\{\Pi_1, \Pi_2\}, 0]$ where :

$$\Pi_1 = \begin{pmatrix} bb & by & yb & yy \\ bb & by & yb & yy \end{pmatrix}$$

$$\Pi_2 = \begin{pmatrix} bb & by & yb & yy \\ bb & yb & by & yy \end{pmatrix}$$

(A) 3

(B) 4

(C) 5

(D) 6

5. Design a K-Map for $F(x, y, z) = x\bar{z} + xyz + y\bar{z}$ of $F(x, y, z)$ and find prime implicants.

(A) xy, $y\bar{z}$, $x\bar{z}$

(B) x, y, z

(C) $\bar{x}y$, yz, $x\bar{z}$

(D) $x\bar{y}$, yz, $\bar{x}z$

6. 11 students plan to have dinner together for multiple days. They will be seated at the round table. Their plan is to ensure that each student sits next to different neighbours at every dinner. How many days can this arrangement be sustained ?

(A) 5

(B) 11

(C) 4

(D) 7

7. Explore all 5 letter combinations formed using the letters a through h. How many of these words contains no repeats, also do not include the subword "bad" ?

(A) 6660

(B) 6667

(C) 6578

(D) 6312

8. Suppose G is the graph with n vertices such that every vertex having degree 5. What is the smallest value of n for which graph might be planar ?

(A) $\frac{5n}{2}$

(B) $5n$

(C) $2n$

(D) $\frac{2n}{5}$

9. Let us consider the full Coca-Cola bottles, 7 half-full and 7 empty. You want to divide the 21 bottles among three persons so that each will receive exactly 7. Moreover, each person must receive the same quantity of Coca-Cola. Solve the problem using Integer Linear programming and find a solution. What will be the objective function ?

(A) There will be a dummy objective function with all zero coefficients.

Status	Number of bottles assigned to person		
	1	2	3
Full	1	3	3
Half-full	5	1	1
Empty	1	3	3

(B) Objective function will be maximize the total quantity of Coca-Cola distribution.

Status	Number of bottles assigned to person		
	1	2	3
Full	3	1	2
Half-full	2	1	3
Empty	2	5	1

(C) Objective function will be minimize the empty bottles.

Status	Number of bottles assigned to person		
	1	2	3
Full	0	1	2
Half-full	0	1	3
Empty	7	5	2

(D) Set of a binary variable is represented for full bottle representation.

Status	Number of bottles assigned to person		
	1	2	3
Full	1	5	2
Half-full	2	1	2
Empty	4	1	3

10. Consider the following linear programming problem :

Maximize $Z = 2x_1 + 3x_2$

Subject to : $x_1 + 3x_2 \leq 12$

$3x_1 + 2x_2 \leq 12$

$x_1, x_2 \geq 0$

At which points of graphical solution space the infeasible basic optimum solutions are represented ?

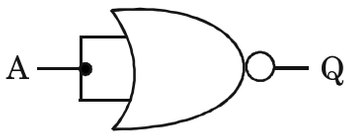
(A) Corner points ($x_1 = 0$, $x_2 = 6$) and ($x_1 = 12$, $x_2 = 0$) are infeasible

(B) Corner points ($x_1 = 10.29$, $x_2 = 2$) and ($x_1 = 0$, $x_2 = 3.34$) are infeasible

(C) Corner points ($x_1 = 12.20$, $x_2 = 6$) and ($x_1 = 0$, $x_2 = 5.24$) are infeasible

(D) None of the corner points are infeasible

11. Given Logic Gate represents which of the following Truth Table ?



(A)

A	Q
0	0
1	0

(B)

A	Q
0	1
1	1

(C)

A	Q
0	0
1	1

(D)

A	Q
0	1
1	0

12. "100" is a number in Decimal Number System. What will be its representation in Octal Number System ?

(A) 100

(B) 144

(C) 414

(D) 441

13. The following Truth Table represents which Logical Micro-operation ?

A	B	F
0	0	0
0	1	1
1	0	1
1	1	0

(A) $F \leftarrow A \wedge B$

(B) $F \leftarrow \overline{A \wedge B}$

(C) $F \leftarrow A \oplus B$

(D) $F \leftarrow \overline{A \oplus B}$

14. Which of the following is not expected from a clock pulse in CPU ?

(A) It is not applied to all registers.

(B) It changes the state of registers as per control signal requirements.

(C) It allows synchronization of various activities.

(D) It may trigger the loading of data into registers or the transfer of data between registers.

15. Which of the following task is performed by Direct Memory Access (DMA) in a computer system ?

(A) allow data transfer between a storage unit and CPU independent of memory

(B) allow data transfer between a storage unit and main memory independent of CPU

(C) allow data transfer between a storage unit and main memory under CPU control

(D) allow data transfer between CPU and main memory independent of a storage unit

16. Which of the following statements is not true with respect to a Hardwired Control Unit in comparison with a Micro-programmed Control Unit ?

(A) It does not require control memory

(B) It provides better execution speed

(C) It enables a simpler control unit design

(D) It does not allow for flexible control unit design

17. Stack Pointer Register (SP) in x86 architecture is generally used to ..... .

(A) point base of the stack

(B) point top of the stack

(C) point top or based of the stack based on opcode

(D) point top or based of the stack based on addressing mode

18. Which of the following computer systems is represented when a computer can process several programs at the same time ?

(A) Single Instruction Stream, Single Data Stream (SISD)

(B) Single Instruction Stream, Multiple Data Stream (SIMD)

(C) Multiple Instruction Stream, Single Data Stream (MISD)

(D) Multiple Instruction Stream, Multiple Data Stream (MIMD)

19. Which Redundant Array of Independent Disks (RAID) technology maintains copy of an entire hard disk on other hard disk ?

(A) RAID 0

(B) RAID 1

(C) RAID 5

(D) RAID 10

20. Which type of memory allows computer system to execute computer programs requiring more memory than physically available ?

(A) Auxiliary Memory

(B) Associative Memory

(C) Cache Memory

(D) Virtual Memory

21. What is the difference between a "shallow copy" and a "deep copy" in the context of programming languages ?

(A) Shallow copy duplicates only references, while deep copy duplicates entire object

(B) Shallow copy duplicates entire object, while deep copy duplicates only references

(C) Shallow copy duplicates only system variables, whereas deep copy duplicated user defined variables

(D) Shallow copy duplicates only user defined variables, whereas deep copy duplicated system variables

22. The term "snapshot" is used in the context of virtualization to refer to ..... .

(A) Backup of virtual machine's current state

(B) Backup of host operating system's current state

(C) Backup of guest operating system's current state

(D) Backup of guest applications current state

23. Predict the output of the following source code in C language :

```
int main( )
{
  int i, x[5];
  for(i=0; i<5; i++) * (x+i) = i;
 for(i=0; i<5; i++) printf("%d", x[i]);
  return 0;
}
```

(A) 0 1 2 3 4

(B) Syntax Error

(C) Semantic Error

(D) Garbage Value

24. Predict the output of the following C source code :

```
int x = 10;
int main( )
{
   int x = 20;
   {
      int x = 30;
      {extern x; printf("%d", x);}
   }
   return 0;
}
```

(A) 10

(B) 20

(C) 30

(D) 10 20 30

25. class C {

public:

void f(int a) {cout << a;}

void f(int a, int b) {cout << a+b;};

void f(int a, int b, int c) {cout << a+b+c;}

};

int main( )

{

C obj;

obj.f(10);

obj.f(10, 20);

obj.f(10, 20, 30);

return 0;

}

The above C++ source code exemplifies which of the following principle with respect to object-oriented programming ?

(A) Abstraction

(B) Encapsulation

(C) Inheritance

(D) Polymorphism

26. Predict the output of this source code written in C++ language :

```
class C1{
public:
    void display() {cout<<"Hello";}
};
class C2; public C1{
public:
    void display() {cout<<"World";}
};
int main(void) {
    C1*ptr = new C2;
    ptr->display();
    return 0;
}
```

(A) Hello

(B) World

(C) Hello World

(D) World Hello

27. Which of the following activities is not an application of XML ?

(A) Data storage

(B) Data transmission

(C) Multiple rendering of the same data

(D) Interaction with the user to get the data

28. Which of the following statements is not true with respect to Applets ?

(A) All web browsers support Applets

(B) Applets are vulnerable from security perspective

(C) Applets can communicate with their server on their own

(D) Applets can play multimedia on client side

29. A transformation that distorts the shape of an object such that the transformed shape appears as if the object was composed of internal layers that had be caused to slide over each other is called as ..... .

(A) Reflection

(B) Shear

(C) Dither

(D) Translation

30. Which of the following materials has highest spectacular reflection coefficient at an angle of 45° of incidence over it ?

(A) Water

(B) Glass

(C) Gold

(D) Silver

31. Which of the following commands is used to save any transaction permanently into the database ?

(A) Redo

(B) Commit

(C) Rollback

(D) Undo

32. The maximum number of children that a B-tree of order m can have :

(A) $m + 1$

(B) $m - 1$

(C) m

(D) $2m$

33. Which of the following commands can be used SQL to delete all the records in the table work ?

(A) Delete from work

(B) Delete from work where Id = 'Null'

(C) Remove table work

(D) Drop table work

34. A database is :

(A) an organized collection of data or information that can be only accessed

(B) an organized collection of data or information that can be only managed

(C) an organized collection of data or information that can be accessed, updated and managed

(D) an organized collection of data or information that cannot be updated

35. The data contained in the data warehouse is described by :

(A) Relational data

(B) Meta data

(C) Operational data

(D) Active data

36. An advantage of distributed database over a centralized database :

(A) Modular growth

(B) Software cost

(C) Software complexity

(D) Slow response

37. In the context of functional dependency, Armstrong inference rules refer to :

(A) Reflexivity, Decomposition and Transitivity

(B) Decomposition and Transitivity

(C) Transitivity, Augmentation and Reflexivity

(D) Decomposition and Reflexivity

38. For the SQL query given below :

SELECT employee_name

FROM employee

WHERE salary BETWEEN 70000 and 130000

Select the equivalent in SQL without BETWEEN operator :

(A) SELECT employee_name
FROM employee
WHERE salary > 70000 and salary < 130000

(B) SELECT employee_name
FROM employee
WHERE salary = 70000 and salary = 130000

(C) SELECT employee_name
FROM employee
WHERE salary >= 70000 and salary <= 130000

(D) SELECT employee_name
FROM employee
WHERE salary < 70000 and salary > 130000

39. A transaction enters into its partially committed state :
(A) When it finishes the execution of final statement
(B) When it starts the execution of first statement
(C) After writing 'COMMIT' into log
(D) It never enters partially committed state

40. Consider the relation scheme (M, N, O, P, Q, R) with the following set of functional dependencies :
$F = \{MO \rightarrow PQ, MPR \rightarrow NO\}$
Which of the following is the trivial functional dependencies in F^+, where F^+ is closure of F ?
(A) $MO \rightarrow PQ$
(B) $MO \rightarrow OP$
(C) $MP \rightarrow P$
(D) $MPR \rightarrow N$

41. In what tree, for every node the height of its left subtree and right subtree differ at least by one :
(A) AVL tree
(B) Threaded binary tree
(C) Binary search tree
(D) Complete tree

42. An example of a distributed OS is :
(A) Amoeba
(B) UNIX
(C) MS-DOS
(D) MULTICS

43. Consider the following proposed solution to dining philosopher's problem to avoid deadlock. Consider the binary semaphore lock in initialized to 1.

```
Philosopher (int i)
{   while (1)
    {  think ( );
       wait (lock); .....(i)
       wait (fork [i]);
       wait (fork [(i+1)%5]);
       signal (lock); ..... (ii)
       eat( );
       wait (lock); ..... (iii)
       signal (fork [i]);
       signal (fork (i + 1) % 5);
       signal (lock); ..... (iv)
}
```

Which of the following is correct ?
(A) Removing (*i*) and (*ii*) will not affect the code. The code will work fine.
(B) Removing (*iii*) and (*iv*) will not affect the code. The code will work fine.
(C) Removing (*i*), (*ii*), (*iii*), (*iv*) will not affect the code. The code will work fine.
(D) All (*i*), (*ii*), (*iii*), (*iv*) are necessary. Removal of any of them will affect the code.

44. Which of the following type is at lowest level in terms of operating system security ?

(A) Type A

(B) Type B

(C) Type C

(D) Type D

45. The equivalent postfix express for $d / (e + f) + b * c$ is :

(A) *defbc / ++*

(B) *def + / bc + **

(C) *def + / bc * +*

(D) *def / ++ bc **

46. Match the following flag bits used in the context of virtual memory management on the List I (Name of the bit) with the different purposes on the List II (Purpose) of the table mentioned :

List I

(Name of the bit)

(*i*) Dirty

(*ii*) R/W

(*iii*) Reference

(*iv*) Valid

List II

(Purpose)

(*a*) Page initialization

(*b*) Write-back policy

(*c*) Page protection

(*d*) Page replacement policy

Codes :

	(*i*)	(*ii*)	(*iii*)	(*iv*)
(A)	(*d*)	(*a*)	(*b*)	(*c*)
(B)	(*b*)	(*c*)	(*a*)	(*d*)
(C)	(*c*)	(*d*)	(*a*)	(*b*)
(D)	(*b*)	(*c*)	(*d*)	(*a*)

47. An operating system contains 3 user processes each requiring 2 unit of resources 'R'. The minimum number of units of '*r*' such that no deadlocks will ever arise is :

(A) 3

(B) 5

(C) 4

(D) 6

48. How much extra space is used by heapsort algorithm ?

(A) $O(n)$

(B) $O(n^p)$

(C) $O(l)$

(D) $O(\log n)$

49. Consider a non-negative counting semaphore S. The operation P(s) decrements S, and V(s) increments S. During an execution, 20 P(s) operations and 12 V(s) operations are issued in some order. The largest initial value of S for which at least one P(s) operation will remain blocked is :

(A) 4

(B) 5

(C) 6

(D) 7

50. Where does the swap space reside ?

(A) RAM

(B) Disk

(C) ROM

(D) On chip cache

51. Which problem exists from the management perspective in the incremental model ?

(A) System structure tends to improve as new increments are added and performs better.

(B) System structure becomes robust as new increments added.

(C) System structure tends to degrade as new increments are added and performs better.

(D) System structure tends to degrade as new increments are added and regular changes corrupts its structure.

52. In development testing ..... may be simple entities such as functions or object classes, or may be coherent groupings of these entities.

(A) Components

(B) Table

(C) View

(D) Domain

53. ..... principle expect the system requirements to change and so design the system to accommodate the changes in Agile software development.

(A) Incremental delivery

(B) People not process

(C) Embrace change

(D) Maintain simplicity

54. The ..... thread of Extreme programming comes from helping build software teams at their start-ups and need to maintain flexibility.

(A) Second

(B) Fourth

(C) Sixth

(D) Seventh

55. ..... are a requirements discovery technique that were first introduced in the Objectory method.

(A) Classes

(B) Objects

(C) Functions

(D) Use cases

56. Architectural models that may be developed may include :

..... models that shows relationships, such as data flow, between the sub-systems.

(A) Static structural

(B) Dynamic process

(C) Interface model

(D) Relationship models

57. ..... ensure the software development team have followed project quality procedures.

(A) Quality assurance

(B) Quality planning

(C) Quality control

(D) Quality check

58. In COCOMO II model PREX stands for ..... .

(A) Personnel experience

(B) Reliability and complexity

(C) Personnel capability

(D) Personal exchange

59. Who presents the code or document at an inspection meeting ?

(A) Reader

(B) Inspector

(C) Chief moderator

(D) Author

60. Which is not a factor influencing system release strategy ?

(A) Technical quality of the system

(B) Platform changes

(C) Lehman's fifth law

(D) Verification

61. The Merger sort algorithm employs the design technique :

(A) Backtracking

(B) Dynamic programming

(C) Divide and Conquer

(D) Brute force

62. A binary tree whose every node has either zero or two children is called :

(A) Binary search tree

(B) Extended binary tree

(C) Complete binary tree

(D) Skewed binary tree

63. For binary search algorithm, which of the following is not a required condition ?

(A) The list must be sorted

(B) There must be an easy mechanism to delete and/or insert elements in list

(C) There should be a direct access to the middle element in any sublist

(D) None of the above

64. A doubly linked list is :

(A) A linear data structure

(B) A non-linear data structure

(C) Both linear and non-linear data structure

(D) Neither linear nor non-linear data structure

65. Which is the odd one among the following ?

(A) Array

(B) Binary tree

(C) Complete binary tree

(D) Graph

66. If a planar graph has v vertices, e edges and f faces, then which of the following is true ?

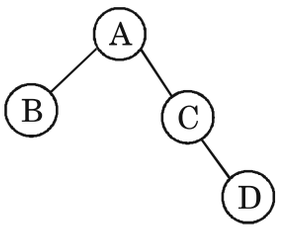
(A) $e + f - v = 2$

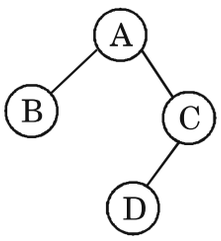
(B) $e - f + v = 2$

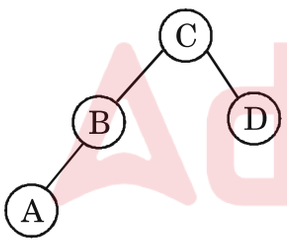
(C) $v + e + f = 2$

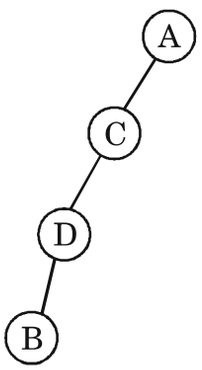
(D) $v - e + f = 2$

67. Given a binary tree with :
(*i*) The inorder tree traversal output as : A B C D
(*ii*) The preorder tree traversal output as : C B A D
Then the original binary tree is :

(A) 

(B) 

(C) 

(D) 

68. Consider the undirected weighted graph G with 3 vertices, whose adjacency matrix is given as :

$$G = \begin{bmatrix} 0 & 2 & 2 \\ 2 & 0 & 2 \\ 2 & 2 & 0 \end{bmatrix}$$

Which of the following is true ?

(A) Graph G has no minimum spanning tree

(B) Graph G has a unique minimum spanning tree of cost 4

(C) Graph G has 3 distinct minimum spanning trees, each of cost 4

(D) Graph H has 3 spanning trees of different costs

69. The travelling salesman problem can be solved using :

(A) BFS traversal

(B) A spanning tree

(C) A minimum spanning tree

(D) DFS traversal

70. A complete binary tree has depth, given by the formula (where n is the number nodes) :

(A) $n \log_2 n$

(B) $\log_2 n$

(C) $\log_2 (n + 1)$

(D) $n \log_2 n + 1$

71. Let $\Sigma = \{a, b\}$, $\Gamma = \{a, b, c\}$ and define 'h' by :

$h(a) = ab$

$h(b) = bbc$

Then $h(aba) = abbbcab$

The homomorphic image of

$$L = \{aa, aba\}$$

is the language ..... .

(A) $h(L) = \{abab, abbbcab\}$

(B) $h(L) = \{abab, abbbcab, aaaa\}$

(C) $h(L) = \{abab, abbbcab, bbbb\}$

(D) $h(L) = \{abb, abcab\}$

72. Determine the regular expression for the language accepted by L_1/L_2 for $L_1 = L(a^*baa^*)$, $L_2 = (ab^*)$:

(A) a^*ba^*

(B) aba^*

(C) $a^*b^*a^*$

(D) $(abc)^*$

73. Determine the context free grammar for the following language where $n, m \geq 0$:

$L = \{w \in \{a,b\}^* \mid n_a(v) = n_b(v)$, where v is any prefix of $w\}$

(A) $S \rightarrow A \mid B$

$A \rightarrow aA \mid aS \mid \in$

$B \rightarrow bB \mid \in$

(B) $S \rightarrow A \mid B$

$A \rightarrow aA \mid aS \mid \in$

$B \rightarrow bB \mid bS \mid \in$

(C) $S \rightarrow A \mid B$

$A \rightarrow aA \mid aB \mid \in$

$B \rightarrow bB \mid \in$

(D) $S \rightarrow A \mid B$

$A \rightarrow aA \mid SS \mid \in$

$B \rightarrow bB \mid bA \mid \in$

74. Which of the following statements are true ?

S_1 : Left recursion is a major problem in top-down parsing and needs to be removed first.

S_2 : Backtracking makes the bottom-up parser delay the input processing.

S_3 : SLR parser has lesser number of states than canonical – LR parser.

S_4 : Canonical – LR parser is more powerful than LALR parser.

(A) S_1 and S_2

(B) S_1 only

(C) S_1 and S_3

(D) S_1, S_3 and S_4

75. What does Russell's paradox challenge in set theory ?

(A) Axioms of infinity

(B) Axioms of choice

(C) Axioms of regularity

(D) Axioms of foundation

76. Which one of the following is not decidable ?

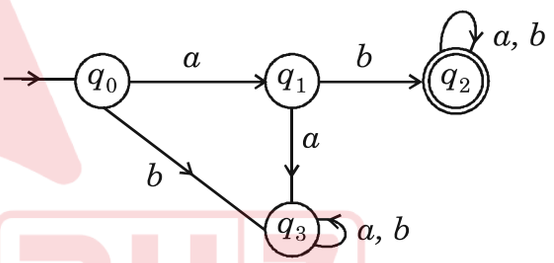
(A) Given a Turing machine M, a string S and an integer K, M accepts S with K step S

(B) Equivalence of two given Turing machines

(C) Language accepted by a given DFSA is non-empty

(D) Language generated by a CFG is non-empty

77. Determine the language accepted by the following deterministic finite accepter over $\Sigma = \{a, b\}$:



(A) A language that recognizes the set of all strings on $\Sigma = \{a, b\}$ starting with prefix '*ab*'

(B) A language that recognizes the set of all strings on $\Sigma = \{a, b\}$ starting with '*ab*'

(C) A language that recognizes the set of all strings on $\Sigma = \{a, b\}$ starting with '*a*' or '*b*'

(D) A language that recognizes the set of all strings on $\Sigma = \{a, b\}$ starting with any number of '*as*'

78. Which of the following is a characteristic of recursive descent parsing ?

(A) Backtracking

(B) Memoization

(C) Ambiguity

(D) Shift-Reduce conflicts

79. In an S-attributed definition, what distinguishes synthesized attributes from inherited attributes ?

(A) Synthesized attributes are computed bottom-up and inherited attributes are computed top-down

(B) Inherited attributes are computed bottom-up and synthesized attributes are computed top-down

(C) Inherited attributes depend only on synthesized attributes

(D) Synthesized attributes depend only on inherited attributes

80. In peephole optimization, what is loop unrolling aimed at achieving ?

(A) Reducing the number of loops

(B) Eliminating conditional statements within loops

(C) Decreasing the size of loops by removing redundant instructions

(D) Expanding the body of a loop to reduce over head and improve parallelism

81. The ..... is a program that runs on computer and servers that allows computer to communicate over a network.

(A) System Software

(B) Application Software

(C) Windows Operating System

(D) Network Operating System

82. Determine the line speed for a 20-channel PCM/TDM system with a 8-kHz sample rate, 10 bits per sample and one framing bit per frame.

(A) 1.608 Mbps

(B) 1.204 Mbps

(C) 3.406 Mbps

(D) 1.2 Mbps

83. In dual cable system to transmit a data a computer outputs the data on to cable 1, which runs to the device called the ..... at the root of the cable tree.

(A) tail end

(B) after one hop

(C) head end

(D) round trip

84. What is the broad band frequency in telephone network ?

(A) 4 kHz

(B) 3 kHz

(C) 2 kHz

(D) 1 kHz

85. In wireless networks CDPD stands for ..... .

(A) Carrier Data Packet Data

(B) Collision Detection in Packet Data

(C) Cellular Digital Packet Distribution

(D) Cellular Digital Packet Data

86. Which device is used to connect different networks that provide necessary translation both in terms of hardware and software ?

(A) Switches

(B) Routers

(C) Hubs

(D) Gateways

87. What is the bit pattern obtained for the sequence of bits 10110101 was sent in even parity by adding a bit at the end ?

(A) 101101011

(B) 101101010

(C) 001101010

(D) 001101011

88. In computer networks, Pulse Code Modulation (PCM) method is used for digitizing analog voice signals usually samples, the incoming voice signal once every ..... microseconds.

(A) 75

(B) 125

(C) 175

(D) 225

89. What is the fixed-size blocks used by Trivial File Transfer Protocol to transfer the data ?

(A) 128 bytes

(B) 256 bytes

(C) 512 bytes

(D) 1024 bytes

90. What are the highly stable and highly volatile values that are assigned to the information in Time-to-live field ?

(A) 86400 and 60

(B) 36000 and 0

(C) 128000 and 128

(D) 120000 and 60

91. In LISP the function that provides the initial element of a list is :

(A) Car

(B) Set

(C) Second

(D) First

92. In neural network, the network capacity is defined as :

(A) The traffic (tarry capacity of network)

(B) The total number of nodes in the network

(C) The number of patterns that can be stored and recalled in a network

(D) The numbers of computes in a network

93. What term describes the scenario where the training error of a model decreases while the test error increases ?

(A) Over fitting

(B) Under fitting

(C) Testing error

(D) Proper fitting

94. What is Coreference Resolution ?

(A) Anaphora Resolution

(B) Given a sentence or larger chunk of text determine which words (mentions) refer to the same objects (entities)

(C) Solution obtained through coreference

(D) Solution of a previous solved problem

95. ..... is the type of morphology that changes the word category and affect the meaning.

(A) Inflectional

(B) Derivational

(C) Cliticization

(D) Infuational

96. Consider the following statements :

Statement (1) : In the logistic regression model we pass the values of W. x + b (for every x in the dot set) through a sigmoid function to return a probabilistic class label.

Statement (2) : In the logistic regression model, if the value (W. x + b) given to the sigmoid function in close to zero. Then the class label predicted (with a 0.5 threashold) is very certain and reliable.

(A) Only (1) is correct

(B) Only (2) is correct

(C) Both (1) and (2) are correct

(D) Neither (1) nor (2) is correct

97. A general fuzzy controller consists of ..... .

(A) Fuzzy rule base, fuzzy inference engine and fuzzification/ defuzzification modules

(B) Fuzzy functions, fuzzy inference engine and fuzzification/ defuzzification modules

(C) Fuzzy rule base, fuzzy data engine and fuzzification/ defuzzification modules

(D) Fuzzy functions, fuzzy data engine and fuzzification/ defuzzification modules

98. Which of the following is not a correct encoding technique used in genetic algorithms ?

(A) Premier encoding

(B) Tree encoding

(C) Binary encoding

(D) Value encoding

99. A neuron has five inputs given by I = {1, 3, 2, –1, 3} and corresponding weights are W = {0.5, 2, –1, 2, –0.5}. The bias $b = 0$ and slope parameter $\alpha = 1$. The sigmoid activation function is used to generate final output y. What is the value of y ?

(A) –1

(B) 0.52

(C) 0.73

(D) 0.92

100. Which among the following minimizes the upper bound of the generalization error and maximizes the margin between a separating hyperplane and the training data, instead of minimizing the training error ?

(A) Boltzmann machine

(B) SVM

(C) Hopfield neural network

(D) RBF

ROUGH WORK

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