1. $A = \{\emptyset, \{\emptyset\}, 2, \{2, \emptyset\}, 3\}$, which of the following is true?

a. $\{\{\emptyset, \{\emptyset\}\} \in A$

b. $\{2\} \in A$

c. $0 \subset A$

d. $3 \subset A$

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2. Consider the following statements:

P: Good mobile phones are not cheap

Q: Cheap mobile phones are not good

L: P implies Q

M: Q implies P

N: P is equivalent to Q

Which of the following about L, M, and N is Correct?

a. Only L is true

b. Only M is true

c. Only N is true

d. L,M,N are true.

3. The binary relation $R = \{(1, 1)\}, (2, 1), (2, 2), (2, 3), (2, 4), (3, 1), (3, 2), (3, 3), (3, 4)$ } on the set $A = \{1, 2, 3, 4\}$ is

a. Reflexive, symmetric and Transitive

b. Neither Reflexive, nor irreflexive but Transitive

c. Irreflexive, symmetric and Transitive

d. Irreflexive, and anti-symmetric

4. What is the minimum number of ordered pairs of non-negative numbers that should be chosen to ensure that there are two pairs (a,b) and (c,d) in the chosen set such that a= c mod 3 and b=d mod 5

a. 4
b. 6
c. 16
d. 24

5. Consider the following set a equations

$x + 2y = 5$

$4x + 8y = 12$

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$3x + 6y + 3z = 15$, This set has

a. Unique solution
b. No solution
c. Finite number of solutions
d. Infinite number of solutions

6. Which two of the following are equivalent for an undirected graph G?

(i) G is a tree

(ii) There is at least one path between any two distinct vertices of G

(iii) G contains no cycles and has (n-1) edges

(iv) G has n edges

a. i and ii
b. ii and iii
c. i and iv
d. ii and iii

SHOT ON MI 10IA

7. For a complete graph with N vertices, the total number of spanning trees is given by:

a. 2N-1

b. N^(N-1)

c. N^(N-2)

d. 2N+1

8. Let G be a simple connected planar graph with 13 vertices and 19 edges. Then, the number of faces in the planar embedding of the graph is:

a. 6

b. 8

c. 9

d. 13

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9. Which one of the following is NOT performed during compilation?

a. Dynamic memory allocation

b. Type checking

c. Symbol table management

d. Inline expansion

10. In which one of the following cases, it is possible to obtain different results for call- by-reference and call-by-name parameter passing methods?

a. Passing a constant value as a parameter.

b. Passing the address of an array as a parameter.

c. Passing an array as a parameter.

d. Passing the address of an array as a constant.

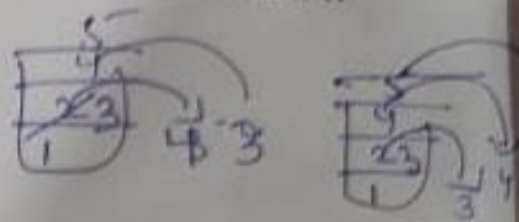
11. Given an empty stack, after performing push (1), push (2), Pop, push (3), push (4), Pop, Pop, push(5), Pop, what is the value of the top of the stack ?.

a. 4

b. 3

c. 2

d. 1



12. We have to sort a list L, consisting of a sorted list followed by a few 'random' elements. Which of the following sorting method would be most suitable for such a task?

a. Bubble sort

b. Selection sort

c. Quick sort

d. Insertion sort

13. A hash table contains 10 buckets and uses linear probing to resolve collisions. The key values are integers and the hash function used is key % 10. If the values 43, 165, 62, 123, 142 are inserted in the table, in what location would the key value 142 be inserted?

a. 4

b. 6

c. 2

d. 3

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14. The result evaluating the postfix expression 10 5 +60 6 / *8 - is

a. 284

b. 213

c. 142

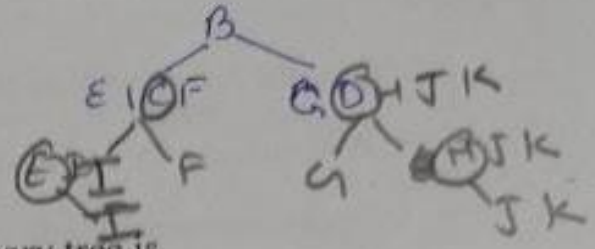
d. 71

I E F C G J K H D B

15. Given a binary tree whose inorder and preorder traversal are given by

Inorder : EICFBGDJHK

Preorder : BCEIFDGHJK



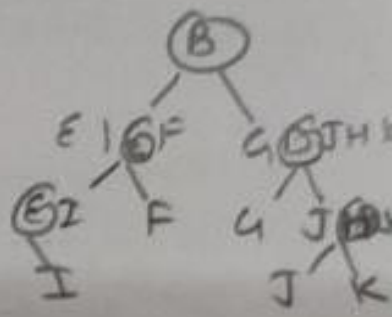
The post order traversal of the above binary tree is

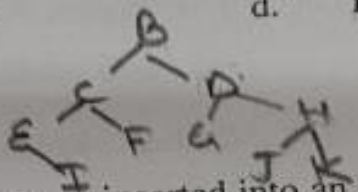
a. IEFCGJKHDB

b. IEFCJGKHDB

c. IEFCGKJHDB

d. IEFCGJKDBH

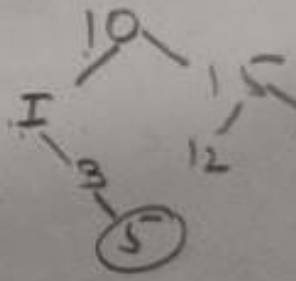




L Rig Root

16. The following numbers are inserted into an empty binary search tree in the given order: 10, 1, 3, 5, 15, 12, 16. What is the height of the binary search tree (the height is the maximum distance of a leaf node from the root)?

I E F C J K H



a. 2

b. 3

c. 4

d. 6

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17. *Linked lists are not suitable data structures of which one of the following problems?*

a. Insertion sort

b. Binary search

c. Radix sort

d. Polynomial manipulation

SHOT ON MI 10I

18. Which of the following OOP concept is not true for the C++ programming language?

a. A class must have member functions

b. C++ Program can be easily written without the use of classes

c. At least one instance should be declared within the C++ program

d. C++ Program must contain at least one class

19. Which among the following concept is correct if a user using the concept of encapsulation in a code?

a. The data type of the data member can be easily modified without modifying any other code

b. The modification of the code can be additional overhead

c. Member functions can be used for modifying the data type of data members

d. The data type of data member cannot be modified.

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20. Consider the following two statements:

(i) A publicly derived class is a subtype of its base class.

(ii) Inheritance provides for code reuse .

a. Both the statements (i) and (ii) are correct.

b. Neither of the statements (i) and (ii) are correct

c. Statement (i) is correct and (ii) is incorrect

d. Statement (i) is incorrect and (ii) is correct.

21. Converting a primitive type data into its corresponding wrapper class object instance is called

a. Boxing
b. Wrapping
c. Auto-boxing
d. Instantiation

22. Which among the following can't be used for polymorphism?

a. Member functions overloading
b. Predefined operator overloading
c. Static member functions
d. Constructor overloading

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23. If a class will serve as a base class, most often the base class data members are:

a. Private
b. Protected
c. Public
d. Polymorphic

24. Which of the following statement is correct?

a. A constructor is called at the time of use of an object.
b. A constructor is called at the time of declaration of an object.
c. A constructor is called at the time of declaration of a class.
d. A constructor is called at the time of use of a class.

SHOT ON MI 10I

25. What is the time complexity of Floyd-Warshall algorithm to calculate all pair shortest path in a graph with n vertices?

a. O(n^2logn)
b. Theta(n^2logn)
c. Theta(n^4)
d. Theta(n^3)

26. Which of the following sorting algorithms has the lowest worst-case complexity?

a. Bubble Sort
b. Merge Sort
c. Quick Sort
d. Selection Sort

27. The recurrence equation

T(1) = 1

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T(n) = 2T(n - 1) + n, n ≥2, evaluates to:

a. $2^{n+1} - n - 2$
b. $2^n - n$
c. $2^{n+1} - 2n - 2$
d. $2^n + n$

28. Consider two strings A = "qpqrr" and B = "pqprqrp ". Let x be the length of the longest common subsequence (not necessarily contiguous) between A and B and let y be the number of such longest common subsequences between A and B. Then x + 10y =

a. 33
b. 23
c. 43
d. 34

29. What is an optimal Huffman code for alphabet b of the following set of frequencies a: 45, b:13, c:12, d:16, e:9, f:5

a. 001

b. 100

c. 111

d. 101

30. Consider the following two problems of graph.

(1) Given a graph, find if the graph has a cycle that visits every vertex exactly once except the first visited vertex which must be visited again to complete the cycle.

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(2) Given a graph, find if the graph has a cycle that visits every edge exactly once. Which of the following is true about above two problems:

a. Both problems belong to P set

b. Both problem s belong to NP complete set

c. Problem 1 belongs NP Complete set and 2 belongs to P

d. Problem 1 belongs to P set and 2 belongs to NP Complete set

31. What is the pre-processing time of Rabin and Karp Algorithm?

a. Theta(m2)

b. Theta(mlogn)

c. Theta(m)

d. Big-Oh(n)

SHOT ON MI 10I

32. Which of the following standard algorithms is not Dynamic Programming based.

a. Bellman-Ford Algorithm for single source shortest path

b. Prim's Minimum Spanning Tree

c. 0-1 Knapsack problem

d. Floyd Warshall Algorithm for all pairs shortest paths

33. Sixty reusable components were available for an application. If only 70% of these components can be used, rest 30% would have to be developed from scratch. If average component is 100 LOC and cost of each LOC is Rs 14, what will be the risk exposure if risk probability is 80% ?

a. Rs 25,200

b. Rs 20,160

c. Rs 25,160

d. Rs 20,400

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34. Which of the following is not included in waterfall model ?

a. Requirement analysis

b. Design

c. Risk analysis

d. Coding

35. Which of the following statement(s) is/are TRUE with regard to software testing?

i. Regression testing technique ensures that the software product runs correctly after the changes during maintenance.

ii. Equivalence partitioning is a white-box testing technique that divides the input domain of a program into classes of data from which test cases can be derived.

a. Only i
b. Only ii.
c. Both i and ii
d. Neither i nor ii

36. Which one of the following non-functional quality attributes is not highly affected by the architecture of the software?

a. Performance
b. Reliability
c. Portability
d. Usability

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37. The lower degree of cohesion is kind of

a. Logical Cohesion
b. Coincidental Cohesion
c. Procedural Cohesion
d. Communicational Cohesion

38. To execute all loops at their boundaries and within their operational bounds is an example of:

a. Black Box Testing
b. Alpha Testing
c. Recovery Testing
d. White Box Testing

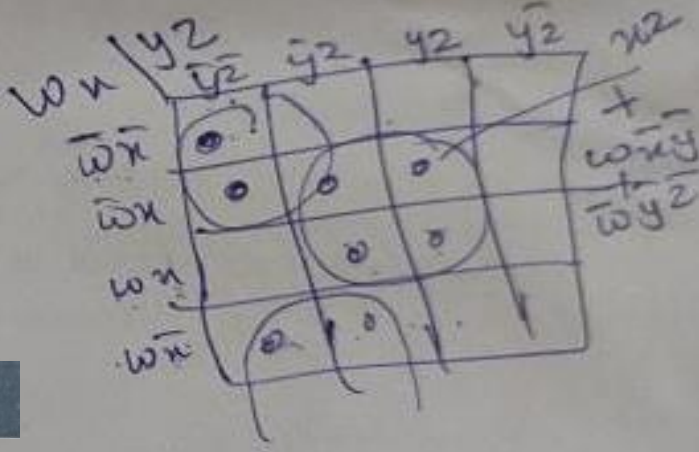
SHOT ON MI 10I

39. Activities which ensure that the software that has been built, is traceable to customer requirement is covered as part of

a. Verification
b. Maintenance
c. Validation
d. Modeling

40. In the context of modular software design, which one of the following combinations is desirable?

a. High cohesion and low coupling
b. High cohesion and high coupling
c. Low cohesion and high coupling
d. Low cohesion and low coupling



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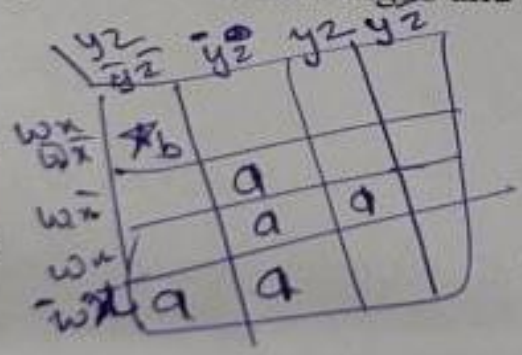
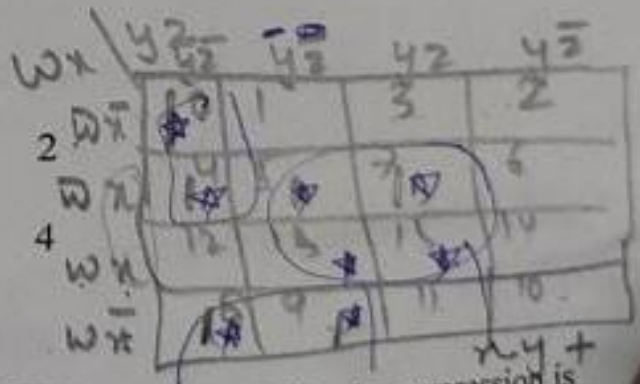
41. If x and y are two decimal digits and $(0.1101)_2 = (0.8xy5)_{10}$, the decimal value of x+y is

a. 1
b. 2
c. 3
d. 4





42. Let $f(w, x, y, z) = \Sigma(0, 4, 5, 7, 8, 9, 13, 15)$. Which of the following expression is not equivalent to f?

a. $x'y'z' + w'xy' + wy'z + xz$
b. $w'y'z' + wx'y' + xz$
c. $w'y'z' + wx'y' + xyz + xy'z$
d. $x'y'z' + wx'y' + w'y$

43. Consider the following minterm expression for F :

$F(P,Q,R,S) = \sum(0,2,5,7,8,10,13,15)$

The minterms 2, 7, 8 and 13 are 'do not care' terms. The minimal sum-of-products form for F is :

a. QS' + Q'S

b. Q'S' + QS

c. Q'R'S' + Q'RS' + QR'S + QRS

d. P'Q'S' + P'QS + PQS + PQ'S'

44. The Boolean function x'y' + xy + x'y is equivalent to

a. x' + y

b. x' + y'

c. x + y

d. x + y'

45. Two cross-coupled NAND gates produce:

a. RS flip-flop

b. SR Latch

c. D flip-flop

d. master-slave flip-flop

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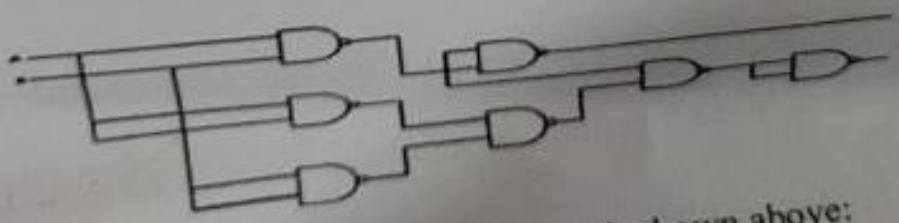
46.



What logic function is performed by the circuit shown above:

a. Ring counter

b. Ripple counter

c. Half adder

d. Full adder

47. Consider a multiplexer with X and Y as data inputs and Z as control input. $Z = 0$ selects input X, and $Z = 1$ selects input Y. What are the connections required to realize the 2-variable Boolean function $f = T + R$, without using any additional hardware ?

a. R to X, 1 to Y, T to Z

b. T to X, R to Y, T to Z

c. T to X, R to Y, 0 to Z

d. R to X, 0 to Y, T to Z

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48. How many pulses are needed to change the contents of a 8-bit up counter from 10101100 to 00100111 (rightmost bit i s the LSB)?

a. 134

b. 133

c. 123

d. 124

49. Suppose only one multiplexer and one inverter are allowed to be used to implement any Boolean function of n variables. What is the minimum size of the multiplexer needed?

a. 2^n line to 1 line

b. 2^{n+1} line to 1 line

c. 2^{n-1} line to 1 line

d. 2^{n+2} line to 1 line

SHOT ON MI 10I

50. The content of the accumulator after the execution of the following 808 assembly language program, is

MVI A, 35H

MOV B, A

STC

CMC

RAR

XRA B

a. 2FH

b. 35H

c. EFH

d. 00H

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51. A DMA controller transfers 32-bit words to memory using cycle Stealing. The words are assembled from a device that transmits characters at a rate of 4800 characters per second. The CPU is fetching and executing instructions at an average rate of one million instructions per second. By how much will the CPU be slowed down because of the DMA transfer?

a. 1.2%

b. 0.12%

c. 2.5%

d. 2.4%

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52. Which of the following mapping is not used for mapping process in cache memory?

a. Segmented - page mapping
b. Associative mapping
c. Direct mapping
d. Set-Associative mapping

53. The Memory Address Register:

a. is a hardware memory device which denotes the location of the current instruction being executed.

b. is a group of electrical circuit, that performs the intent of instructions fetched from memory

c. contains the address of the memory location that is to be read from or stored into

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d. contains a copy of the designated memory location specified by the MAR after a "read" or the new contents of the memory prior to a "write"

54. An interrupt in which the external device supplies its address as well as the interrupt requests is known as

a. designated interrupt
b. maskable interrupt
c. non-maskable interrupt
d. vectored interrupt

55. Number of chips (128 x 8 RAM) needed to provide a memory capacity of 1024 bytes

a. 4
b. 2
c. 16
d. 8

56. Two eight bit bytes 1100 0011 and 0100 1100 are added. What are the values of the overflow, carry and zero flags respectively, if the arithmetic unit of the CPU uses 2's complement form?

a. 0, 1, 1
b. 0, 1, 0
c. 1, 1, 0
d. 1, 0, 1

57. Booth's coding in 8 bits for the decimal number -57 is:

a. 0-100+ 1000
b. 0-100+ 100-1
c. 0-1+ 100-10+ 1
d. 00-10+100-1

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58. Aging registers are:

a. Counters which indicate how long ago their associated pages have been referenced.
b. Registers which keep track of when the program was last accessed.
c. Counters to keep track of last accessed instruction.
d. Counters to keep track of the latest data structures referred.

59. Which of the following Special purpose register holds the address of next instructions to be executed ?

a. Instruction Register
b. Stack pointer
c. Program Counter
d. Base Register

60. If L1 and L2 are context free language and R a regular set, then which one of the languages below is not necessarily a context free language?

a. L_1L_2
b. $L_1 \cap L_2$
c. $L_1 \cap R$
d. $L_1 \cup L_2$

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61. Any string of terminals that can be generated by the following CFG is:

S--> XY

X--> ax | bX | a

Y--> Ya | Yb | a

a. Has at least one 'b'
b. Should end in a 'a'
c. Has no consecutive a's or b's
d. Has at least two a's

62. A language is represented by a regular expression (a)*(a+ba). Which of the following string does not belong to the regular set represented by this expression.

a. aaa
b. aba
c. aa
d. ababa

63. If G = ({S}, {a}, {S -> SS), S), then language generated by G is:

a. $L(G) = \varphi$
b. $L(G) = a^n$
c. $L(G) = a^*$
d. $L(G) = a^n b a^n$

64. Statement 1: Mealy machine reacts faster to inputs.

Statement 2: Moore machine has more circuit delays.

Choose the correct option:

a. Statement 1 is true but Statement 2 is false
b. Statement 1 is false and Statement 2 is true
c. Statement 1 is true and Statement 2 is true
d. None of the mentioned is true

65. If language L={0, 1}*, then the reversed language L^R =

a. {0,1}*
b. {}
c. {0}*
d. {1}*

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66. Consider the following problems:

(i) Whether a finite state automaton halts on all inputs?
(ii) Whether a given context free language is regular?
(iii) Whether a Turing machine computes the product of two numbers?

Which one of the following is correct?

a. Only (i) and (iii) are w1decidable problems
b. Only (ii) and (iii) are undecidable problems
c. Only (i) and (ii) are undecidable problems
d. (i), (ii) and (iii) are undecidable problems

67. Which one of the following regular expressions is NOT equivalent to the regular expression (a + b + c) *?

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

b. $(a^*b^*c^*)^*$

c. $((ab)^* + c^*)^*$

d. $(a^*b^* + c^*)^*$

68. Suppose Ml and M2 are two Turing Machine 's such that L(Ml) = L(M2). Then

a. On every input on which M l doesn't halt, M2 doesn't halt too

b. On every i/p which M l accepts, M2 halts

c. On every i/p on which M l halts, M2 halts too

d. On every i/p on which M2 halts, M2 accepts

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69. Which of the following parser is a top-down parser?

a. An LALR parser

b. A LR parser

c. Operator precedence parser

d. Recursive descent parser

70. Given the following expression gram mar:

E --> E * F | F + E | F

F --> F - F | id

Which of the following is true?

a. * has higher precedence than +

b. - has higher precedence than *

c. + and -have same precedence

d. + has higher precedence than *

71. Consider the grammar with non-terminals N = {S,C,Sl },terminals T={a,b,i,t,e}, with S as the start symbol, and the following set of rules :

S --> iCtSS1|a

Sl --> eS|∈

c --> b

The grammar is NOT LL(l) because:

a. it is ambiguous

b. it is left recursive

c. it is right recursive

d. it is not context-free

72. Consider the translation scheme shown below

s →T R

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R→+ T {print ('+');} R | ε

T →num {print (num.val);}

Here num is a token that represents an integer and num. val represents the corresponding integer value. For an input string '9 + 5 + 2', this translation scheme will print

a. 9 + 5 + 2

b. 9 5 + 2 +

c. 9 5 2 + +

d. + + 9 5 2

SHOT ON MI 10I

73. Which of the following statements is false?

a. An LL(1) parser is a top-down parser

b. LALR is more powerful than SLR

c. An unambiguous grammar has same leftmost and rightmost derivation

d. An ambiguous grammar can never be LR(k) for any k

74. *The output of a lexical analyzer is:*

a. A parse tree

b. Intermediate code

c. Machine code

d. A stream of tokens

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75. Consider the following grammar:

A → cAd A → ab/ac/a

For Input string cad, how many times the recursive descent parser will backtrack?

a. 2

b. 3

c. 4

d. 5

76. Which one of the following is a synchronization tool?

a. Thread

b. Pipe

c. Semaphore

d. Socket

77. The remote method invocation _____.

a. allows a process to invoke memory on a remote object

b. allows a thread to invoke a method on a remote object

c. allows a thread to invoke memory on a remote object

d. allows a process to invoke a method on a remote object

78. Which of the following scheduling algorithms is non-preemptive?

a. Round Robin

b. First- In First-Out

c. Multi level Queue Scheduling

d. Multilevel Queue Scheduling with Feed back

79. A process executes the code

fork ();

fork ();

fork ();

$2^n - 1 = 2^3 - 1 =$

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The total number of child processes created is

a. 3

b. 4

c. 7

d. 8

OT ON MI 10I

80. 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 now in the reverse order. How many page faults will occur?

a. 195
b. 192
c. 197
d. 196

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81. Consider a disk system with 100 cylinders. The requests to access the cylinders occur in following sequence:

4, 34, 10, 7, 19, 73, 2, 15, 6, 20

Assuming that the head is currently at cylinder 50, what is the time taken to satisfy all requests if it takes 1ms to move from one cylinder to adjacent one and shortest seek time first policy is used?

a. 119ms
b. 95ms
c. 233ms
d. 276ms

82. An operating system uses Shortest Remaining Time first (SRT) process scheduling algorithm. Consider the arrival times and execution times for the following processes :

Process	Execution Time	Arrival Time
P1	20	0
P2	25	15
P3	10	30
P4	15	45

What is the total waiting time for process P2?

a. 15 b. 20

c. 40 d. 55

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83. 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 values of N could lead to a deadlock?

a. 2 b. 3

c. 6 d. 1

84. What is Granularity ?

a. The size of database b. The size of data item

c. The size of record d. The size of file

85. Consider a schema R(A, B, C, D) and functional dependencies A->B and C->D. Then the decomposition R1 (A, B) and R2(C, D) is:

a. Lossless Join

b. Dependency preserving and lossless join

c. Lossless Join but not dependency preserving

d. Dependency preserving but not lossless join

86. Which of the following is an optimistic concurrency control method?

a. Time stamp ordering

b. Lock-based

c. Validation based

d. None of these

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87. Suppose R is a relation schema and F is a set of functional dependencies on R. Further, suppose R1 and R2 form a decomposition of R. Then the decomposition is a lossless join decomposition of R provided that:

a. $R1 \cap R2 \rightarrow R1$ is in F+

b. $R1 \cap R2 \rightarrow R2$ is in F+

c. at least one from $R1 \cap R2 \rightarrow R1$ and $R1 \cap R2 \rightarrow R2$ is in F+

d. both $R1 \cap R2 \rightarrow R1$ and $R1 \cap R2 \rightarrow R2$ functional dependencies are in F+

88. Match the following:

Set-I

I. 2 NF

II. 3 NF

III. 4 NF

IV. 5 NF

Set-II

(a) transitive dependencies eliminated

(b) multivalued attribute removed

(c) contain no partial functional dependencies

(d) contains no join dependency

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Codes :

	I	II	III	IV
a.	(a)	(c)	(b)	(d)
b.	(d)	(a)	(b)	(c)
c.	(c)	(d)	(a)	(b)
d.	(d)	(b)	(a)	(c)

89. Consider a schema R(A, B, C, D) and functional dependencies A->B and C->D. Then the decomposition RI (A, B) and R2(C, D) is:

a. Dependency preserving but not lossless join

b. Dependency preserving and lossless join

c. Lossless Join but not dependency preserving

d. Lossless Join

90. *The SQL Expression:*

Select distinct T. branch name from branch T, branch S where T. assets > S. assets and S. branch-city = DELHI, finds the name of:

a. All branches that have greater assets than allocated in DELHI.

b. The branch that has the greatest asset in DELHI.

c. Any branch that has greater asset than any branch located in DELHI.

d. All branches that have greater asset than any branch located in DELHI.

91. Match the following :

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(a)	Create	(i)	The E-R Model	
(b)	Select	(ii)	Relationship Model	
(c)	Rectangle	(iii)	DDL	
(d)	Record	(iv)	DML Codes :	

	(a)	(b)	(c)	(d)
a.	(iv)	(iii)	(ii)	(i)
b.	(iii)	(iv)	(i)	(ii)
c.	(iv)	(iii)	(i)	(ii)
d.	(iii)	(iv)	(ii)	(i)

92. The Reverse address resolution protocol (RARP) is used for:

a. Finding the IP address from the DNS

b. Finding the IP address of the default gateway

c. Finding the IP address that corresponds to a MAC address

d. Finding the MAC address that corresponds to an IP address

93. The value of 19^{-1} mod 91 is:

a. 11 b. 23

c. 24 d. 59

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94. A class B network address 130.50.0.0 is submitted as follows. The last 10 bits of the host ID are allotted for host number and the remaining 6 bits are reserved for subnet number. what are the first hosts address of 1st and 4th subnets?

a. 130.50.4.1 and 130.50.16.1 b. 130.50.1.1 and 130.50.4.1

c. 130.50.0.0 and 130.50.3.0 d. 130.50.10.1 and 130.50.14.0

95. An IP packet has arrived with the first few hexadecimal digits as shown below:

45000028000100000102 . . .

How many hops can this packet travel before being dropped?

a. 5 b. 4

c. 2 d. 1

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96. If we want to implement a mechanism that automates the IP configuration, including IP address, subnet mask, default gateway, and DNS inf01mation. Which protocol will you use to accomplish this?

a. SMTP
b. DHCP
c. ARP
d. SNMP

97. *Which of the following is a private key cryptography?*

a. MD5
b. AES
c. RSA
d. Diffie-Hellman

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98. Packets of the same session may be routed through different paths in :

a. TCP, but not UDP
b. UDP, but not TCP
c. TCP and UDP
d. Neither TCP nor UDP

99. The bandwidth of the line is 1.5 Mbps with round trip time (RTT) as 45 milliseconds. If the size of each packet is 1 KB (kilobytes), then what is the efficiency in Stop and wait protocol?

a. 10.8
b. 21.6
c. 5.4
d. 11.6

100 Which of the following cryptographic technique may be used for the generation of Digital signature?

a. DES

b. AES

c. Play- fair

d. EIGamal

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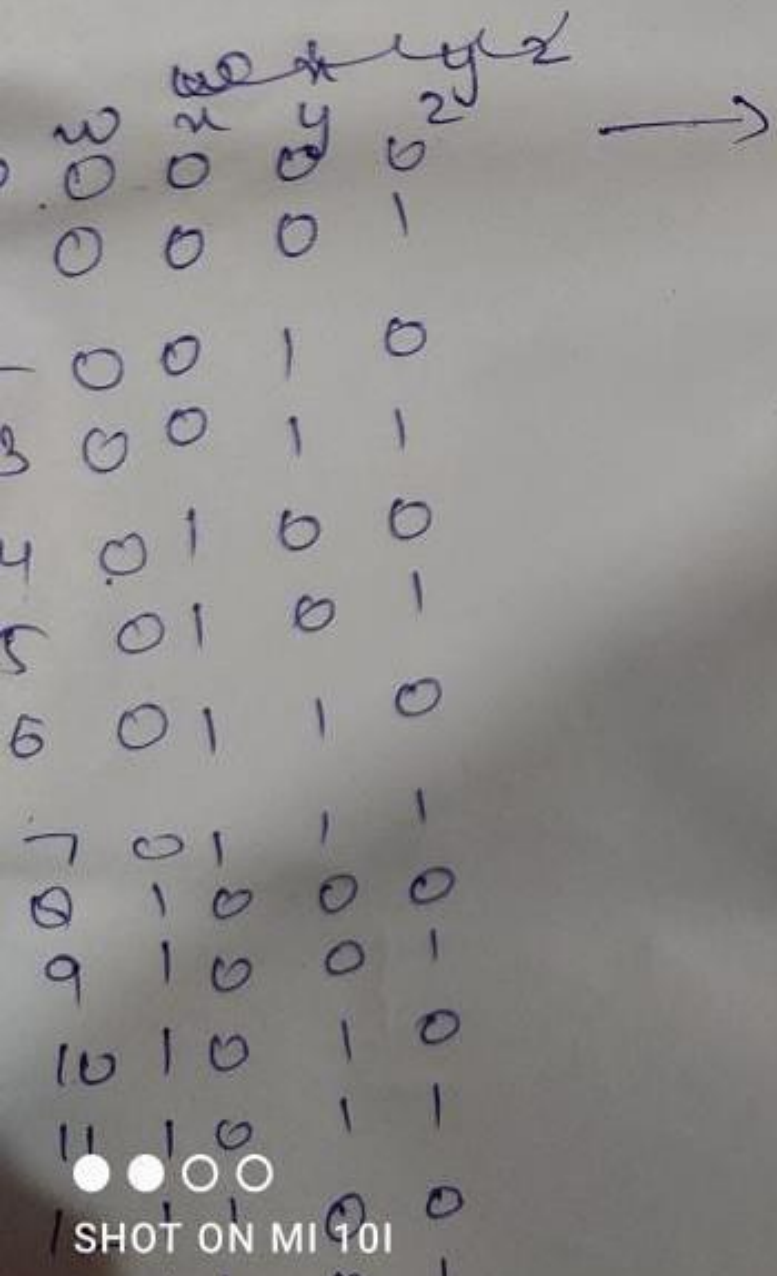

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