Signature of Invigilator

Question Booklet Series | **X**

PAPER–II **Question Booklet No.**
(Identical with OMR Answer Sheet Number)

Subject Code : 22

COMPUTER SCIENCE

Time : 2 Hours *Maximum Marks: 200*

Instructions for the Candidates

PAPER II

(COMPUTER SCIENCE)

1. A neuron with 4 inputs has a weight vector $w = [1, 2, 3, 4]^T$ and a bias 0. The activation function is linear, given by $f(net) = 2 * net$. If the input vector is $[4, 8, 5, 6]$ then the output of the neuron will be

(A) 59

(B) 56

(C) 112

(D) 118

2. The equations $3x - y \geq 3$ and $4x - 4y \geq 4$, have

(A) solution for positive x and y.

(B) no solution for positive x and y.

(C) solution for all x.

(D) solution for all y.

3. Which of the following manages the switching function in GSM?

(A) BSS

(B) MSC

(C) NSS

(D) OSS

4. Consider the following two statements.

S1 : In SaaS, cloud service model applications are provisioned.

S2 : Amazon's Elastic Computing Cloud (EC2) is a well-known cloud storage.

(A) S1 is correct but S2 is not correct.

(B) S1 is not correct but S2 is correct.

(C) Both S1 and S2 are correct.

(D) Neither S1 nor S2 are correct.

5. Match the following:

(a) Context free Grammar	(1) Linear Scan
(b) Code optimization	(2) Lexical and Syntax rule
(c) Global register allocation	(3) Code movement
(d) Semantic Analysis	(4) Type Checking

(A) (a)–(4), (b)–(3), (c)–(1), (d)–(2)

(B) (a)–(2), (b)–(3), (c)–(1), (d)–(4)

(C) (a)–(2), (b)–(1), (c)–(4), (d)–(3)

(D) (a)–(4), (b)–(3), (c)–(2), (d)–(1)

6. Consider the following relation in a database:

Works (employee_name, company_name, salary), where the employee_name is the primary key.

Which of the following query always finds those distinct company names whose employee average salary greater than employee average salary at 'Samsung'?

(A)
```
select company_name
from Works
group by company_name
having avg (salary) > (select
avg (salary)
 from Works
where company_name = 'Samsung')
```

(B)
```
select company_name
from Works as w₁
where (select avg (salary)
from Works
where  company_name  =  w₁.
company_name) > (select avg
(salary)
from Works
where company_name = 'Samsung')
```

(C) Both (A) and (B)

(D) Neither (A) nor (B)

7. What is needed by K-means clustering?

(A) Distance metrics

(B) Number of clusters

(C) Initial guess to the cluster Centroids

(D) All of the above

8. How many standard exceptions exist in C++?

(A) 5

(B) 4

(C) 7

(D) 13

9. Which of the following $\frac{I}{O}$ technique(s) uses interrupts to take attention of CPU/ Processor?

    I. Programmed $\frac{I}{O}$

    II. Interrupt driven $\frac{I}{O}$

    III. Direct Memory Access (DMA)

(A) Only I

(B) I and II

(C) II and III

(D) None of the above

10. The statement $(P \vee Q) \wedge (\sim P \vee R) \rightarrow (Q \vee R)$ is

(A) a tautology

(B) a contradiction

(C) neither a tautology nor a contradiction

(D) logically equivalent to $(P \vee Q) \rightarrow R$

11. Which of the following optimization problems can be better solved with order GA?

(A) 0 – 1 knapsack problem

(B) Travelling salesman problem

(C) Job shop scheduling problem

(D) Optimal binary search tree construction problem

12. Under what condition can a vertex combine and distribute flow in any manner?

(A) It may violate edge capacities.

(B) It should maintain flow conservation.

(C) The vertex should be a source vertex.

(D) The vertex should be a sink vertex.

13. Consider a relation $R(ABCD)$ with functional dependencies $F : \{A \rightarrow B, AB \rightarrow C, D \rightarrow AC\}$

Which of the following statements is true about the given scheme R?

    I. Minimal cover for the given set F does not exist.

    II. The candidate key of the given schema R is 'AB'.

(A) Only I

(B) Only II

(C) Both I and II

(D) Neither I not II

14. What is true about an Abstract class?

(A) An Abstract class cannot contain a virtual function as its member.

(B) It is not possible to inherit an Abstract class to create a derived class.

(C) An Abstract class cannot be inherited.

(D) All of the above are true.

15. What is the availability of a software with the following figures? Mean Time Between Failure (MTBF) = 40 days, Mean Time to Repair (MTTR) = 10 hours.

(A) 70%

(B) 80%

(C) 90%

(D) 99%

16. Which GA encoding scheme suffers from the Hamming Cliff problem?

(A) Binary coded GA

(B) Real coded GA

(C) Order GA

(D) Tree coded GA

17. The transport layer protocols used for real time multimedia, file transfer, DNS and email respectively are:

    (A) TCP – UDP – UDP – TCP

    (B) UDP – TCP – UDP – TCP

    (C) UDP – UDP – TCP – TCP

    (D) TCP – UDP – TCP – UDP

18. Which one of the following is the correct order in which a software project manager estimates various project parameters while using COCOMO?

    (A) Cost, effort, duration, size

    (B) Cost, duration, effort, size

    (C) Size, effort, duration, cost

    (D) Size, cost, effort, duration

19. A multilevel page table is preferred in comparison to a single level page table for translating virtual address to physical address because

    (A) it reduces the memory access time to read or write a memory location.

    (B) it is required by the translation lookaside buffer.

    (C) it helps to reduce the number of page faults in page.

    (D) it helps to reduce the size of page table needed to implement the virtual address space of process.

20. The Cohen-Sutherland algorithm divides the region into _____ number of spaces.

    (A) 4

    (B) 8

    (C) 9

    (D) 11

21. What is usually regarded as the Von-Neumann bottleneck?

    (A) Processor/ Memory Interface

    (B) Control Unit

    (C) Arithmetic Logic Unit

    (D) Instruction Set

22. An Agent is composed of _____.

    (A) Architecture

    (B) Agent functions

    (C) Perceptron

    (D) Architecture and Program

23. What is the identity element in the group $G = \{2, 4, 6, 8\}$ under multiplication modulo 10?

    (A) 2

    (B) 4

    (C) 6

    (D) 8

24. In Bresenham's line algorithm (where slope is less than 1), the initial value of decision parameter PK is _____.

    (A) 0

    (B) $2\Delta y - \Delta x$

    (C) $2\Delta y - 2\Delta x$

    (D) $\Delta x - \Delta y$

25. How many cycles are required for a 100 MHz processor to execute a program which requires 5 seconds of CPU time?

    (A) 10^9

    (B) 50×10^7

    (C) 10^8

    (D) 50

26. The prefix form of $A - B / (C * D \wedge E)$ is

    (A) $- / * \wedge ABCDE$

    (B) $- ABCD * \wedge DE$

    (C) $- A / B * C \wedge DE$

    (D) $- A/ BC * \wedge DE$

27. The example(s) of Distance Vector Protocol is/are

    I. Open Shortest Path First (OSPF)

    II. Routing Information Protocol (RIP)

    III. Interior Gateway Routing Protocol (IGRP)

(A) I only

(B) I and II only

(C) II and III only

(D) All I, II and III

28. Which of the following algorithm does not face local maxima problem?

(A) Simple HC

(B) Steepest Ascent HC

(C) Best First Search

(D) All of the above

29. The boolean function $A + BC$ is a reduced form of

(A) $AB + BC$

(B) $(A + B)(A + C)$

(C) $A'B + AB'C$

(D) $(A + C)\,B$

30. Consider a system with n processors. A program with 80% parallel part and 20% sequential part. There is a speed up of 4 when we run this program on given system with processors as compared to the single processor system. The value of n is

(A) 14

(B) 15

(C) 16

(D) 18

31. Assume that we have a dataset containing information about 200 individuals. One hundred of these individuals have purchased life insurance. A supervised data mining session has discovered the following rule:

If age < 30 and credit card insurance = yes THEN life insurance = yes.

Rule Accuracy = 70%

Rule Coverage = 63%

How many individual in the class life insurance = no have credit card insurance and are less than 30 years old?

(A) 63

(B) 70

(C) 18

(D) 30

32. Given items as {value, weight} pairs {{40, 20}, {30, 10}, {20, 5}}. The capacity of knapsack = 20. Find the maximum value output assuming items to be divisible.

(A) 60

(B) 80

(C) 100

(D) 40

33. Which of the following is the correct set of equations for oblique parallel projection?

(A) $x_p = x + z(L_1 + \cos\theta),\ yp = y + z(L_1 + \sin\theta)$

(B) $x_p = x + z(L_1 \sin\theta),\ yp = y + z(L_1 \cos\theta)$

(C) $x_p = x - z(L_1 \cos\theta),\ yp = y - z(L_1 \sin\theta)$

(D) $x_p = x + z(L_1 \cos\theta),\ yp = y + z(L_1 \sin\theta)$

34. Unit testing of a software module does not test which one of the following?

(A) Whether coding standards have been followed.

(B) Whether the functions of the module are working as per design.

(C) Whether all arithmetic statements of the module are working properly.

(D) Whether all control statements are working properly.

35. The Language $L = \{a^x b^y \mid x \neq y\}$ is constructed from a grammar G which _____.

    (A) is a linear regular grammar

    (B) is a non-linear regular grammar

    (C) is a linear context-free grammar

    (D) is a non-linear context-free grammar

36. Suppose, every region of a planar simple graph has 'n' vertices and 'e' edges, drawn in a plane bounded by K-edges. Then, $K(n-2)$ equals to which of the following?

    (A) $e(n-2)$

    (B) $e(K-2)$

    (C) $2n - K$

    (D) $2(n-K)$

37. A system with 8 blocks of cache memory which is 2-way set associative mapped. Cache memory using LRU replacement algorithm. A process preferencing following main memory blocks in given order — 10, 11, 12, 18, 5, 11, 6, 7, 10, 15, 11, 5.

Assume cache is initially empty, which of the following is false?

    (A) 4 conflict misses

    (B) 8 compulsory misses

    (C) 0 capacity misses

    (D) 2 hits

38. A feature F_1 can take certain value : A, B, C, D, E & F and represents grade of students from a college. Which of the following statements is true?

    (A) Feature F_1 is an example of nominal variable.

    (B) Feature F_1 is an example of ordinal variable.

    (C) It does not belong to any of the above category.

    (D) Both (A) and (B)

39. Consider the following encodings $E_1 = \{D, w\} \mid D$ is a DFA and $w \in L(D)\}$ and $E_2 = \{T, w\} \mid T$ is a Turing machine that accepts a string $w\}$

    (A) E_1 is decidable and E_2 is decidable.

    (B) E_1 is undecidable and E_2 is undecidable.

    (C) E_1 is undecidable and E_2 is recognizable.

    (D) E_1 is decidable and E_2 is recognizable.

40. Consider the following statements —

    S1 : Register remaining is used to prevent WAR and WAW hazards in pipelined CPUs.

    S2 : WAR hazard is also known as anti-dependency hazard.

    S3 : Branch prediction is used to resolve the control hazards in pipelined CPUs.

The correct statement(s) is/are

    (A) All

    (B) S1 and S3 only

    (C) S2 and S3 only

    (D) S1 and S2 only

41. For a given relation $R(A_1, A_2, \dots A_n)$, what is the number of super keys, if $(A_1 A_2)$ and $(A_2 A_3 A_4)$ are candidate keys?

    (A) $2^{n-3} + 2^{n-2}$

    (B) $2^{n-3} + 2^{n-2} + 2^{n-4}$

    (C) $2^{n-3} + 2^{n-2} - 2^{n-4}$

    (D) $2^{n-3} - 2^{n-2}$

42. Which of the following statements is true?

    (A) No $LR(1)$ is $LL(1)$.

    (B) Every $LL(1)$ is $LR(1)$.

    (C) Some $LR(1)$ are $LL(1)$.

    (D) Some $LL(1)$ are $LR(1)$.

43. The analysis performed to uncover the interesting statistical correlation between associated attribute value pairs is known as the _____.

    (A) mining of association

    (B) mining of correlation

    (C) mining of clusters

    (D) All of the above

44. A message 'CRYPTOGRAPHY' is encrypted (ignore quotes) using columnar transposition cipher with a key 'TABLE'.

The encrypted message is

    (A) YRCTPOGRAYHP

    (B) YHPARGOTPYRC

    (C) OTPYRCYHPARG

    (D) RGYYRTPPACOH

45. IF G is the forest with 54 vertices and 17 connected components, then the total number of edges in G is

    (A) 36

    (B) 37

    (C) 38

    (D) 27

46. The matrix contains m rows and n columns. The matrix is called a Sparse matrix if _____.

    (A) total number of zero elements $> (m * n) / 2$

    (B) total number of zero elements $= m + n$

    (C) total number of zero elements $= m - n$

    (D) total number of zero elements $= m / n$

47. What is the correct way to round off x, a float to an *int* value in 'C'?
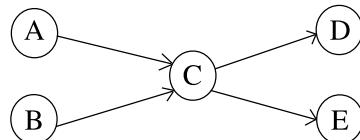
    (A) $Y = (int)\, x + 0{\cdot}5$

    (B) $Y = (int)\, (x + 0{\cdot}5)$

    (C) $Y = int\, (x + 0{\cdot}5)$

    (D) $Y = (int)\, ((int)\, x + 0{\cdot}5)$

48. Which of the following systems can accommodate higher number of users and services?

    (A) GSM

    (B) GPRS

    (C) CDMA

    (D) Both GSM and CDMA

49. Consider a portion of the network diagram given below. What is the LS of activity C?

ES = 11, EF =17   ES = 26, EF = 33
LS = 18, LF = 20   LS = 27, LF =38

ES = 7, EF =16   ES = 26, EF = 32
LS = 9, LF = 20   LS = 27, LF =37

    (A) 20

    (B) 21

    (C) 26

    (D) 27

50. A process executes the following

       for $(i = 0; i < n; i + +)$ fork( );

The total number of child process created is

    (A) n

    (B) $2^n - 1$

    (C) 2^n

    (D) $2^{(n + 1)} - 1$

51. A class contains 10 students with 6 men and 4 women. The number of ways to select a 4-member committee with 2 men and 2 women, is

(A) 90

(B) 80

(C) 70

(D) 60

52. Alpha testing is usually performed by which one of the following?

(A) Test team

(B) Development team

(C) A group of friendly customers

(D) Customers

53. Which of the following statement is wrong?

(A) In B+ tree data pointers only at leaf nodes.

(B) In B– tree, no serach key is repeated if search key is unique.

(C) In B– tree, leaf nodes are connected as linked list.

(D) In B– tree, data pointers exists at leaf and non-leaf both types of nodes.

54. Match List-I and List-II based on 'C++' and find the correct answer from the codes given below the list.

List-I	List-II
(a) Instance variable	i. is defined within function definition.
(b) Static variable	ii. is defined within class as data member.
(c) Local variable	iii. is defined within the class as class variable.
(d) Global variable	iv. is defined outside main function and outside any class.

Codes:

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

55. Heuristic values are consistant if

(A) $h(n) <= c(n, n_1) + h(n_1)$

(B) $h(n)$ is admissible.

(C) $h(n)$ are inadmissible.

(D) Both (B) and (C)

56. Match List-I and List-II and find the correct answer from the codes given below the list.

List-I	List-II
(a) PaaS	(i) Cisco Meta Cloud
(b) SaaS	(ii) Google Apps
(c) IaaS	(iii) One Drive
(d) STaaS	(iv) Microsoft Azure

Codes:

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

57. In a stack, if an user tries to remove an element from an empty stack, it is called _____.

(A) Overflow

(B) Garbage Collection

(C) Underflow

(D) Empty Collection

58. Which of the following statements are true?

(i) Round Robin scheduling has a better average response time than FCFS scheduling.

(ii) Long term scheduler is invoked less frequently than short term scheduler.

(iii) In multi-level feedback queue scheduling, a process does not change its ready queue once it is assigned.

(iv) Round Robin scheduling behaves like FCFS if the time quantum is infinite.

(A) (i) and (ii)

(B) (ii) and (iii)

(C) (ii), (iii) and (iv)

(D) (i), (ii) and (iv)

59. What will be the value returned by the following function when it is called with 11?

```
recur (int n0) {
    if ((n0/2) != ∅)
        return (recur (n0/2) * 10 + num % 2);
    else
        return 1;
}
```

(A) 1

(B) 1011

(C) Function does not return any value because it goes into infinite loop.

(D) 11

60. Let $N = \{1, 2, 3, ...\}$ is the universal set,

$A = \{n | n <= 6\}$,

$B = \{n | 4 <= n <= 9\}$, and

$D = \{2, 3, 5, 7, 8\}$

The set $(A \cap B) \Delta (A \cap D)$, where Δ defines set symmetric difference is given by

(A) $\{1, 3, 5, 7, 9\}$

(B) $\{2, 3, 4, 6, 9\}$

(C) $\{2, 3, 4, 6\}$

(D) $\{1, 3, 4, 5\}$

61. What would be the asymptotic time complexity to find an element in the linked list?

(A) $0\,(1)$

(B) $0\,(n)$

(C) $0\,(n^2)$

(D) $0\,(n^4)$

62. Consider the following GADGETS instance:

Name	Price
Phone	11,500
iPhone	50,000
Laptop	80,000
iPad	68,000

The following SQL query is executed:
SELECT PRICE FROM GADGETS ORDER BY NAME DESC; All four touples will be returned by the query. Identify the correct order of touple numbers in the output, if the touple number in the above tables are 1, 2, 3 and 4.

(A) 1, 2, 3, 4

(B) 1, 3, 2, 4

(C) 4, 2, 3, 1

(D) 3, 4, 2, 1

63. At a particular time, a counting semaphore has a value 7. Then there were 'x' P operations and 4 V operations performed on this semaphore. If the final value of the semaphore is 9, then what is the value of 'x'?

(A) 1

(B) 2

(C) 3

(D) 4

64. While performing Division of Floating point number systems in a computer, exponent part of the result is added with

(A) $(2^n - 1)$

(B) $(n - 1)$

(C) $[2^{(n-1)} - 1]$

(D) $(2n - 1)$

65. Alpha-Beta Pruning is a modified version of

(A) Maxmin algorithm

(B) Minimax algorithm

(C) Maximax algorithm

(D) Both A and B

66. Computers can only perform _____; multiplication is performed using _____.

    (A) Addition; Shifting operation

    (B) Addition; Booth's algorithm

    (C) Addition, subtraction; Booth's algorithm

    (D) Addition; Restoring method

67. Agile model advocates which one of the following approaches?

    (A) In each increment, get something "quick and dirty" delivered and thereby save time.

    (B) In each increment, get something simple released as quickly as possible.

    (C) In each increment, get something of business value delivered as quickly as possible, consistent with the right level of quality.

    (D) In each increment, get something delivered once it has been fully documented and the documentation has been signed off as complete.

68. Consider the following requirement for a word-processor software: "The software should provide facility to import an existing image available as a jpeg file into the document being created." Which one of the following types of requirements is this?

    (A) Functional requirement

    (B) Non-functional requirement

    (C) Constraints on the implementation

    (D) Goal of implementation

69. Bit Map is a method of

    (A) keeping track of allocated blocks.

    (B) keeping track of free blocks.

    (C) allocating free blocks.

    (D) keeping track of free/allocated blocks.

70. Data warehousing is defined as

    (A) a subject oriented integrated time variant non-volatile collection of data in support of management.

    (B) selecting the right dataset for KDD.

    (C) the real discovery stage of KDD process.

    (D) All of the above

71. The special memory used to store the micro routines of a computer is _____.

    (A) Control Table

    (B) Control Store

    (C) Control Mart

    (D) Control Shop

72. "Rahim is very honest" this statement can be completely expressed using

    (A) FOPL

    (B) Fuzzy Logic

    (C) Semantic Net

    (D) All of the above

73. Which of the following is true for Virtual Network Computing (VNC)?

   (i) It is a graphical desktop-sharing system.

   (ii) It uses the Remote Frame Buffer (RFB) protocol to remotely control another computer.

   (iii) Multiple clients may connect to a VNC server at the same time.

   (iv) VNC logs into the computer, creating a virtual desktop session so that users can share the resources of the same computer between them.

    (A) (i) and (ii)

    (B) (i), (iii) and (iv)

    (C) (i), (ii) and (iii)

    (D) (ii), (iii) and (iv)

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

    (A) 5832

    (B) 256

    (C) 512

    (D) 1024

75. Address part of RAM (Random Access Memory) is designed using

    (A) Decoders

    (B) Encoders

    (C) Multiplexers

    (D) None of the above

76. _____ allows the inclusion of virtually any type of file or document in an email message.

    (A) IMAP

    (B) POP3

    (C) MIME

    (D) SMTP

77. Which of the following statement(s) is/are correct?

  I. Hierarchical analysis is a scanning phase where the stream of characters is read and grouped into various tokens having a collective meaning.

  II. Semantic analysis phase is used to check whether the components of the source program are meaningful or not.

  III. In linear analysis phase, based on a collective meaning, the tokens are categorized into nested group.

    (A) Only I

    (B) Only II

    (C) II and III

    (D) I and II

78. If the region codes for the two end points of a line are 1010 and 0110, the line is

    (A) completely visible.

    (B) completely invisible.

    (C) partially visible.

    (D) Can't say anything

79. Consider the Languages :

$$L_1 = \{a^n b^n \mid n \geq x, \text{ for some } x\}$$

and $\quad L_2 = \{a^n b^n \mid 0 \leq n \leq y, \text{ for some } y\}.$

If $x > y$, then $L_1 \cap L_2$ is

    (A) Finite

    (B) Finite but not regular

    (C) Regular but not finite

    (D) Context free but not regular

80. In a virtual memory environment the minimum number of page frames that must be allocated to a running process is determined by

    (A) the number of processes in the memory.

    (B) the instruction set architecture.

    (C) the page size.

    (D) the physical memory size.

81. What is back propagation?

    (A) It is another name given to the curvy function in the perceptron.

    (B) It is the transmission of error back through the network to adjust the inputs.

    (C) It is the transmission of error back through the network to allow weights to be adjusted so that the network can learn.

    (D) Both (A) and (B)

82. Which one of the following is a characteristic of a good object-oriented design?

    (A) Deep class hierarchy

    (B) Large number of methods per class

    (C) Large number of message exchanges per use case

    (D) Moderate number of methods per class

83. Which of the following is not the method to Arepresent Sparse Matrix?

    (A) Array

    (B) Linked List

    (C) Dictionary of Keys

    (D) Heap

84. In cabinet projection, what is the projected length of the lines that are perpendicular to the viewing plane?

    (A) Same length as the original

    (B) Double the length of the original

    (C) Half the length of the original

    (D) Projected length does not depend on the original length.

85. Which of the following is an example of LL(1) grammar?

    (A) $S \rightarrow xSyS \,/\, ySxS \,/\, \in$

    (B) $S \rightarrow xXYy$
        $X \rightarrow \alpha \,/\in$
        $Y \rightarrow \beta \,/\in$

    (C) $S \rightarrow X \,/\, \delta$
        $X \rightarrow \delta$

    (D) $S \rightarrow xXx \,/\, \in$
        $X \rightarrow xyS \,/\, \in$

86. Write down the sequence of steps to be taken in designing a fuzzy Logic Controller.

    (A) Defuzzification $\rightarrow$ Rule evaluation $\rightarrow$ Fuzzification.

    (B) Fuzzy sets $\rightarrow$ Defuzzification $\rightarrow$ Rule evaluation.

    (C) Fuzzification $\rightarrow$ Rule evaluation $\rightarrow$ Defuzzification.

    (D) Rule evaluation $\rightarrow$ Fuzzification $\rightarrow$ Defuzzification.

87. Which of the following cryptographic methods provides perfect security?

    (A) Rotor Machine

    (B) One-time Pad Cipher

    (C) Hill Cipher

    (D) Playfair Cipher

88. Which of the following is not a public-key cryptography scheme?

    (A) RSA

    (B) Diffie-Hellman Key Exchange

    (C) DSS

    (D) AES

89. Consider the argumented grammar given below:

    $S' \rightarrow \bullet\, S$
    $S \rightarrow \bullet\, L = R \,/\, \bullet\, R$
    $L \rightarrow \bullet\, + R \,/\, \bullet\, id$
    $R \rightarrow \bullet\, L$

Let $l_0 = \text{CLOSURE}(\{[S' \rightarrow \bullet\, S]\})$. The number of items in the set GOTO $(l_0, +)$ is

    (A) 1

    (B) 2

    (C) 3

    (D) 4

90. Which of the following is NOT true of deadlock prevention and deadlock avoidance schemes?

(A) In deadlock prevention, the request for resources is always granted if the resulting state is safe.

(B) In deadlock avoidance, the request for resources is always granted if the result state is safe.

(C) Deadlock avoidance is less restrictive than deadlock prevention.

(D) Deadlock avoidance requires knowledge of resource requirements a priori.

91. The modules in a good software design should have which one of the following characteristics?

(A) High cohesion, low coupling

(B) Low cohesion, high coupling

(C) Low cohesion, low coupling

(D) High cohesion, high coupling

92. Consider the DFA

$$M = \left(\{q_0, q_1, q_2, q_f\}, \{0,1\}, \delta, q_0, q_f\right)$$ and

its transition table is as follows:

	0	1
q_0	q_1	q_2
q_1	q_f	q_1
q_2	q_2	q_2
q_f	q_1	q_2

The Language accepted by the DFA is

(A) $(01* 0 + 10*1)$

(B) $(01* 0 + 10*1)*$

(C) $(01* 0 + 10*1)^+$

(D) $(01*00* + 10*11*)$

93. How many conditions have to be met if an NP-complete problem is polynomially reducible?

(A) 1

(B) 2

(C) 3

(D) 4

94. In an RSA cryptosystem, participant A generates his public and private keys using two prime numbers, p = 13 and q = 11.

If A's public key is 37, then A's private key is

(A) 35

(B) 37

(C) 13

(D) 29

95. Suppose a memory system contains the cache, main memory and virtual memory access time of which are 5 nanoseconds, 100 nanoseconds and 10 miliseconds respectively. If cache hit rate is 0.8 and main memory hit rate is 0.995, then what is the average memory access time?

(A) 124 ns

(B) 1024 ns

(C) 10024 ns

(D) 100024 ns

96. Which of the following is useful in implementing heap sort?

(A) Stack

(B) Set

(C) List

(D) Queue

97. Given the following subnet IPs and corresponding broadcast IPs for three subnets, what would be the subnet IP and broadcast IP after route summarization?

Subnet IP	Broadcast IP
172.16.1.0	172.16.1.255
172.16.2.0	172.16.2.255
172.16.3.0	172.16.3.255

(A) 172.16.0.0/23, subnet broadcast 172.16.3.255

(B) 172.16.0.0/23, subnet broadcast 172.16.1.255

(C) 172.16.0.0/22, subnet broadcast 172.16.3.255

(D) 172.16.0.0/24, subnet broadcast 172.16.3.255

98. Consider a complete graph G with 4 vertices. The graph G has _____ spanning trees.

(A) 15

(B) 8

(C) 16

(D) 13

99. If there are 3 page frames, how many page faults will occur for following page reference string using LRU page replacement algorithm?

5 6 1 2 6 3 6 4 2 3 6 3 2 1 2 6 1 5 6 1

(A) 12

(B) 13

(C) 14

(D) 15

100. Which one of the following is not true of a Sprint?

(A) It is the fundamental process flow of Scrum.

(B) It is month long iteretion, during which an incremental product functionality completed.

(C) During a Sprint, customer feedback is continually obtained and the Sprint back log is accordingly modified.

(D) Each day begins with a daily Scrum meeting.

Space for Rough Work

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