

Roll No.

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(Write Roll Number from left side exactly as in the Admit Card)

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Signature of Invigilator

Question Booklet Series

X

PAPER-II

Question Booklet No.

Subject Code : 22

## COMPUTER SCIENCE

Time : 2 Hours

Maximum Marks: 200

## Instructions for the Candidates

- Write your Roll Number in the space provided on the top of this page as well as on the OMR Sheet provided.
- At the commencement of the examination, the Question Booklet will be given to you. In the first 5 minutes, you are requested to open the booklet and verify it:
  - To have access to the Question Booklet, tear off the paper seal on the edge of this cover page.
  - Faulty booklet, if detected, should be got replaced immediately by a correct booklet from the invigilator within the period of 5 (five) minutes. Afterwards, neither the Question Booklet will be replaced nor any extra time will be given.
  - Verify whether the Question Booklet Number is identical with OMR Sheet Number; if not, the full set is to be replaced.
  - After this verification is over, the Question Booklet Series and Question Booklet Number should be entered on the OMR Sheet.
- This paper consists of One Hundred (100) multiple-choice type questions. All the questions are compulsory. Each question carries *two* marks.
- Each Question has four alternative responses marked: (A) (B) (C) (D) . You have to darken the circle as indicated below on the correct response against each question.  
*Example:* (A) (B) (C) (D) , where (C) is the correct response.
- Your responses to the questions are to be indicated correctly in the OMR Sheet. If you mark your response at any place other than in the circle in the OMR Sheet, it will not be evaluated.
- Rough work is to be done at the end of this booklet.
- If you write your Name, Phone Number or put any mark on any part of the OMR Sheet, except in the space allotted for the relevant entries, which may disclose your identity, or use abusive language or employ any other unfair means, such as change of response by scratching or using white fluid, you will render yourself liable to disqualification.
- Do not tamper or fold the OMR Sheet in any way. If you do so, your OMR Sheet will not be evaluated.
- You have to return the 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 question booklet and duplicate copy of OMR Sheet after completion of examination.
- Use only **Black Ball point pen**.
- Use of any calculator, mobile phone, electronic devices/gadgets etc. is strictly prohibited.
- There is no negative marks for incorrect answer.

**The Question Booklet  
is encrypted with  
QR code for  
security purpose.**

## COMPUTER SCIENCE

1. How many numbers of different automata can be formed with 2 states ( $q_0$  and  $q_1$ ) and over the alphabets (0, 1, 2)? ( $q_0$  is always the starting state)

- (A) 5832
- (B) 256
- (C) 512
- (D) 1024

2. Drawing the concept “seeing few white swan” we conclude all swans are white, falls under \_\_\_\_\_ in AI.

- (A) analogical learning
- (B) supervised learning
- (C) learning automata
- (D) inductive learning

3. The number of cells/users of GSM is almost \_\_\_\_\_ relative to AMPS.

- (A) one half
- (B) the same
- (C) three times longer
- (D) six times longer

4. Which of the following statements is *false*?

- (A) Halting problem of turing machines is undecidable
- (B) Given two arbitrary context-free grammars  $G_1$ ,  $G_2$  and it is undecidable if  $L(G_1)=L(G_2)$
- (C) Determining whether a context-free grammar is ambiguous and undecidable
- (D) Given two regular grammars  $G_1$ ,  $G_2$  and it is undecidable if  $L(G_1)=L(G_2)$

5. Generation of intermediate code based on abstract machine model is useful in compilers because

- (A) It helps in implementation of lexical analysis and syntax analysis
- (B) Syntax-direct translations can be written for intermediate code generation
- (C) It enhances the probability of the front end of the compiler
- (D) It is not possible to generate code for real machines directly from high level language programs

6. A company has choice of two languages L1 and L2 to develop software for their client. Number of LOC required to develop an application in L2 is thrice the LOC in language L1. Also, software has to be maintained for next 10 years. Various parameters for two languages are given below to decide which Language should be preferred for development.

Parameter	L1	L2
Man-year needed for development	LOC/1000	LOC/1000
Development Cost	Rs. 70,000	Rs. 90,000
Cost of Maintenance per year	Rs. 1,00,000	Rs.40,000

Total cost of the project includes cost of development and maintenance. What is the LOC for L1 for which cost of developing of the software with both Languages must be the same?

- (A) 2000
- (B) 6000
- (C) 3000
- (D) 5000

7. Which one of the following statements is *false*?

- (A) User level threads are not scheduled by the kernel
- (B) When a user level thread is blocked, all other threads of its process are blocked
- (C) Context switching between user level threads is faster than context switching between kernel level threads
- (D) Kernel level threads cannot share the code segment

8. Consider the following partial requirement for a software: “When a camera mounted on the gate detects an incoming vehicle, the gate should be opened, if the incoming vehicle is a registered vehicle”. It can be considered to be which one of the following types of requirement?

- (A) Functional requirement
- (B) Non-functional requirement
- (C) Constraint
- (D) External interface

9. Which one of the following views is implicit in a SRS document?

- (A) Black box
- (B) White box
- (C) Grey box
- (D) Glass box

10. If the region codes for the two end points of a line are 1010 and 0101, the line is

- (A) completely visible
- (B) completely invisible
- (C) partially visible
- (D) can't say anything

11. In socket programming, which of the following functions indicates that the server will accept a connection?

- (A) socket ( )
- (B) bind ( )
- (C) connect ( )
- (D) listen ( )

12. Presence of which one of the following characteristics in a project would indicate the suitability of the Extreme Programming (XP) model?

- (A) Stable and well understood requirements
- (B) Mission critical software
- (C) Service-oriented project
- (D) Extremely large project

13. The general homogeneous coordinate representation of a point P(x, y) can also be written as

- (A) (x, y, z)
- (B) (h.x, h.y, h)
- (C) (x/h, y/h, h)
- (D)  $\left( \frac{1}{h.x}, \frac{1}{h.y}, \frac{1}{h} \right)$

14. For students in a college, if we want to partition the students based on the different extra curricular activities that they participate in, which clustering approach will be most suitable for this task?

- (A) Hierarchical
- (B) Overlapping
- (C) Partitional
- (D) Partial

15. One bit of static memory is composed of

- (A) A capacitor
- (B) A flip-flop
- (C) Decoder
- (D) Multiplexer

16. Which one of the following is *not true* of the agile model of software development?

- (A) Incremental development and delivery
- (B) Evolutionary development
- (C) Developed software usually has high quality and reliability
- (D) Facilitation of customer feedback

17. Which of the following is *not* a symmetric key cryptography scheme?

- (A) El Gamel
- (B) Blowfish
- (C) AES
- (D) IDEA

18. Consider the Language:

$L = \{x \mid x \in (a,b)^* \text{ and number of strings in } x \text{ is divisible by either 2 or 3 but not both}\}$ . The minimum number of states and number of final states required to create a DFA are

- (A) 6 and 4
- (B) 7 and 4
- (C) 7 and 3
- (D) 6 and 3

19. Parent String 1 : 00000000

Parent String 2 : 11111111

Then what should be the offsprings in 1 point crossover?

- (A) 01010101 ; 10110011
- (B) 11001100 ; 10011000
- (C) 00110011 ; 11001100
- (D) 00011111 ; 11100000

20. In fixed point number representation, a negative number in binary number system (in a computer) is represented by

- (A) Signed—Magnitude representation
- (B) Signed—1's complement representation
- (C) Signed—2's complement representation
- (D) Both (A) and (B)

21. How new state is generated in Genetic Algorithm?

- (A) Composition
- (B) Crossover
- (C) Mutation
- (D) Both (B) and (C)

22. Given

S1= If a procedure makes no call, then activation record can be created statically.

S2= Compilers from programming languages, that support recursion necessarily need heap storage for memory allocation in the run-time environment.

S3= Some code optimizations are carried out on the intermediate code because, they enhance the portability of the compiler to other target processors.

Which of the above statements is/are correct?

- (A) Only S1
- (B) S1 and S2
- (C) S1 and S3
- (D) Only S3

23. \_\_\_\_\_ are *not* a data mining functionality.

- (A) Clustering and analysis
- (B) Selection and interpretation
- (C) Classification and regression
- (D) Characterization and discrimination

24. The region code for visible region in Cohen-Sutherland polygon clipping algorithm is

- (A) 0000
- (B) 0110
- (C) 1001
- (D) 1111

25. Why does the reliability of a software application keeps changing throughout its life?

- (A) Fault detection and correction
- (B) Dynamic nature of software
- (C) Process evolution
- (D) Users become more proficient due to continuous usage

26. Which of the following is *not* an objective of Network Security?

- (A) Non-repudiation
- (B) Confidentiality
- (C) Attainability
- (D) Message Integrity

27. SELECT itemname, color, clothesSIZE, SUM(quantity)

FROM sales

GROUPBY rollup (itemname, color, clothes SIZE);

How many grouping is possible in this rollup?

- (A) 8
- (B) 4
- (C) 2
- (D) 1

28. Given that “X is sweet” with  $T(X) = 0.7$  and “Y is sweet” with  $T(Y) = 0.5$ , then the Fuzzy truth value of the proposition. “If X is sweet and Y is Sweet” is

- (A) 0.2
- (B) 0.7
- (C) 0.5
- (D) 0.4

29. Which of the following fields is present in IPv4 header but missing in IPv6 header?

- (A) Traffic class
- (B) Type of service
- (C) Flow level
- (D) Version

30. Roulette wheel selection scheme is preferred when

- (A) needs low selection pressure
- (B) fitness values are non-uniformly distributed
- (C) fitness values are uniformly distributed
- (D) needs high population diversity

31. Which of the following is the most commonly used data structure for implementing Dijkstra’s Algorithm?

- (A) Max priority queue
- (B) Stack
- (C) Circular queue
- (D) Min priority queue

32. Cache memory works much faster than main memory system (RAM) because
- (A) cache memory system is fabricated using different semiconductor material
  - (B) it is a addressless RAM system that follows associative memory structure
  - (C) cache memory is a virtual memory system
  - (D) statements (B) and (C) are correct
33. Which of the following statements is *false*?
- (A) Every regular grammar is linear
  - (B) Pumping lemma can prove that any finite language is regular
  - (C) A linear grammar can have at most one non-terminal at the right hand side of production
  - (D) A language with finite numbers of string can be regular
34. Which of the following statements is/are *true*?
- (A) Two successive translations are additive
  - (B) Two successive rotations are additive
  - (C) Two successive scaling are multiplicative
  - (D) Statements (A) and (C)
35. Virtual memory system can be implemented by which of the following technique(s)?
- (A) Paging Technique
  - (B) Segmentation Technique
  - (C) Demand Paging
  - (D) Paging and Segmentation Techniques
36. The expression for Absorption law is given by
- (A)  $A+AB=A$
  - (B)  $A+AB=B$
  - (C)  $AB+AA'=A$
  - (D)  $A+B=B+A$
37. Which one of the following is *true* of an object-oriented design solution using a deep inheritance hierarchy?
- (A) It is a sign of a good design as it increases reuse
  - (B) It is a sign of a good design as it leads to sophisticated and versatile classes at the leaf level
  - (C) It is a sign of good design, as it increases polymorphic bindings
  - (D) It is a sign of bad design, as it breaks encapsulation
38. In a paged memory, the page hit ratio is 0.35, the time required to access a page in secondary storage is equal to 100 ns. The time required to access a page in primary memory is 10 ns. The average time required to access a page is
- (A) 65.0 ns
  - (B) 68.0 ns
  - (C) 68.5 ns
  - (D) 78.5 ns
39. A multilayer feedforward network has 5 input units, one hidden layer with 4 units and 3 output units. How many weights does this network have?
- (A) 16
  - (B) 20
  - (C) 24
  - (D) 32

40. Consider the graph  $M$  with three vertices. Its adjacency matrix is shown below. Which of the following is *true*?

$$M = \begin{bmatrix} 0 & 1 & 1 \\ 1 & 0 & 1 \\ 1 & 1 & 0 \end{bmatrix}$$

- (A) Graph  $M$  has no minimum spanning tree
- (B) Graph  $M$  has a unique minimum spanning trees of cost 2
- (C) Graph  $M$  has 3 distinct minimum spanning trees, each of cost 2
- (D) Graph  $M$  has 3 spanning trees of different costs

41. Which defuzzification method can be used only for symmetrical output membership function?

- (A) Height method
- (B) Centre of Gravity method
- (C) Weighted average method
- (D) Centre of area method

42. Which one of the following is an application of the backtracking algorithm?

- (A) Finding the shortest path
- (B) Finding the efficient quantity to shop
- (C) Ludo
- (D) Crossword

43. Consider a direct mapped cache with 8 cache blocks (numbered 0-7). If the memory block requests are in the following order—

3,5,2,8,0,63,9,16,20,17,25,18,30,24,2,63,5,82,17,24

Which of the following memory blocks will *not* be in the cache at the end of the sequence?

- (A) 3
- (B) 18
- (C) 20
- (D) 30

44. Which of the following is a good alternative to the star schema?

- (A) Snowflake schema
- (B) Snow star schema
- (C) Star snowflake schema
- (D) Fact constellation

45. Feasible region is the set of points which satisfy

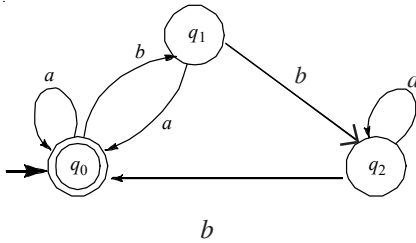
- (A) the objective functions
- (B) some of the given constraints
- (C) all of the given constraints
- (D) some of the decision variables

46. A processor performs addition of the following 2's complement numbers 01001101 and 11101001. After the execution of this addition operation, the status of the carry overflow and sign flags respectively will be

- (A) 110
- (B) 010
- (C) 100
- (D) 101



47. Regular expression corresponding to the following DFA is



- (A)  $(aU b(aU b a^* b))^*$
- (B)  $(aU b(a^*U b a^* b))$
- (C)  $(aU b(aU b^* ab))^*$
- (D)  $(a^*U b(aU b a^* b))$

48. The numbers of states and the numbers of final states required for the DFA that accepts the language  $L = \{\omega \mid \omega \in (a,b)^* \text{ and number of } a \text{ in } \omega \text{ is divisible by 3 and number of } b \text{ in } \omega \text{ is not divisible by 4}\}$  is

- (A) 12 and 1
- (B) 12 and 5
- (C) 16 and 5
- (D) 16 and 9

49. Which one of the following is the correct ordering of the coupling of modules from strongest (least desirable) to weakest (most desirable)?

- (A) Content, common, control, stamp, data
- (B) Common, content, control, stamp, data
- (C) Content, data, common, stamp, control
- (D) Data, control, common, stamp, content

50. Numbers of vertices of odd degree in a simple graph is

- (A) always even
- (B) always odd
- (C) either even or odd
- (D) always zero

51. A system uses FIFO policy for page replacement. It has 4 page Frames with no pages loaded to begin with. The system first accesses 100 distinct pages in some order and then accesses the same 100 pages but in reverse order. How many page fault can occur?

- (A) 196
- (B) 192
- (C) 197
- (D) 195

52. Consider a 5 stage pipelined processor with stage delays 5ns, 8ns, 4ns, 6ns and 8ns, the inter stage buffer delay is 2ns. (while executing the large no. of instructions without considering the conflicts). The throughput of the pipeline is

- (A)  $1 \times 10^8$
- (B)  $1.25 \times 10^8$
- (C)  $0.8 \times 10^8$
- (D)  $0.5 \times 10^8$

53. A B+tree can contain a maximum of 7 pointers in a node. What is the maximum number of keys in leaves?

- (A) 6
- (B) 3
- (C) 4
- (D) 7

54. Which message is used for agent discovery and agent solicitation in Mobile IP?

- (A) SMTP
- (B) FTP
- (C) ARP
- (D) ICMP

55. For the same size of training data as input the faster learning technique for NN is

- (A) supervised training with Gradient decent error correction
- (B) supervised training with stochastic method
- (C) supervised training with error calculation
- (D) supervised training with Hebbian method

56. Palindromes can't be recognized by finite state automata because,

- $S_1$  = FSA cannot deterministically fix the midpoint.
- $S_2$  = Even if the mid point is known, it cannot match the second half with the first half.
- $S_3$  = FSA cannot have arbitrarily large memory.

- (A) only  $S_1$  is sufficient
- (B)  $S_2$  and  $S_3$  are sufficient
- (C)  $S_1$  and  $S_3$  are sufficient
- (D)  $S_1, S_2, S_3$  all are sufficient

57. In a B-tree, block size is 1KB, search key size is 8 bytes, data pointer size is 10 bytes and block/tree pointer size is 14 bytes. What is the maximum number of data pointer possible in a non-leaf node of the above given B-tree?

- (A) 31
- (B) 32
- (C) 30
- (D) 33

58. When a derived class is allowed to change the definition of its base class member function, it is referred to as \_\_\_\_\_.

- (A) function overloading
- (B) multi level inheritance
- (C) function overriding
- (D) hybrid inheritance

59. Let G be a simple graph with 10 vertices. In the graph G, there is a vertex of degree 1, a vertex of degree 2, a vertex of degree 3, a vertex of degree 4, a vertex of degree 5, a vertex of degree 6, a vertex of degree 7, a vertex of degree 8 and a vertex of degree 9. What can be the degree of the remaining (last) vertex?

- (A) 2
- (B) 3
- (C) 4
- (D) 5

60. Which of the following statements is *true*?

- (A) Regression testing and acceptance testing are same
- (B) Regression tests show if all defects in the modified part of the code have been resolved
- (C) Regression tests are performed to detect if code changes have introduced any defects
- (D) Regression tests should only be performed during integration testing

61. A system has 6 identical resources and N processes competing for them. Each process can request at most 2 resources. Which one of the following value of N could lead to a deadlock?

- (A) 1
- (B) 2
- (C) 3
- (D) 6

62. Considering the following two statements, which option is correct?

$S_1$  = The context-free languages are closed under homomorphism.

$S_2$  = Any multitape turing machine cannot be simulated by single tape turing machine.

- (A)  $S_1$  and  $S_2$  both are true
- (B)  $S_1$  is true and  $S_2$  is false
- (C)  $S_1$  and  $S_2$  both are false
- (D)  $S_1$  is false and  $S_2$  is true

63. Match List-I with List-II and select the correct answer using the codes given below the lists:

*List-I*

*List-II*

- |                    |                               |
|--------------------|-------------------------------|
| (a) ADD R1, R2, R3 | (1) Three address instruction |
| (b) PUSH X         | (2) Two address instruction   |
| (c) ADD            | (3) One address instruction   |
| (d) SUB R1, R3     | (4) Zero Address instruction  |

Where R1, R2, R3 are Registers and X is the memory address.

Codes:

- |         |     |     |     |
|---------|-----|-----|-----|
| (a)     | (b) | (c) | (d) |
| (A) (1) | (3) | (4) | (2) |
| (B) (4) | (3) | (4) | (3) |
| (C) (2) | (3) | (1) | (4) |
| (D) (1) | (4) | (4) | (2) |

64. Backtracking algorithm is implemented by constructing a tree of choices called as \_\_\_\_\_.

- (A) State-space tree
- (B) State-chart tree
- (C) Node tree
- (D) Backtracking tree

65. In cloud, service uptime is 45 minutes and downtime is 15 minutes in an hour. What is the availability of the service?

- (A) 0.15
- (B) 0.45
- (C) 0.75
- (D) 0.95

66. In a neural network if sigmoids were present the three layers would

- (A) extend into 4 layers
- (B) collapse into only 2 layers
- (C) Either (A) or (B) depending upon situation
- (D) Neither (A) nor (B)

67. If a problem can be solved by combining optimal solutions to non-overlapping problems, the strategy is called \_\_\_\_\_.

- (A) Dynamic programming
- (B) Greedy
- (C) Divide and Conquer
- (D) Recursion

68. A cyclic group is always a/an

- (A) Subgroup
- (B) Monoid
- (C) Abelian group
- (D) Semi group

69. What will be the output of the following 'C++' code?

```
#include <iostream>
#include <vector>
using namespace std;
int main ( )
{
    vector<int>v;
    for (int i=1; i<=5; i++)
        v.push-back (i);
    Cout<<v.size();
    Cout<<" "<<v.capacity();
    return 0;
}
```

- (A) 85
- (B) 88
- (C) 55
- (D) 58

70. Let  $r_i(D)$  and  $W_i(D)$  are read and write operations respectively on data  $D$  by transaction  $T_i$ . Consider the following schedules:

$$S_1 = r_2(A), r_3(B), W_2(A), r_3(A), r_1(C), r_1(A), r_2(C), W_3(B), W_1(C).$$

$$S_2 = W_2(B), r_3(A), r_1(B), r_3(B), r_2(C), r_1(C), W_2(C), r_3(C), W_1(C)$$

Which of the following is correct?

- (A)  $S_1$  is conflict serializable
- (B) For schedule  $S_1$ ,  $T_2 \rightarrow T_3 \rightarrow T_1$  is only possible serial schedule which is conflict equivalent to  $S_1$
- (C)  $S_2$  is view serializable
- (D) Serial schedule  $T_2 \rightarrow T_3 \rightarrow T_1$  is view equivalent to  $S_2$

71. The number of non-negative solutions to  $x + y + z = 18$  with the conditions  $x \geq 3$ ,  $y \geq 2$  and  $z \geq 1$  is

- (A) 86
- (B) 88
- (C) 91
- (D) 94

72. In publickey cryptography, exponentiation is a commonly used operation. Which option has the tightest upper bound on the number of multiplications required to compute  $b^n \bmod m$  where  $0 \leq b$  and  $n \leq m$ ?

- (A)  $O(\log n)$
- (B)  $O(\sqrt{n})$
- (C)  $O(n^2)$
- (D)  $O(n)$

73. The main purpose of integration testing is to find which one of the following types of errors?

- (A) Logic errors
- (B) Algorithmic errors
- (C) Arithmetic errors
- (D) Interface errors

74. Which of the following technologies help in evolution of cloud computing?

- (i) Grid computing and utility computing.
- (ii) Virtualization and Hypervisor.
- (iii) Edge and Fog computing.
- (iv) Service-oriented architecture.

- (A) (ii) and (iii)
- (B) (i), (ii) and (iii)
- (C) (i) and (ii)
- (D) All (i), (ii), (iii) and (iv)

75. Match the following:

- |                   |               |
|-------------------|---------------|
| (a) 192.7.255.2   | (i) Class-A   |
| (b) 129.255.255.1 | (ii) Class-B  |
| (c) 125.0.0.0     | (iii) Class-C |

Codes:

- |           |       |       |
|-----------|-------|-------|
| (a)       | (b)   | (c)   |
| (A) (i)   | (ii)  | (iii) |
| (B) (ii)  | (iii) | (i)   |
| (C) (iii) | (ii)  | (i)   |
| (D) (iii) | (i)   | (ii)  |

76. Which of the following is good for sorting arrays having less than 100 elements?

- (A) Quick sort
- (B) Selection sort
- (C) Merge sort
- (D) Insertion sort

77. Depth First Search is equivalent to which of the traversal in the Binary Trees?

- (A) Pre-order
- (B) Post-order
- (C) Level-order
- (D) In-order

78. The stalling of the processor due to the unavailability of the instructions is called as \_\_\_\_\_.

- (A) Control Hazards
- (B) Structural Hazards
- (C) Input Hazards
- (D) Data Hazards

79. Consider a relation schema  $r(A,B,C,D,E,F)$  and attribute  $A$  is element of every candidate key of  $r$ . Maximum possible candidate key of  $r$  is

- (A) 8
- (B) 9
- (C) 11
- (D) 10

80. Which of the following is *false*?

- (A) The C++ interfaces are implemented using abstract classes
- (B) The purposes of an abstract class is to provide an appropriate base class from which other classes can inherit
- (C) Abstract classes can be used to instantiate objects and serve only as an interface
- (D) Classes that can be used to instantiate objects are called concrete class

81. Protocol stack of IoT are as follows:

- (A) Perception layer, Network layer and Application layer
- (B) Internet, Transport and Application layer
- (C) Physical layer, Transport and Application layer
- (D) Network, Transport and Application layer

[ Please Turn Over ]

82. Consider the following four statements:

- S1: MD5 is vulnerable to the Birthday attack.  
 S2: Traceroute uses the “Destination port unreachable” ICMP error message.  
 S3: AES is a type of public key encryption algorithm.  
 S4: IPv4 has a maximum of 60 byte fixed header size.

How many of the above statements are *true*?

- (A) 1  
 (B) 2  
 (C) 3  
 (D) 4

83. Which of the following requires a device driver?

- (A) Disk  
 (B) RAM  
 (C) L2 Cache  
 (D) L1 Cache

84. Consider a project with the following functional units: 50 user inputs, 40 user outputs, 30 users enquiries, 5 user files, 3 external interfaces. What will be the unadjusted function points for the project?

- (A) 391  
 (B) 491  
 (C) 591  
 (D) 691

85. A relation R on a set is represented by the matrix  $\begin{bmatrix} [1,1,0], [1,1,1], [0,1,1] \end{bmatrix}$ . R is \_\_\_\_\_.

- (A) Reflexive  
 (B) Symmetric  
 (C) Both Reflexive and Symmetric  
 (D) Neither Reflexive nor Symmetric

86. In memory interleaving, the lower order bits of the address is used to \_\_\_\_\_.

- (A) get the data  
 (B) get the address of the module  
 (C) get the address of the data within the module  
 (D) get the address of the data outside the module

87. What is the time complexity of the search function in a hash table using a binary tree?

- (A)  $O(1)$   
 (B)  $O(n)$   
 (C)  $O(\log n)$   
 (D)  $O(n \log n)$

88. Which of the following statements regarding the features of the object-oriented approach to databases are *true*?

- (a) The ability to develop more realistic models of the real world  
 (b) The ability to represent the world in a non-geometric way  
 (c) The ability to develop databases using natural language approaches  
 (d) The need to split objects into their component parts  
 (e) The ability to develop database models based on location rather than state and behaviour
- (A) (a), (b) and (c)  
 (B) (b), (c) and (d)  
 (C) (a), (d) and (e)  
 (D) (c), (d) and (e)

89. Match the following:

- I. Primary index (a) non key and ordering  
 II. Clustering index (b) non-key and non-ordering  
 III. Secondary index (c) Key and ordering (key)  
 IV. Secondary index (d) Key and non (non-key) ordering

Codes:

	(I)	(II)	(III)	(IV)
(A)	(d)	(a)	(c)	(b)
(B)	(c)	(a)	(d)	(b)
(C)	(c)	(b)	(d)	(a)
(D)	(d)	(b)	(c)	(a)

90. What is the value of the postfix expression

6 3 2 4 + - \* ?

- (A) 1  
 (B) -18  
 (C) 40  
 (D) 74

91. A hardisk has 32 recording of surfaces, 256 cylinders, 512 sectors per track and sector size is 1KB. The total size of the hardisk is

- (A) 4 GB  
 (B) 4 TB  
 (C) 2 GB  
 (D) 4 MB

92. The extra time needed to bring the data into memory in case of a miss is called as \_\_\_\_\_.

- (A) Delay  
 (B) Propagation time  
 (C) Miss penalty  
 (D) Extra time

93. Consider a relation schema  $r(A, B, C, D)$  with  $F$  as set of functional dependencies.  $F$  contains the following functional dependencies:

$A \rightarrow B$

$A \rightarrow D$

$A \rightarrow C$

$B \rightarrow D$

We decompose the relation  $r$  into two relation schemas  $r_1(A, B, C)$  and  $r_2(B, D)$ .

Which of the following statement(s) is/are correct regarding above situation?

- (I) Decomposition in lossless  
 (II) Decomposition in dependency preserving  
 (III) (Functional dependency in  $r_1$ )  $\cup$  (Functional dependency in  $r_2$ ) =  $F$   
 (IV) Decomposition is in BCNF  
 (A) Only I  
 (B) I and II  
 (C) I, II and IV  
 (D) III and IV

94. What is the availability of software with the following reliability parameters?

- (a) Mean Time Between Failure (MTBF)=25 days.  
 (b) Mean Time To Repair (MTTR)=6 hours.  
 (A) 1%  
 (B) 24%  
 (C) 98.06%  
 (D) 99.009%

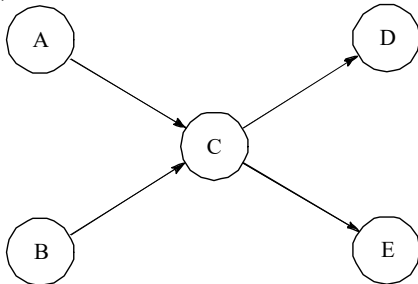
95. A solution to the Dining Philosophers Problem which avoids deadlock is/are

- (A) Ensure that all philosophers pick up the left fork before the right fork
- (B) Ensure that all philosophers pick up the right fork before the left fork
- (C) Ensure that one particular philosopher pick up the left before the right fork and that all other philosophers pick up the right fork before the left fork
- (D) Ensure that all philosophers pick up the left and right fork sequentially one after another

96. Consider a portion of the network diagram given below. What is the LF of activity C?

ES = 11, EF = 17  
LS = 18, LF = 20

ES = 26, EF = 33  
LS = 27, LF = 38



ES = 7, EF = 16  
LS = 9, LF = 20

ES = 26, EF = 32  
LS = 27, LF = 37

- (A) 24
- (B) 25
- (C) 26
- (D) 27

97. Which data structure is most suitable for uniform cost search?

- (A) Stack
- (B) Queue
- (C) D-Queue
- (D) Priority queue

98. Use the effect of slow start on a link with 8 milliseconds RTT and there is no congestion. The receiver window is 48kB and maximum segment size is 2kB. How long does it take before the first full window can be sent?

- (A) 24 msec
- (B) 40 msec
- (C) 48 msec
- (D) 64 msec



99. Time complexity of Best First Search is

- (A)  $O(b^d)$
- (B)  $O(ed)$
- (C)  $O(\log n)$
- (D)  $O(n^2)$

100. Match the following:

- |                             |                        |
|-----------------------------|------------------------|
| (i) Mark and Swap Algorithm | (a) Optimization       |
| (ii) Temporaries            | (b) Garbage Collection |
| (iii) Loop unrolling        | (c) Activation Records |
| (iv) Local Optimization     | (d) Basic Block        |

Codes:

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

**Space for Rough Work**

**Space for Rough Work**

**Space for Rough Work**