Test Booklet Code & Serial No.
प्रश्नपत्रिका कोड व क्रमांक

A

Paper-II
COMPUTER SCIENCE AND APPLICATIONS

Signature and Name of Invigilator

1. (Signature) .....

(Name) .....

2. (Signature) .....

(Name) .....

Seat No. | | | | | | | |

(In figures as in Admit Card)

Seat No. .....

(In words)

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

(To be filled by the Candidate)

JUN - 37225

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 (B) is the correct response.

   (A) ● (C) (D)

   Following wrong methods should not be used as they are not recognised by scanning machine in digitized assessment. Candidate using such method will be responsible for their loss.

WRONG METHODS			
(A)(B)(C)(D)	(A)(B)(C)(D)	(A)●(C)(D)	(A)(B)(C)(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 काळ्या/निळ्या करावा.
   उदा. : जर (B) हे योग्य उत्तर असेल तर.

   (A) ● (C) (D)

   खालील चुकीच्या पद्धती वापरू नये, कारण डिजिटाइज्ड (Digitized) मूल्यांकनात स्कॅनिंग मशीन त्यांना ओळखत नाही. त्या पद्धती वापरून नुकसान झाल्यास त्यास विद्यार्थीच जबाबदार असतील.

WRONG METHODS			
(A)(B)(C)(D)	(A)(B)(C)(D)	(A)●(C)(D)	(A)(B)(C)(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 गैरमार्गांचा 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. Let ϕ, ψ be the formula, $\phi \models \Psi$, if and only if $\phi \models \Psi$ is a :

   (A) Tautology

   (B) Contradiction

   (C) Contingency

   (D) Either tautology or contradiction or contingency

2. Which of the following relations defined on $X = \{1, 2, 3\}$ is an equivalent relation ?

   (A) {(1, 2), (2, 2), (3, 3)}

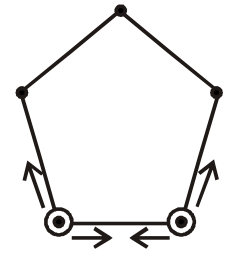
   (B) {(1, 1), (2, 2), (2, 2), (2, 1), (3, 3), (1, 1)}

   (C) {(1, 1), (1, 2), (1, 3), (2, 2), (2, 1), (3, 3), (3, 1)}

   (D) All of the above

3. Five people stand at the vertices of a pentagon, throwing frisbees to each other. They have two frisbees, initially at adjacent vertices as shown in the figure. In each time interval, each frisbee is thrown either to the left or to the right (along an edge of the pentagon) with equal probability. This process continues until one person is the target of two frisbees simultaneously, then game ends.

   (Note : All throws are independent of past history)

   Find the mean and variance of the number of pairs of throws.

   (A) 12 and 100

   (B) 6 and 50

   (C) 24 and 200

   (D) 18 and 80

4. A rod is divided into six segment is to be colored with one or more of 4 different colors. In how many ways can this be done ?

(A) 160

(B) 146

(C) 150

(D) 133

5. A committee is to be selected from 5 candidates a, b, c, d and e. The selection must satisfy all the following conditions :

- Either a or b must be included, but not both
- Either c or e or both must be included
- If d is included then b must be included
- Either a or c are included or neither is included.
- If e is included, then c and d must be included. How should selection be made ?

(A) $a \wedge \overline{b} \wedge c \wedge \overline{d} \wedge \overline{e}$

(B) $\overline{a} \wedge \overline{b} \wedge c \wedge \overline{d} \wedge \overline{e}$

(C) $\overline{a} \wedge \overline{b} \wedge c \wedge \overline{d} \wedge e$

(D) $\overline{a} \wedge \overline{b} \wedge c \wedge d \wedge \overline{e}$

6. The thickness of a graph G is defined as minimum number of (edge-disjoint) planar subgraphs into which G can be decomposed. The thickness of G is defined as $\theta(G)$. What is the thickness of planar graph ?

(A) 1

(B) 2

(C) 3

(D) 4

7. Let us consider the letters from a through h, and all 5 letters are made using these letters. (words are just strings of letters). How many of these words contain no repeated letters ?

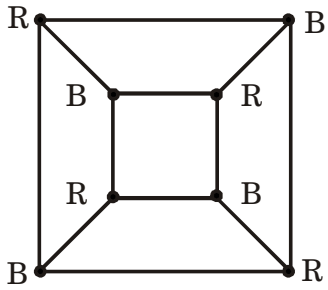
(A) 6720

(B) 6072

(C) 7260

(D) 7630

8. What is the smallest number of colors that can be used to color the vertices of a cube so that no 2 adjacent vertices are colored identically ?



(A) 2 colors

(B) 1 color

(C) 3 colors

(D) 4 colors

9. Let us consider the following primal problem :

Maximize $z = 2x_1 + x_2$

Subject to $x_1 - x_2 \leq 4$,

$x_1 - x_2 \leq 2$,

$x_1, x_2 \geq 0$

What will be its dual problem ?

(A) Dual feasible

(B) Dual infeasible

(C) Dual feasible and unbounded

(D) Dual unbounded

10. Consider the following linear programming problem :

Maximize $z = 5x_1 + 2x_2 + 3x_3 - x_4 + x_5$

Subject to : $x_1 + 2x_2 + 2x_3 + x_4 = 8$

$3x_1 + 4x_2 + x_3 + x_5 = 7$

$x_1, x_2, x_3, x_4, x_5 \geq 0$

What will be the basic feasible solution after iteration 1 ?

(A) $x_1 = 0, x_2 = 0, x_3 = 4, x_4 = 0, x_5 = 3, z = 15$

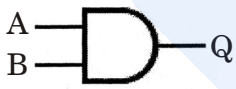
(B) $x_1 = 1, x_2 = 2, x_3 = 1, x_4 = 0, x_5 = 0, z = 12$

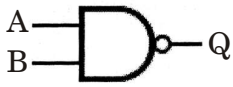
(C) $x_1 = 0, x_2 = 5, x_3 = 0, x_4 = 1, x_5 = 0, z = 10$

(D) There is no feasible solution for this problem

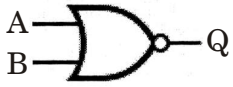
11. Given Truth Table represents which of the following Logic Gate ?

Input		Output
A	**B**	**Q**
0	0	1
0	1	1
1	0	1
1	1	0

(A) 

(B) 

(C) 

(D) 

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

(A) 40

(B) 64

(C) 100

(D) 256

13. What is the interpretation of "R1 ← R2" instruction in Register Transfer Language ?

(A) Load the content of R2 into R1

(B) Add the content of R2 into R1

(C) Load the content of R2 into R1 and then delete the contents of R2

(D) Add the content of R2 into R1 and then delete the contents of R2

14. The "instruction decode" phase in CPU's instruction cycle is responsible to ..... .

(A) load the instruction into CPU

(B) translate the instruction into machine language code

(C) determine the opcode and operands of the instruction

(D) execute the operation specified by the instruction

15. What is the objective of Assembly Level Language in a computer system ?

(A) to provide a natural language environment for the programmer

(B) to provide a high-level abstraction of hardware for the programmer

(C) to enable direct execution of code by the computer system

(D) to enable execution of code on different computer system platforms

16. Identify an appropriate operation sequence with respect to execution of a machine level language instruction.

(A) Load instruction address–get the instruction–execute the opcode–get effective address of operands

(B) Load instruction address–get effective address of operands–get the instruction–execute the opcode

(C) Load instruction address–get the instruction–get effective address of operands–execute the opcode

(D) Load instruction address–get effective address of operands–execute the opcode–get the instruction

17. Which of the following statements is true with respect to RISC architecture in comparison with CISC architecture ?

(A) Instruction set consists of more instructions

(B) Instructions involve more addressing modes

(C) Instructions are generally of fixed length

(D) Instruction set consists of complex instructions

18. Which of the following computer system is represented when many processing units are working under the supervision of a common control unit ?

(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 of the following generally does not use a Software Interrupt ?

(A) Software Timer

(B) System Timer

(C) Page Fault

(D) Task Switching

20. Which type of memory generally enables to enhance the performance of a CPU ?

(A) Auxiliary Memory

(B) Associative Memory

(C) Cache Memory

(D) Virtual Memory

21. In which programming paradigm the desired result is declared as the value of a series of function applications ?

(A) Procedural

(B) Object oriented

(C) Logical

(D) Functional

22. Which of the following scenario necessitates file locking to be enabled by an Integrated Development Environment (IDE) ?

(A) To ensure the privacy of a source code file

(B) To prevent un-authorized access to a source code file

(C) To prevent concurrent access to a source code file

(D) To enable proper versioning of a source code file

23. How much memory will be allocated for the instances of structure S (with respect to C language) ?

```
typedef struct {
        char a;
        int b;
} S;
```

(A) size required to store a character

(B) size required to store an integer

(C) size required to store a character and an integer

(D) allocated memory size will depend upon the available memory

24.
```
int main() {
        int x
        x = (1 + 2;
        return x;
}
```

Which of the following statements is true with respect to this source code in C language ?

(A) Syntax Error

(B) Semantic Error

(C) Linking Error

(D) Runtime Error

25. Which of the following term describes the ability of a class to provide common interface for different types of objects in object-oriented programming ?

(A) Encapsulation

(B) Polymorphism

(C) Inheritance

(D) Abstraction

26. By default, C++ language provides ..... .

(A) early binding for variables and late binding for functions

(B) late binding for variables and early binding for functions

(C) early binding for variables and early binding for functions

(D) late binding for variables and late binding for functions

27. Which of the following options appropriately describes the term DHTML ?

(A) HTML supported by specific browsers

(B) Combination of HTML and stylesheets

(C) Combination of HTML and client-side scripts

(D) Combination of HTML, stylesheets and client-side scripts

28. JavaScript language can be used ..... .

(A) only for client-side programming in web applications

(B) only for server-side programming in web applications

(C) for client-side as well as server-side programming in web applications

(D) only to create desktop applications

29. Assume that a line is drawn using DDA line drawing algorithm and the points p_1, p_2, p_3, ..., p_n are generated in the sequence with $p_1(5, 15)$ as the first point and $p_n(15, 25)$ as last point of the line. What is the location of the third point p_3 ?

(A) (6, 11)

(B) (7, 11)

(C) (6, 12)

(D) (7, 12)

30. The binary region code assigned to the line end point located at the bottom-right side of the clipping rectangle in the Cohen-Sutherland line clipping algorithm is ..... .

(A) 0110

(B) 1010

(C) 0101

(D) 1001

31. Among the following, which is foreign key constraint ?

(A) Domain integrity

(B) Entity integrity

(C) Referential integrity

(D) Key integrity

32. In the ..... normal form, a composite attribute is converted to individual attributes. Which of the following represents a query in the tuple relational calculus ?

(A) {P(t)|t}

(B) {P()|t}

(C) {t|P()}

(D) {t|P(t)}

33. A set of one or more attributes which, taken collectively, allow us to uniquely identify an entity in the entity set is called ..... .

(A) Primary key

(B) Foreign key

(C) Super key

(D) Candidate key

34. The future trends and behaviors (For business managers to make proactive knowledge-driven decisions) can be predicted by :

(A) Meta data

(B) Data warehouse

(C) Data mining

(D) Relational data

35. Which NoSQL database is known for its ability to handle complex queries and data analysis ?

(A) Dbase

(B) HBase

(C) Couchbase

(D) MongoDB

36. Let R = (M N O P Q) be a relational scheme with functional dependency F = {M $\rightarrow$ N, N $\rightarrow$ O, MO $\rightarrow$ P}

Then closures of Q and M are :

(A) Φ, MNOP

(B) Φ, Φ

(C) Q, MNOP

(D) Q, MNO

37. The ..... file organization provides very fast access to any arbitrary record of a file.

(A) B-tree

(B) Sequential

(C) Ordered

(D) Hashed

38. Select the *correct* option :

(A) The height of a B^+-tree is independent of the number of records

(B) B-trees are used in primary indexes and B^+-trees are used in secondary indexes

(C) Range queries are faster on B^+-tree

(D) B^+-trees are used for storing data in main memory and B-trees are used for storing data on disk

39. An ER model of a database consists of entity types P and Q. These are connected by a relationship R, which does not have its own attributes (i.e., no self attributes).

Under which one of the following condition, can the relational table for R be merged with that of P ?

(A) Relationship R is one-to-many and the participation of P in R is total

(B) Relationship R is one-to-many and the participation of P in R is partial

(C) Relationship R is many-to-one and the participation of P in R is total

(D) Relationship R is many-to-one and the participation of P in R is partial

40. A data dictionary system is called a ..... if it is used only by designers, users, and administrators and not by the DBMS software.

(A) passive data dictionary

(B) static data dictionary

(C) active data dictionary

(D) dynamic data dictionary

41. Network operating system runs on ..... .

(A) every system in the network

(B) server

(C) both server and every system in the network

(D) Neither server nor every system in the network

42. A sender 'S' sends a message 'M' to receiver 'R', which is digitally signed by 'S' with its private key. In this scenario, one or more of the following security violations can take place.

(1) 'S' can launch a birthday attack to replace M with a fraudulent message.

(2) A third party attacker can launch a birthday attack to replace 'M' with a fraudulent message.

(3) 'R' can launch a birthday attack to replace 'M' with a fraudulent message.

Which of the following are possible security violations ?

(A) (1) and (2) only

(B) (1) only

(C) (2) only

(D) (2) and (3) only

43. A CPU generates 32-bit virtual addresses. The page size in 4KB. The processor has a translation look-aside Buffer (TLB) which can hold a total of 128 pages table entries and is 4-way set associative. The maximum size of the TLB tag is :

(A) 11 bits

(B) 13 bits

(C) 15 bits

(D) 20 bits

44. With regard to linked list, which of the statement is FALSE ?

(A) An algorithm to search for an element in a singly linked list requires O(n) operations in the worst case

(B) An algorithm for deleting the first element in a singly linked list requires O(n) operations in the worst case.

(C) An algorithm for finding the maximum value in a circular linked list requires O(n) operations

(D) An algorithm for deleting the middle node of a circular linked list requires O(n) operations

45. Consider a disk that has 150 cylinders, numbered from 0 to 149. Currently the disk arm is at 80 and moving towards higher cylinders. The disk access requests for cylinders are 30, 78, 96, 123, 141, 15, 13, 68. What will be the absolute difference traversed by R/W head when CSCAN and clock is used ?

(A) 135

(B) 42

(C) 38

(D) 21

46. Consider a system with 'M' CPU processors and 'N' processes then how many processes can be present in ready, running and blocked state at maximum ?

(A) N, M, N

(B) N, M, M

(C) M, N, M

(D) N, N+M, M

47. Binary search tree is an example of :

(A) Divide and conquer technique

(B) Greedy Algorithm

(C) Back tracking

(D) Dynamic programming

48. Which of the below statements is false ?

(A) Kernel stack can be used to store the context of a process

(B) User stack is used to store the function details during function calls

(C) Kernel stack is used to store the user program functional arguments

(D) Content of the process is useful to restart the process after some time

49. Consider a program, which spawn 20 threads to find out the sum of elements in a shared array of 200. Each thread i, takes elements A[i] to A[(20 * i) – 1] and compute local sum loc_sum [i] and eventually adds loc_sum[i] to a shared variable tot_sum for total sum which of the following needs to be placed inside a critical section ?

(A) Reading array values

(B) Add to tot_sum

(C) Both (A) and (B)

(D) Neither (A) nor (B)

50. The number of child processes are created using the following code :

```
int main()
{ fork(););
  fork();
  fork();
  return 0;
}
```

(A) 5

(B) 6

(C) 7

(D) 8

51. ..... model takes the fundamental process activities of specification, development, validation and evolution and represents them as separate process phases such as requirements specification, software design, implementation, testing and so on.

(A) The waterfall model

(B) Incremental development

(C) Reuse-oriented software engineering

(D) Modular Approach

52. MDD stands for ..... .

(A) Model based driver development

(B) Model-driven development

(C) Model-development design

(D) Modular design development

53. ..... testing involves delivering a system to a number of potential customers who agree to use that system.

(A) Unit

(B) Beta

(C) Alpha

(D) Validation

54. The Dynamic System Development Method was developed in U.K. in the year ..... .

(A) 1988

(B) 1989

(C) 1990

(D) 1991

55. Which standard is used to prepare Software Requirement and Specification document ?

(A) ISO

(B) IEEE

(C) ACM

(D) OSI

56. Architectural models that may be developed may include : A ..... model that shows how the system is organised into processes at run-time.

(A) static structural

(B) dynamic process

(C) interface model

(D) relationship models

57. Software quality management for large systems can be structured into ..... main activities.

(A) Two

(B) Three

(C) Four

(D) Five

58. The first version of the COCOMO model (COCOMO 81) was a ..... level model where the levels corresponded to the detail of the analysis of the cost estimate.

(A) one

(B) two

(C) three

(D) four

59. Which testing is intended to reveal defects in the system rather than to simulate its operational use ?

(A) Defect testing

(B) Unit testing

(C) Black Box

(D) White Box

60. ..... procedures are concerned with analysing the costs and benefits of proposed changes, approving those changes that are worthwhile and tracking which components of the system have been changed.

(A) Change management

(B) Cost estimation

(C) Software

(D) Testing

61. Which of the following sorting does not have worst case running time of $O(n^2)$?

(A) Merger sort

(B) Quick sort

(C) Insertion sort

(D) Bubble sort

62. In breadth first search of a graph, which data structure is used to hold nodes ?

(A) Array

(B) Queue

(C) Stack

(D) Graph

63. In the ..... traversal, we visit all of a vertex's descendants before we move on to an adjacent vertex.

(A) Breadth First

(B) Depth First

(C) Inorder

(D) Preorder

64. Identify the odd one :

(A) Priority queue

(B) Circular queue

(C) Deque

(D) Tower of Hanoi

65. Stack has applications in :

(A) Function calls

(B) Evaluation of arithmetic expressions

(C) Large number arithmetic

(D) All of the above

66. The post-order and in-order traversal of a Binary tree generates the same output. Then the tree is :

(A) Nearly balanced

(B) Completely balanced

(C) Right skewed

(D) Left skewed

67. Given a complete graph G with 5 vertices, then the graph G has how many spanning trees :

(A) 25

(B) 125

(C) 225

(D) 325

68. Consider an undirected graph G with vertices {A, B, C, D}. In graph G, every edge has distinct weight. Edge CD has minimum weight. Edge AB has maximum weight. Then, which of the following is false ?

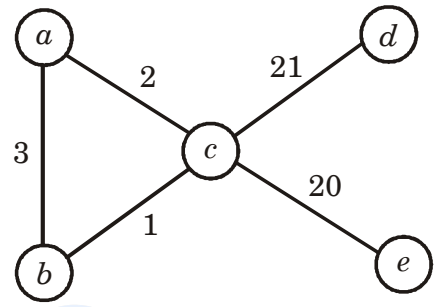
(A) Every minimum spanning tree of G must contain CD

(B) If AB is in a minimum spanning tree, then its removal must disconnect G

(C) No minimum spanning tree contains AB

(D) G has a unique minimum spanning tree

69. Consider the graph shown below :



Which of the following are the edges in the MST (Minimum Spanning Tree) of the given graph ?

(A) $(a–b)$ $(a–c)$ $(c–d)$ $(c–e)$

(B) $(a–b)$ $(a–d)$ $(c–d)$ $(c–e)$

(C) $(a–b)$ $(a–c)$ $(b–c)$ $(c–d)$ $(c–e)$

(D) $(b–c)$ $(a–c)$ $(c–e)$ $(c–e)$

70. In a directed graph, if there is a path from each vertex to every other vertex, then it is called :

(A) Weakly connected

(B) Tightly connected

(C) Strongly connected

(D) Loosely connected

71. In peephole optimization, constant folding involves :

(A) Combining consecutive loads

(B) Eliminating dead code

(C) Folding constant expressions during compilation

(D) Unrolling loops

72. Which of the following best describes the relationship between activation records and the call stack ?

(A) Activation records are stored in a heap, and the call stack is used for control flow

(B) Activation records are stored in call stack, representing the sequence of function calls

(C) Activation records are managed globally, and the call stack is used for loop constructs

(D) Activation records and call stack are unrelated concepts in memory management

73. In an L-attributed grammar, synthesized attributes are calculated using attributes from :

(A) The same non-terminal

(B) The parent non-terminal in the parse tree

(C) The child non-terminal in the parse tree

(D) The sibling non-terminal in the parse tree

74. If A is a top-down parser and B is a bottom-up parser, which of the following statements is false ?

(A) A generates the string to be parsed, beginning with the start symbol of the grammar

(B) B reduces the input string to the start symbol of the grammar

(C) A uses canonical reduction to check the syntactic errors

(D) B uses canonical reduction to reach the start symbol

75. The language $L = \{a^n b^n c^n : n \geq 1\}$ is a content sensitive language. Give a content sensitive grammar for L :

(A) S → aSbc | aAbc
Ab → bA
Ac → Bbcc
bB → Bb
aB → aa | aaA

(B) S → abc | aAbc
Ab → bA
Ac → Bbcc
bB → Bb
aB → aa | aaA

(C) S → abc | aAbc
Ab → Ab
Ac → Bbcc
bB → Bb
aB → aa | aaA

(D) S → abc | aAbc
A → bA
A → Bbcc
bB → Bb
aB → aa | aaA

76. LF is recursively enumerable iff F satisfies which of the following conditions ?

(1) If L is in F and $L \subseteq L'$ for some recursively enumerable language L', then L' is in F (containment property).

(2) If L is an infinite language in F, then there is a finite subset of L which is in F.

(3) The set of finite languages in F is enumerable.

(A) (1) and (3)

(B) (2) Only

(C) (1) and (2)

(D) (1), (2) and (3)

77. Let P_1 be the problem of finding a Hamiltonian cycle in a graph G and P_2 be the problem of determining if a Hamiltonian cycle exists in a graph. Which one of the following is true ?

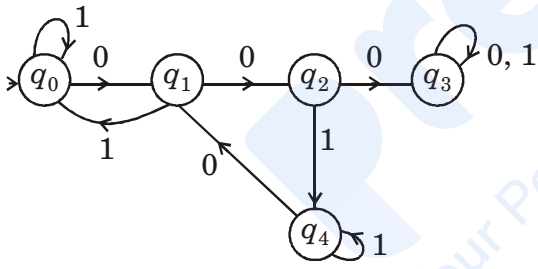
(A) Both P_1 and P_2 are NP-Hard

(B) P_1 is NP-Hard, but P_2 is not

(C) P_2 is NP-Hard, but P_1 is not

(D) Neither P_1 nor P_2 is NP-Hard

78. Determine the language accepted by the following FA :



(A) All strings containing 00 but not 011

(B) All strings containing 00 but not 000

(C) All strings containing 000 but not 00

(D) All strings containing 11 but not 000

79. Give regular expression for the language that contains all strings with at least one occurrence of each symbol in $\sum = \{a, b, c\}$,.

(A) $(a + b + c)^*$ abc $(a + b + c)^*$

(B) $(a + b + c)^*$ a $(a + b + c)^*$ b $(a + b + c)^*$ c $(a + b + c)^*$

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

(D) a $(a + b + c)^*$ b $(a + b + c)^*$ c $(a + b + c)^*$

80. Let L_1 and L_2 be languages on the same alphabet. Then the right quotient of L_1 with L_2 is defined as :

(A) $L_1/L_2 = \{x : xy \in L_1$ for some $y \in L_2\}$

(B) $L_1/L_2 = \{x : x \in L_1$ for some $y \in L_2\}$

(C) $L_1/L_2 = \{x : x \in L_1$ for some $xy \in L_2\}$

(D) $L_1 - L_2 = \{x : xy \in L_1$ for some $y \in L_2\}$

81. How many number of transmission modes exists for data communication circuits ?

(A) 4

(B) 3

(C) 2

(D) 1

82. A ..... is used in data communication networks that transfer high-speed digital information between only two stations.

(A) multi-point

(B) point-to-point topology

(C) simplex

(D) duplex

83. In a transmission, if the active time of the binary pulse is less than 100% of the bit time then it is called as ..... .

(A) unipolar return to zero (UPRZ)

(B) return to zero (RZ)

(C) unipolar non-return to zero (UPNRZ)

(D) nonreturn to zero (NRZ)

84. Which coaxial cable is used for analog transmission ?

(A) 25 ohm cable

(B) 50 ohm cable

(C) 75 ohm cable

(D) 100 ohm cable

85. IEEE 802.5 (the IBM token ring), is operating at ..... and ..... Mbps.

(A) 2 and 4

(B) 4 and 16

(C) 16 and 32

(D) 32 and 64

86. In FDM, SPADE system full duplex service, the total transponder bandwidth used was ..... Mbps for uplink portion and ..... Mbps for downlink.

(A) 25 and 50

(B) 50 and 50

(C) 50 and 75

(D) 75 and 100

87. Which is the special bit pattern of flag byte in a frame ?

(A) 01010101

(B) 10110110

(C) 01111110

(D) 10011001

88. What is the name of the protocol in which the sender sends one frame and then waits for an acknowledgement before proceeding ?

(A) Goback n

(B) piggybacking

(C) sliding window

(D) stop and wait

89. Which code will be responded by the server which indicates ready to accept email message ?

(A) 250

(B) 334

(C) 221

(D) 350

90. In the principal DNS resource record type, Type "A' represents ..... .

(A) Name server

(B) Pointer

(C) Host Description

(D) IP address of a host

91. Which of the following is true related to satisfiable property ?

(A) A statement is satisfiable if there is some interpretation for which it is false

(B) A statement is satisfiable if some interpretation for which it is true

(C) A statement is satisfiable if there is no interpretation for which it is true

(D) A statement is satisfiable if there is no interpretation for which it is false

92. What are transposition rule ?

(A) From P $\rightarrow$ Q, infer ~ Q $\rightarrow$ P

(B) From P $\rightarrow$ Q, infer Q $\rightarrow$ ~ P

(C) From P $\rightarrow$ Q, infer Q $\rightarrow$ P

(D) From P $\rightarrow$ Q, infer ~ Q ~ P

93. In language understanding, the levels of knowledge that does not include ?

(A) Phonological

(B) Syntactic

(C) Empirical

(D) Logical

94. Agents behavior can be best described by ..... .

(A) Perception sequence

(B) Agent function

(C) Sensors and actuators

(D) Environment in which agent is performing

95. A search algorithm takes ..... as an input and returns ..... as an output.

(A) Input, output

(B) Problem, solution

(C) Solution, problem

(D) Parameters, sequence of actions

96. Let A be a fuzzy set defined with respect to the universal set X defined for all $x \in X$, then :

(A) $\min[A(x), 1 - A(x)] = 0$

(B) $\min[A(x), 1 - A(x)] \neq 0$

(C) $\min[A(x), 1 - A(x)] > 0$

(D) $\min[A(x), 1 - A(x)] < 0$

97. For a crisp relation R(X, X), iff the pair $< x, y > \in R$ it is also the case that $< y, x > \in R$ for each $x, y \in X$ for $x \neq y$, then such a relation is called as a ..... relation.

(A) transitive

(B) symmetric

(C) reflexive

(D) nontransitive

98. The binary relation on a single set "*is smarter than*" is ..... .

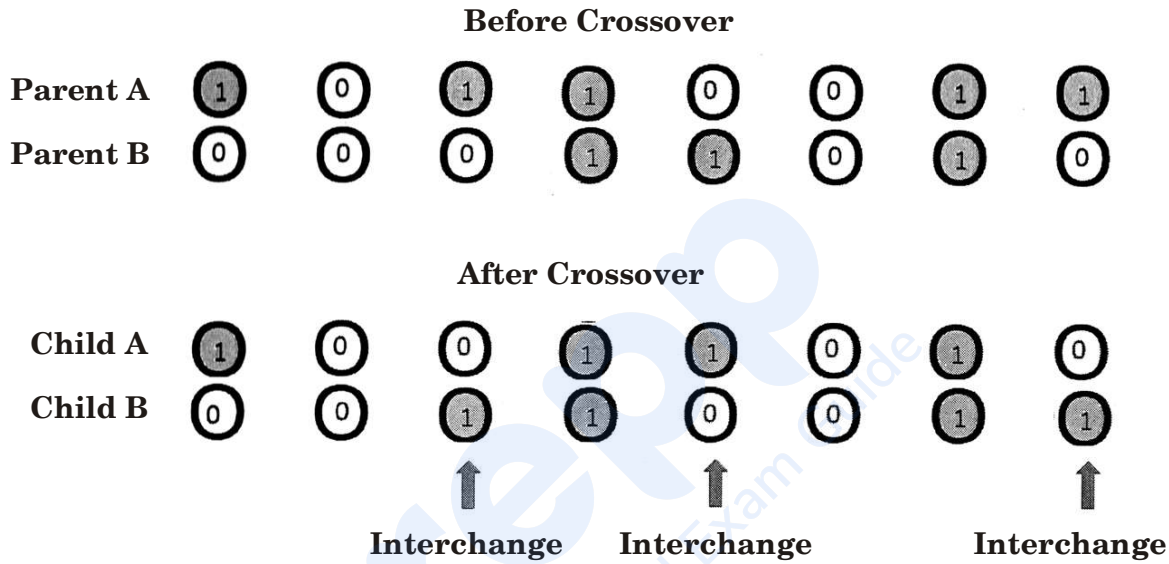
(A) reflexive

(B) symmetric

(C) transitive

(D) reflexive and transitive

99. Which type of crossover is performed in the following genetic algorithm problem ?



(A) Matrix crossover

(B) Multipoint even site crossover

(C) Uniform crossover

(D) Single site crossover

100. The weight w for the autoassociative BAM set of vectors $(x_1, x_2, ..., x_L)$ is computed as ..... .

(A) $\sum_{i=1}^{L} x_i x_i^t$

(B) $\sum_{i=1}^{L} x_i^t x_i$

(C) $\sum_{i=1}^{L} \left(\frac{x_i}{x_i^t} \right)$

(D) $\sum_{i=1}^{L} \left(\frac{x_i^t}{x_i} \right)$

ROUGH WORK

ROUGH WORK