ME1315

COMPUTER SCIENCE & INFORMATION TECHNOLOGY
Paper - 2

502

Series A

Sl.No. ; 311305

Duration : 150 Minutes   Max. Marks : 300

INSTRUCTIONS TO CANDIDATES

1. Please check the Test Booklet immediately on opening and ensure that it contains all the 150 multiple choice questions printed on it.

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1   [P.T.O.

1) Which of the following are partitions of $\{1,2,......8\}$?
   - (1) $\{\{1,3,5\},\{1,2,6\},\{4,7,8\}\}$
   - (2) $\{\{1,3,5\},\{2,6,7\},\{4,8\}\}$
   - (3) $\{\{1,3,5\},\{2,6\},\{2,6\},\{4,7,8\}\}$
   - (4) $\{\{1,5\},\{2,6\},\{4,8\}\}$

2) Let $S = \{1,2,...,n\}$. Let S_1 be the set of all subsets of S that contain 1. Let T_1 denote the set of all subsets of S that don't contain 1. Which of the following statement is correct?
   - (1) $|T_1| = |S_1| = 2^{(n-1)}$
   - (2) $|T_1| \neq |S_1|$
   - (3) $|T_1| + |S_1| = 2^{(n-1)}$
   - (4) $|T_1| + |S_1| = 2^n$

3) Let $A = \{0,1\} \times \{0,1\}$ and $B = \{a,b,c\}$. Suppose A is listed in lexicographic order based on $0 < 1$ and B is in alphabetic order. If $A \times B \times A$ is listed in lexicographic order, then the next element after $((1,0), c, (1,1))$ is _____.
   - (1) $((1,0), a, (0,0))$
   - (2) $((1,1), c, (0,0))$
   - (3) $((1,1) a, (0,0))$
   - (4) $((1,1), a, (1,1))$

4) Let $P(A)$ denote the power set of A. If $P(A) \subseteq B$ then
   - (1) $2^{|A|} \leq |B|$
   - (2) $2^{|A|} \geq |B|$
   - (3) $2^{|A|} \geq 2^{|B|}$
   - (4) $2|A| < |B|$

5) The inverse of the function $f(x) = x^2 - 5$ is
   - (1) $f^{-1}(y) = \sqrt{y+5}$
   - (2) $f^{-1}(y) = \sqrt{y-5}$
   - (3) $f^{-1}(y) = \sqrt{y} - 5$
   - (4) $f^{-1}(y) = \sqrt{y} + 5$

6) Let $D_{30} = \{1,2,3,5,6,10,15,30\}$ and let the relation $/$ (divides) be a partial order relation on D_{30}. Which of the following statements is correct?
   - (1) All the lower bounds of 10 and 15 are 1,2,3,5,6
   - (2) All the lower bounds of 10 and 15 are 1,2,3,5
   - (3) All the lower bounds of 10 and 15 are 1,5
   - (4) All the lower bounds of 10 and 15 are 2,3,5

7) Let $P(S)$ be the power set of $S = \{1,2,3\}$, and then define a lattice L under partial ordering of set inclusion induced on $P(S)$. Which of the following sets are the sub-lattices of L.
   $A = \{\phi, \{1,2\}, \{2,3\}, \{1,2,3\}\}$
   $B = \{\phi, \{1\},\{1,2\}, \{1,2,3\}\}$
   $C = \{\phi, \{3\}, \{1,3\}, \{1,2,3\}\}$
   $D = \{\{1\}, \{3\}, \{1,3\}, \{1,2,3\}\}$
   $E = \{\phi,\{3\}, \{1,2\}, \{1,2,3\}\}$
   - (1) A and D are sub-lattices of L
   - (2) B and C are sub-lattices of L
   - (3) A is a sub-lattice of L
   - (4) D is a sub-lattice of L

8) In a 5-variable Boolean function, what are the "*minterms*" that differ from m_{20} by one literal?
   - (1) $m_0, m_5, m_{10}, m_{15}, m_{25}$
   - (2) $m_4, m_8, m_{16}, m_{24}, m_{28}$
   - (3) $m_4, m_{16}, m_{21}, m_{22}, m_{28}$
   - (4) $m_4, m_{21}, m_{22}, m_{24}, m_{28}$

9) Given the Boolean function $J(A, B, C) = \sum (0,1,7) + d(2,5,6)$, which of the following sum of products expressions (not necessarily minimal) represent $J(A, B, C)$?

    (i) $A'B' + AB$

    (ii) $A'B' + BC$

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

    (iv) $A'B' + AC$

    (v) $A'B' + ABC$

    (1)   (i), (ii) and (iii)   (2)   (iii), (iv) and (v)

    (3)   (i), (ii), (iv) and (v)   (4)   (i), (iii), (iv) and (v)

10) A group has 11 elements. The number of proper sub-groups it can have is

    (1)   0   (2)   4   (3)   5   (4)   8

11) Which of the following techniques can be used to counter the problem of external fragmentation that occurs in dynamic partitioning memory management?

    (1)   Compaction   (2)   Segmentation   (3)   Swapping   (4)   Splitting

12) The addresses generated by a particular program in a pure demand paging system with 100 records per page and one free main memory frame are as follows

    0100, 0200, 0420, 0489, 0510, 0530, 0599, 0120, 0220, 0230, 0260, 0320, 0370

    The number of page faults generated in order to execute the program is

    (1)   13   (2)   8   (3)   7   (4)   10

13) In the process state transition diagram, transition from running to ready state indicates that

    (1)   the running process is preempted by a higher priority process

    (2)   the running process initiated an input/output operation

    (3)   the running process is blocked for a semaphore operation

    (4)   that the OS is not ready to service the running process

14) Which of the following activities is not done by memory management?

    (1)   Keep an account of which parts of memory are currently being used by each of the processes

    (2)   Decide which processes are to be brought into memory when memory space becomes available

    (3)   Allocate and de-allocate memory space as needed

    (4)   Storage allocation

15) Which of the following statements is incorrect with regard to operating system design?

    (1)   Layered approach is easy to design and debug

    (2)   Layered approach is less efficient

    (3)   Changes to the kernel tend to be fewer with microkernel approach

    (4)   Microkernels are less secure and reliable

16) When a process creates a new process using the *fork* () operation, then which of the following structures are shared between the parent process and the child process?
   (1) Stack
   (2) Heap
   (3) Shared Memory Segments
   (4) Stack, Heap and Shared Memory Segments

17) Which of the following statements is incorrect with respect to threads?
   (1) User-level threads are unknown by the kernel
   (2) Kernel threads are more expensive
   (3) User-level threads are more expensive
   (4) Thread creation uses fewer resources than process creation

18) Semaphore can be used for _____.
   (1) detecting deadlock
   (2) process synchronization
   (3) process scheduling
   (4) defining priority of the processes

19) Which scheduler controls the degree of multiprogramming?
   (1) Short-term scheduler
   (2) Long-term scheduler
   (3) Middle-term scheduler
   (4) Disk Scheduler

20) Let S and Q be two semaphores initialized to 1, where P_0 and P_1 are the processes defined as follows:

   Process P_1 Process P_2
   wait (S);   wait(Q);
   wait(Q);   wait(S);
     ---;   ----;
   signal(S);   signal(Q);
   signal(Q);   signal(S);

   Which one of the following statements is correct with respect to the above construct?
   (1) Causes starvation
   (2) Causes livelock
   (3) Causes a deadlock
   (4) Does not ensure mutual exclusion

21) The number of address and data lines for a memory of $4K \times 16$ is:
   (1) 12 and 16
   (2) 10 and 16
   (3) 12 and 12
   (4) 16 and 16

22) The instruction of a micro programmed control unit is called as
   (1) micro-instruction
   (2) micro-operation
   (3) machine instruction
   (4) micro-program

23) Suppose that a bus has 16 data lines and requires 4 cycles of 250nsecs each to transfer data. The bandwidth of this bus would be 2 Megabytes/sec. If the cycle time of the bus was reduced to 125nsecs and the number of cycles required for transfer stayed the same what would the bandwidth of the bus?
   (1) 1 Megabyte/sec
   (2) 4 Megabytes/sec
   (3) 8 Megabytes/sec
   (4) 2 Megabytes/sec

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[P.T.O.

24) In a memory-mapped I/O system, which of the following will not be there?

(1) LOAD   (2) IN   (3) OUT   (4) ADD

25) In signed-magnitude binary division, if the dividend is $(11100)_2$ and divisor is $(10011)_2$ then the result is

(1) $(00100)_2$ (2) $(10100)_2$ (3) $(11001)_2$ (4) $(01100)_2$

26) How many RAM chips of size 8K×16 are required to build 1 Megabyte memory?

(1) 128   (2) 64   (3) 32   (4) 16

27) How many 1's are present in 5×512+3×64+7×8+4

(1) 9   (2) 8   (3) 7   (4) 6

28) In a 32-bit floating-point format, the leftmost bit stores the sign of the number. The exponent value is stored in the next eight bits. A bias of 127 is subtracted from the field to get the true exponent value. The base is assumed to be 2. The format stores a normalized floating-point number, with the left-most being implicit. Thus remaining 23 bits are used to store 24-bit significand. What is the highest positive integer that can be represented

(1) 2^{128} (2) $(2-2^{-23})\times 2^{128}$ (3) 2^{127} (4) $(2-2^{-23})\times 2^{127}$

29) Listed below are some of the Operating System abstractions and related hardware components:

i.   Thread   p)   Interrupt

ii.   Virtual   q)   Memory

     Address Space   r)   CPU

iii.   File System   s)   Disk

iv.   Signal

Which of the following correctly relates the Operating System abstractions and related hardware components?

(1) i-p ii-q iii-r iv-s   (2) i-r ii-s iii-q iv-p

(3) i-r ii-q iii-s iv-p   (4) i-r ii-p iii-q iv-s

30) A non-pipeline system takes 50ns to process a task. The same task can be processed in six-segment pipeline with a clock cycle of 10ns. What is the speed-up ratio of the pipeline for 100 tasks?

(1) 4.76ns   (2) 40ns   (3) 40.76ns   (4) 1ns

31) An interface that provides I/O transfer of data directly to and from the memory unit and peripheral is termed as

(1) DMA   (2) UART   (3) USRT   (4) Serial Interface

32) Which of the following normal forms eliminates the anomalies of multivalued dependencies?
   (1) 3NF   (2) BCNF   (3) 4NF   (4) 5NF

33) Which one of the following state transitions is made when the transaction has been rolled back and the database is restored to the state prior to the start of the transition?
   (1) Active→Partially Committed   (2) Active→Committed
   (3) Active→Aborted   (4) Partially Committed→Committed

34) Consider relations R(A,B) and S(C,D); and the following SQL query.
   Select distinct A,B,
   from R,S
   Under what conditions the result is guaranteed to be same as R.
   (1) R has no duplicate and S is non-empty
   (2) R and S have no duplicates
   (3) S has no duplicates and R is non-empty
   (4) R and S have the same number of tuples

35) Let $R = (A, B, C, D)$ and $F = \{A \to B, A \to C, BC \to D\}$, then which of the following is correct?
   (1) $B \to D$ (2) $A \to B$ (3) $A \to D$ (4) $D \to A$

36) Which one of the following relational algebra transformations is incorrect?
   (1) $\sigma_{C1}(\sigma_{C1}(R)) \to \sigma_{C2}(\sigma_{C2}(R))$ (2) $\sigma_C(\pi_A(R)) \to \pi_A(\sigma_C(R))$
   (3) $\sigma_c(R \cup S) \to \sigma_c(R) \cup \sigma_c(S)$ (4) $\sigma_C(R) \to \pi_A(R)$

37) If relation R has m tuples and S has n tuples, what is the maximum and minimum number of tuples in $R \bowtie S$?
   (1) $m + n$ and 0   (2) mn and 0
   (3) $m + n$ and $|m - n|$ (4) mn and $m + n$

38) The referential integrity rule requires that
   (1) Every null foreign key value must reference an existing primary key value.
   (2) It makes it possible for an attribute to have a corresponding value.
   (3) Every non-null foreign key value must reference an existing primary key value.
   (4) It makes it possible to delete a row in one table whose primary key does not have a matching foreign key value in another table.

39) Which of the following statements is correct?
   (1) Every relation in 2NF is also in BCNF
   (2) Every relation in BCNF is also in 3NF
   (3) No relation can be in both BCNF and 3NF
   (4) Every relation is 2NF is also in 3 NF

40) Consider the schedule S and determine which one of the following schedules is conflict equivalent schedule to S.

$S: R_1(X); R_2(Z); R_1(Z); R_3(X); R_3(Y); W_1(X); W_3(Y); R_2(Y); W_2(Z); W_2(Y)$

(1) T1→T2→T3   (2) T2→T1→T3

(3) T3→T1→T2   (4) T3→T2→T1

41) Which one of the following file organization techniques provides very fast direct access?

(1) Hashed File Organization   (2) B-Tree Organization

(3) B+ Tree Organization   (4) Indexed-Sequential File Organization

42) Consider the following functions

$$f(n) = 3n^{\sqrt{n}}$$

$$g(n) = 2^{\sqrt{n}\log_2 n}$$

$$h(n) = n!$$

(1) $h(n) = O(f(n))$ (2) $h(n)$ is $O(g(n))$

(3) $g(n)$ is not $O(f(n))$ (4) $f(n)$ is $O(g(n))$

43) Which one of the following recurrence relation denotes the running time of selection sort algorithm.

(1) $T(n) = 2T(n/2) + cn$ (2) $T(n) = T(n-1) + cn$

(3) $T(n) = T(n-1) + c$ (4) $T(n) = 2T(n/2) + c$

44) Match the following:

a. Divide and Conquer   i.   Graph Coloring

b. Dynamic Programming   ii.   Travelling Salesperson Problem

c. Backtracking   iii.   Quicksort

(1) a:iii; b:i; c:ii   (2) a:iii; b:ii; c:i

(3) a:ii; b:iii; c:i   (4) a:ii; b:i; c:iii

45) Which one of the following statements is correct?

i) The Euler tour of a graph can be determined in polynomial time

ii) The Hamiltonian cycle can be determined in polynomial time.

iii) Determining whether a directed graph has a Euler tour is NP-complete

iv) Determining whether a directed graph has a Hamiltonian cycle is NP-complete

(1) (i) and (ii)   (2) (i) and (iv)

(3) (ii) and (iii)   (4) (iii) and (iv)

46) Which of the following statements is incorrect?

   (1) If the output of one polynomial-time algorithm is fed into the input of another, the composite algorithm is polynomial

   (2) Halting problem is NP-hard problem

   (3) Travelling salesperson problem has a polynomial time algorithm

   (4) Satisfiability problem is np-complete

47) Which one of the algorithms obtains global optimal solutions?

   (1) Greedy algorithm   (2) Dynamic Programming

   (3) Greedy algorithm and Dynamic Programming   (4) Divide and Conquer

48) Consider a hash function $h(k) = k \bmod 9$ and a hash table consisting of 9 slots, where the collisions are resolved by chaining. If the following keys are inserted in the order: 5, 28, 19, 15, 20, 33, 12, 17, 10, then what are the maximum, minimum and average chain lengths for the given instance.

   (1) 3, 0, and 1   (2) 3, 3, and 3   (3) 4, 0, and 1   (4) 3, 0, and 2

49) What is the time complexity of depth first search traversal of a graph consisting of n vertices and m edges represented using adjacency list?

   (1) $O(n)$ (2) $O(m+n)$ (3) $O(n^2)$ (4) $O(mm)$

50) What is the time complexity of Kruskal's algorithm for finding the minimum spanning tree of an undirected graph containing n vertices and m edges?

   (1) $O(n)$ (2) $O(m+n)$ (3) $O(n^2)$ (4) $O(m \log n)$

51) The maximum window size for data transmission using selective reject protocol with n-bit frame sequence is

   (1) 2^n (2) 2^{n-1} (3) $2^n - 1$ (4) 2^{n-2}

52) Which of the following is not a client-server application

   (1) Internet chat   (2) Web browsing

   (3) E-mail   (4) Ping

53) In Ethernet when Manchester encoding is used, the bit rate is

   (1) Half the baud rate   (2) Twice the baud rate

   (3) Same as the baud rate   (4) Thrice the baud rate

54) In a network of LANs connected by bridges, packets are sent from one LAN to another through intermediate bridges. Since more than one may exist between two LANs, packets may have to be routed through multiple bridges. Why is the spanning tree algorithm used for bridge-routing?

   (1) For shortest path routing between LANs   (2) For avoiding loops in the routing paths

   (3) For fault tolerance   (4) For minimizing collisions

[P.T.O.

55) Which of the following functionalities must be implemented by a transport protocol over and above the network protocol?

(1) Recovery from packet losses   (2) Detection of duplicate packets

(3) Packet delivery in the correct order   (4) End to end connectivity

56) An organization has a class B network and wishes to form subnets for 64 departments. The subnet mask would be:

(1) 255.255.0.0   (2) 255.255.64.0

(3) 255.255.128.0   (4) 255.255.252.0

57) What is the maximum size of data that the application layer can pass on to the TCP layer below?

(1) Any size   (2) 2^{16} bytes-size of TCP header

(3) 2^{16} bytes   (4) 1500 bytes

58) The subnet mask for a particular network is 255.255.31.0. Which of the following pairs of IP addresses could belong to this network

(1) 172.57.88.62 and 172.56.87.233   (2) 10.35.28.2 and 10.35.29.4

(3) 191.203.31.87 and 191.234.31.88   (4) 128.8.129.43 and 128.8.161.55

59) In an IPv4 datagram, the M bit is 0, the value of HLEN is 10, the value of total length is 400 and the fragment offset value is 300. The position of the datagram, the sequence numbers of the first and the last bytes of the payload, respectively are

(1) Last fragment, 2400 and 2789   (2) First fragment, 2400 and 2759

(3) Last fragment, 2400 and 2759   (4) Middle fragment, 300 and 689

60) Consider different activities related to email

m1: Send an email from a mail client to a mail server

m2: Download an email from mailbox server to a mail client

m3: Checking email in a web browser

What is the application level protocol used in each activity?

(1) M1:HTTP m2: SMTP m3:POP   (2) m1:HSMTP m2: FTP m3:HTTP

(3) m1:SMTP m2: POP m3:HTTP   (4) m1:POP m2: SMTP m3: IMAP

61) A computer on a 10 Mbps network is regulated by a token bucket. The token bucket is filled at a rate of 2Mbps. It is initially filled to capacity with 16 Megabits. What is the maximum duration for which the computer can transmit at the full 10 Mbps?

    (1)   1.6 sec   (2)   2 sec   (3)   5 sec   (4)   8 sec

62) The process of defining a problem in terms of few steps and then exploring each of the steps further is known as

    (1)   step-wise refinement   (2)   modularization

    (3)   Integration   (4)   Divide and Conquer

63) The following program is to be tested for statement coverage,

```
begin
f(a=b)
{
S1;
exit;
}
else if (c=d)
{
s2;
}
else
{
S3;
exit;
}
s4
end
```

The test cases T1,T2,T3 and T4 given below are expressed in terms of the properties satisfied by the values of variables a, b, c & d. The exact values are not given:

T1: a, b, c &d are all equal

T2: a ,b, c & d are all distinct

T3: a=b & c!=d

T4: a!=b & c=d

Which of the test suites given below ensures coverage of statement S1,S2, S3 & S4

    (1)   T1,T2,T3   (2)   T2,T3   (3)   T3,T4   (4)   T1,T2,T4

64) Which of the following statements is FALSE?

    (1)   HTTP runs over TCP

    (2)   HTTP describes the structure of web pages

    (3)   HTTP allows information to be stored in URL

    (4)   HTTP can be used to test the validity of a hypertext link

[P.T.O.

65) Consider the HTML table definition given below:

```
<table border=1>
<tr><td rowspan=2>ab</td>
<td colspan=2>cb</td>
</tr>
<tr><td>ef</td>
<td rowspan=2>gh</td>
</tr>
<tr><td colspan=2>ij</td>
</tr>
</table>
```

The number of rows in each column and the number of columns in each row are:

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

(3)   (2,3,2) and (2,3,2)   (4)   (2,3,2) and (2,2,3)

66) The language represented by the regular expression $1*01* + 1* + 1*01*01*$ is

(1)   All strings over {0,1} which contains exactly one zero

(2)   All strings over {0,1} which contain at least two zeros.

(3)   All strings over {0,1} which contain at most two zeros

(4)   All strings over {0,1} containing exactly two zeros

67) In CSMA/CD, after the 4th collision, what is the probability that the node will attempt to retransmit immediately?

(1)   0.0625   (2)   0.5   (3)   0.125   (4)   0.25s

68) An array of 32 bit integers is stored in a byte addressable memory starting from the location 2000H. The size of the array is 100. If the index addressing   is used to access the array elements, what would be the contents of index register?

(1)   100   (2)   4   (3)   32   (4)   2000H

69) Which of the following statements is incorrect?

(1)   Every recursively enumerable language is recursive

(2)   The union of two recursively enumerable languages is recursively enumerable

(3)   The union of two recursive languages is recursive enumerable language

(4)   If the language L and it's complement L' are recursively enumerable then L is recursive

70) The entity integrity rule requires that

(1)   All primary key entries are unique

(2)   A part of the key may be null

(3)   Foreign key values do not reference primary key values

(4)   Duplicate object values are allowed

71) Let $L_1 = \{ba, ab\}$, $L_2 = \{a, b\}$ be two languages, then the length of the minimum string in $L_1 L_2 *$ is

(1) 0   (2) 1   (3) 2   (4) 3

72) Consider the languages $L_1 = \{a^i b^j \mid i = j\}$ and $L_2 = a_i b_j \mid i \neq j\}$, then which of the following statements is correct?

(1) Both L_1, L_2 are regular languages

(2) L_1 is Context Free Language but L_2 is Regular

(3) L_2 is CFL but L_1 is Regular

(4) Both L_1, L_2 are context free languages

73) Number of strings in the language represented by the Regular expression $(0 + 1)(0 + 1)1(0 + 1)$ is

(1) 4   (2) 6   (3) 8   (4) 16

74) The chromatic number of null graph N_n is

(1) 0   (2) 1   (3) 2   (4) 3

75) Booth's algorithm is used to _____ signed numbers (2's complement)

(1) add   (2) subtract   (3) multiply   (4) divide

76) A connected graph contains 'n' vertices and 'm' edges then circuit rank is

(1) $n-m$ (2) $m-(n-1)$ (3) $n-(m-1)$ (4) $m+n$

77) A connected planar graph has 35 regions with degree 6 each, then number of vertices is _____

(1) 35   (2) 70   (3) 72   (4) 96

78) Which of the following minimal spanning tree algorithm assures connectivity of tree at all steps?

(1) Kruskal   (2) Prims   (3) Both Kruskal and Prims   (4) Dijkstra

79) If G is a connected plane graph with E edges, V vertices and R regions, then the following is true

(1) $|V| - |E| = 2$ (2) $|V| - |E| + |R| = 1$

(3) $|V| - |E| = 2 + |R|$ (4) $|V| + |R| = |E| + 2$

80) The minimum number of colours required to colour any connected planar graph is

(1) 3   (2) 4   (3) 5   (4) Connot decide

81) The number of ways of placing 7-similar balls in 5 distinct boxes is

(1) C(11,7)   (2) C(12,7)   (3) C(11,5)   (4) C(12,5)

82) The number of ways of forming 5-member committee consisting of 2 girls and 3 boys from 10 girls and 20 boys

(1) C(10,2)+C(20,3)

(2) P(10,2)+P(20,3)

(3) P(10,2)P(20,3)

(4) C(10,2)C(20,3)

83) How many terms will be there in the expansion of $(x+y+z)^6$

(1) 15 (2) 28 (3) 35 (4) 45

84) A shift reduce parser generates actions specified in the braces following the corresponding rule of grammar

$S \rightarrow xxS$ {PRINT "1"}

$S \rightarrow y$ {PRINT "2"}

$S \rightarrow Sz$ {PRINT "3"}

What is the translation of $xxxxyzz$ using the syntax directed translation?

(1) 23131 (2) 11231 (3) 33211 (4) none of these

85) Which one of the following is the loader function accomplished by the programmer, in an absolute loading scheme?

(i) Allocation (ii) Linking (iii) Reallocation

(1) Both (i) and (ii) (2) (i) only (3) (ii) only (4) (iii) only

86) Which one of the following statements is correct?

(1) In operator precedence parsing precedence relations are defined for every pair of a non-terminal

(2) In operator precedence parsing, precedence relations are defined for every pair of a terminal

(3) In operator precedence parsing, precedence relations are defined to delimit the handle

(4) In operator precedence parsing precedence relations are defined to delimit a statement

87) Which of the following statements is correct?

(i) LR parsers can handle a larger range of languages and grammars than LL parsing

(ii) LR parsers do not backtrack

(iii) LR parser is a bottom-up parser

(1) (i) only (2) (ii) only (3) (iii) only (4) (i), (ii) and (iii)

88) Which of the following is the most powerful parser?

(1) SLR (2) LALR

(3) Canonical LR (4) Operator-precedence

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89) A top down parser generates _____.

    (1)   Right-most derivation   (2)   Right-most derivation in reverse

    (3)   Left-most derivation   (4)   Left-most derivation in reverse

90) Which one of the following statements is correct with respect to the grammar give below?

$$S \rightarrow 1A \mid 1B$$
$$A \rightarrow 1$$
$$B \rightarrow 1$$

    (1)   LL(1) and LR(1)   (2)   LL(1) but not LR(1)

    (3)   LR(1) but not LL(1)   (4)   Neither LL(1) not LR(1)

91) Which one of the following statements is correct with respect to the grammar given below?

$$E \rightarrow E + T \mid F$$
$$T \rightarrow T * F \mid F$$
$$F \rightarrow id$$

    (1)   Both + and * are right associative   (2)   Both + and * are left associative

    (3)   + is left associative but * is right associative   (4)   * is left associative but + is right associative

92) Which of the following statement is true about Push Down Automata(PDA)?

    (1)   PDAs recognize Context-sensitive Languages

    (2)   PDAs recognize Context-free Languages

    (3)   PDAs recognize Type 1 Languages

    (4)   PDAs recognize Type 0 Languages

93) Consider the grammar G=(N,T,P,S), where N={S,A,B}, T={a,b}, P={(S→AB),(B→ab), (A→aa), (A→a), (B→b)}. Which of the following statement is true about the above grammar.

    (1)   It is Context Sensitive   (2)   It is Context free

    (3)   It is type 0 grammar   (4)   It is unrestricted language

94) What would be the speed of a processor in terms instructions per second if the processor has two types of instructions A and B. Type A instructions take 18 clock cycles and type B instructions take 8 clock cycles. Programs on an average use 20% of type A and 80% of type B instructions. The clock rate is of 1 GHz.

    (1)   1000 MIPS   (2)   10 MIPS

    (3)   100 MIPS   (4)   10000 MIPS

95) Consider the following sequence of C language statements.

    typedef int -| IntegerPointer

    IntegerPointer A,B;

    A= (IntegerPointer) malloc

    (sizeof(int));

    B= (IntegerPointer) malloc

    (sizeof(int));

    -|A = 5;

    -|B = 17;

    free (A);

    A=B;

    free (B);

The above situation wherein A contains a pointer pointing to the location that B's pointer used to point to is known as

(1) dangling pointer   (2) side effect   (3) null pointer   (4) free pointer

96) Which of the following page replacement algorithms suffers from Balody's Anomaly?

(1) Optimal replacement   (2) LRU

(3) FCFS   (4) Second Chance

97) Consider the following sequence of instructions of stack based CPU.

    PUSH a

    PUSH b

    ADD

    PUSH a

    PUSH b

    ADD

    MUL

    PUSH c

    MUL

Which of the following is implemented by the above sequence?

(1) $2c(a+b)$ (2) $2c^2(a+b)$ (3) $c(a^2+b^2)$ (4) $c(a+b)^2$

98) Which of the following is a top-down parser?

(1) Predictive recursive descent

(2) Shift-reduce

(3) Canonical LR(1)

(4) LALR(1)

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99) Consider the following code with four valid code words:

0000000000   0000011111   1111100000   1111111111

Which of the following is correct sequence of hamming distance of the above code and the number of bit errors that can be corrected using the above code?

(1)   4,2   (2)   5,2   (3)   5,3   (4)   4,3

100) List of objects together with the operations allowed on these objects is called _____.

(1)   Capability list   (2)   access list   (3)   available list   (4)   access matrix

101) What is the output of following C language code?

```
# include
<stdio.h>
int main ( )
{
static int i = 1;
tun (i);
tun (i);
tun (i);
printf ("%d", i);
}
tun (int i)
{
i++;
}
```

(1)   1   (2)   2   (3)   3   (4)   4

102) Which of the following tree need not be a binary tree

(1)   BST   (2)   AVL   (3)   Heap   (4)   B-Tree

103) Which data structure is used to implement radix sort

(1)   Stacks   (2)   Queue   (3)   Linked list   (4)   Tree

104) Which of the following sorting algorithm does not have worst case time complexity of $O(n^2)$

(1)   Bubble Sort   (2)   Quick Sort   (3)   Insertion Sort   (4)   Heap Sort

105) A decimal number has 25 digits. The number of bits needed for its equivalent binary representation is, approximately_____.

(1)   50   (2)   60   (3)   75   (4)   80

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106) Consider a set $x = \{a, b, c, d\}$. The number of binary operations that can be defined on x is

(1)   42   (2)   24   (3)   216   (4)   416

107) Consider the following C program:

```
main()
{
    int x=5;
    printf("%d,%d,%d\n",x,x<<2,x>>2);
}
```

What could be the output of the above program?

(1)   5,20,5   (2)   4,4,1   (3)   5,20,1   (4)   20,20,5

108) According to the precedence defined in the C language, arrange the operators $., ||, <, =$ in the ascending order of precedence.

(1) $., ||, <, =$ (2) $=, <, ||, .$

(3) $=, ||, <, .$ (4) $<, ||, =, .$

109) What is the output of the following programming C language code?

```
for (i=1;i<5;++i)
if (i==3) continue;
else
printf("%d", i);
```

(1)   1 2 4 5   (2)   1 2 4   (3)   2 4 5   (4)   3 3 3

110) If n has the value 3, then the statement a[++n]=n++ results in _____

(1)   a[5]=3   (2)   a[5]=4   (3)   a[4]=4   (4)   a[4]=3

111) Aliasing in the context of programming languages refers to

(1)   Multiple variables having the same memory location

(2)   Multiple variables having the same value

(3)   Multiple variables having the same identifier

(4)   Multiple use of the same variable

112) Error detection at the data link level is achieved by

(1)   bit stuffing

(2)   cyclic redundancy codes

(3)   hamming codes

(4)   equalization

113) In the carrier sense network if the prevailing condition is a 'channel busy', then which of the following statements is correct?

(1) Non-persistent CSMA results in randomized wait and sense

(2) With 1-persistent CSMA, the channel is continually sensed

(3) p-persistent CSMA results in randomized retransmission

(4) Non-persistent CSMA does not sense the channel

114) The average time required to perform a successful sequential search for an element in an array A(1:n) is given by

(1) $(n+1)/2$ (2) $\log_2 n$ (3) $n(n+1)/2$ (4) n^2

115) Consider the following C program

```
int x;

    main()
{

        int x=0;
        {
            int x=10;
            x++;
            change_x(x);
            x++;
            modify_x();
            printf("%d ",x);
        }
        x++;
        change_x(x);
        printf("%d ",x);
        modify_x();
        printf("%d\n",x);
}

modify_x()
{
        return (x+=10);
}
change_x()
{
        return(x+=1);
}
```
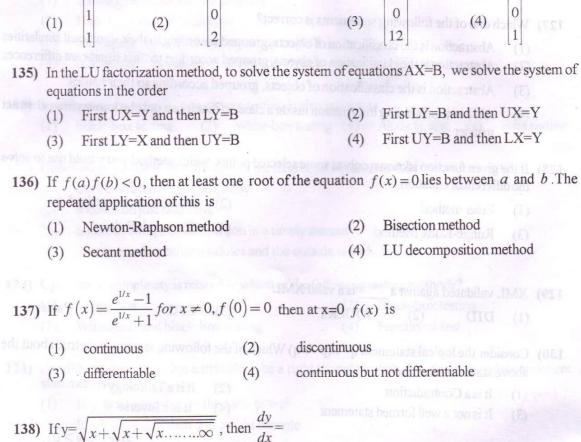
What would be the output of the above program?

(1) 23   14   24   (2) 23   1   1   (3) 13   1   1   (4) 12   1   1

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116) Average successful search time taken by binary search on a sorted array of 10 items is

    (1) 2.6   (2) 2.7   (3) 2.8   (4) 2.9

117) What is the number of comparisons required for merging two sorted lists of sizes m and n into a sorted list of size $m + n$

    (1) $O(m)$ (2) $O(n)$ (3) $O(m+n)$ (4) $O(\log n + \log m)$

118) The number of binary trees with 3 nodes which when traversed in post-order gives the sequence A, B, C is

    (1) 3   (2) 9   (3) 7   (4) 5

119) A machine needs a minimum of 100 sec to sort 1000 names by quick sort. The minimum time needed to sort 100 names will be approximately

    (1) 50.2   (2) 6.7   (3) 72.7   (4) 11.2

120) What is the disadvantage of spiral model?

    (1)   It is inefficient for smaller projects

    (2)   High amount of risk analysis

    (3)   Strong approval and documentation control

    (4)   Additional functionalities can be added later

121) In software engineering, acceptance testing is also known as

    (1) black-box testing   (2) white-box testing (3) Alpha testing   (4) Beta testing

122) Cohesion is a qualitative indication of the degree to which a module

    (1)   can be written more compactly

    (2)   focuses on just one thing

    (3)   is able to complete its function in a timely manner

    (4)   is connected to other modules and the outside world

123) Cyclomatic complexity is related to which of the following testing methods?

    (1)   White-box   (2)   Black-box testing

    (3)   White-box and black-box testing   (4)   Functional-test

124) A sufficient condition that a triangle T be a right triangle is that $a^2 + b^2 + = c^2$. An equivalent statement is

    (1)   If T is a right triangle then $a^2 + b^2 = c^2$

    (2)   If $a^2 + b^2 = c^2$ then T is a right triangle

    (3) T is a right triangle only if $a^2 + b^2 = c^2$

    (4) T is a right triangle unless $a^2 + b^2 = c^2$

125) Consider the statement, "Given that people who are in need of refuge and consolation are apt to do odd things, it is clear that people who are apt to do odd things are in need of refuge and consolation." This statement, of the form $(P \Rightarrow Q) \Rightarrow (Q \Rightarrow P)$

    (1)   People who are in need of refuge and consolation are not apt to do odd things

    (2)   People are apt to do odd things if and only if they are in need of refuge and consolation

    (3)   People who are apt to do odd things are in need of refuge and consolation

    (4)   People who are in need of refuge and consolation are apt to do odd things

126) Which of the following statements is correct?

    (1)   A ripple counter is an asynchronous counter.

    (2)   In an asynchronous counter, each state is clocked by the same pulse

    (3)   An asynchronous decade counter increases its value by ten for each clock pulse

    (4)   Asynchronous inputs will cause the flip-flop to respond immediately with regard to the clock input

127) Which one of the following statements is correct?

    (1)   Abstraction is the classification of objects, grouped according to their significant similarities

    (2)   Abstraction is the classification of objects, grouped according to their significant differences

    (3)   Abstraction is the classification of objects, grouped according to their names

    (4)   Abstraction is hiding information inside a class so that it can only be known in an abstract manner

128) If the given function isknown only at some selected points, which method you would use to solve the differential equation.

    (1)   Euler method   (2)   modified Euler method

    (3)   Runge-Kutte Method   (4)   Simpson's Rule

129) XML validated against a _____ is a valid XML

    (1)   DTD   (2)   JQUERY   (3)   CFG   (4)   Parser

130) Consider the logical statement $q \rightarrow (p \rightarrow q)$ Which of the following statements is true about the above statement?

    (1)   It is a Contradiction.   (2)   It is a Tautology

    (3)   It is not a well formed statement   (4)   It is a Inverse

131) The mean of the distribution whose probability density function $f(x) = \begin{cases} \alpha e^{-\alpha x}, x \geq 0 \\ 0, x < 0 \end{cases}$ is

    (1)   0   (2)   1   (3) $1/\alpha$ (4) α

132) For a poisson distribution

    (1) Mean = standard deviation   (2) Mean = variance

    (3) Mean = mean deviation   (4) Mean = median

133) The Eigen values of a matrix are 1,2,–1 then the sum of Eigenvalues of the inverse of that matrix are

    (1) 0   (2) 1/2   (3) 2   (4) 4

134) The possible Eigenvector of the matrix $\begin{bmatrix} 3 & 0 & -2 \\ 0 & 2 & 0 \\ -2 & 0 & 0 \end{bmatrix}$ corresponding to one of its Eigen value (-1) is

    (1) $\begin{bmatrix} 1 \\ 1 \\ 1 \end{bmatrix}$ (2) $\begin{bmatrix} 1 \\ 0 \\ 2 \end{bmatrix}$ (3) $\begin{bmatrix} -1 \\ 0 \\ 12 \end{bmatrix}$ (4) $\begin{bmatrix} 2 \\ 0 \\ 1 \end{bmatrix}$

135) In the LU factorization method, to solve the system of equations AX=B, we solve the system of equations in the order

    (1) First UX=Y and then LY=B   (2) First LY=B and then UX=Y

    (3) First LY=X and then UY=B   (4) First UY=B and then LX=Y

136) If $f(a)f(b) < 0$, then at least one root of the equation $f(x) = 0$ lies between a and b. The repeated application of this is

    (1) Newton-Raphson method   (2) Bisection method

    (3) Secant method   (4) LU decomposition method

137) If $f(x) = \dfrac{e^{1/x} - 1}{e^{1/x} + 1}$ for $x \neq 0$, $f(0) = 0$ then at x=0 $f(x)$ is

    (1) continuous   (2) discontinuous

    (3) differentiable   (4) continuous but not differentiable

138) If $y = \sqrt{x + \sqrt{x + \sqrt{x \ldots \ldots \infty}}}$, then $\dfrac{dy}{dx} =$

    (1) $1/y$ (2) $1/x$ (3) $1/(2x-1)$ (4) $1/(2y-1)$

139) $\int\limits_{-1}^{1}(x-[2x])\,dx =$

(1) 1   (2) 0   (3) 2   (4) 4

140) Consider the following C declaration

    int   (*f)();

Which of the following statements correctly interprets the above declaration?

(1) f is a function which returns an integer

(2) f is a function which returns a pointer to an integer

(3) f is a function to pointer which returns an integer

(4) f is pointer to a function which returns an integer

141) Which of the following statements is false about DNS?

(1) DNS uses TCP for its implementation

(2) DNS uses both TCP and UDP for its implementation.

(3) DNS is implemented as a distributed database system.

(4) DNS maps internet domain name onto the IP address.

142) Which of the following is the correct sequence of the statements to be executed to insert a node after a node whose address is p? The pointer field nextptr points to the next node and the address of the new node is q.

(1) p□nextptr=q;   q□nextptr=p;

(2) p□nextptr=q; q□nextptr=p□nextptr;

(3) q□nextptr=p□nextptr; p□nextptr=q;

(4) q□nextptr=p□nextptr; p□nextptr=q□nextptr;

143) A bit string, 0111101111101111110, needs to be transmitted at the data link layer. What is the string actually transmitted after the bit stuffing?

(1) 0111101111100111111100   (2) 0111101111100111111010

(3) 0111101111101111111000   (4) 0111100111110111111100

144) A channel has a bit rate of 4000 bps and a propagation delay of 20 msec. For what range of frame sizes(S) (in number of bits) does stop-and-wait protocol give an efficiency of at least 50 percent?

(1) $S \leq 160$ (2) $S \geq 160$

(3) $80 \leq S \leq 160$ (4) $S \geq 40, 20 \leq S \leq 30$

145) Which of the following sliding window protocols has the receiver window size more than 1?

(1) Stop-and-wait protocol

(2) One-bit window protocol

(3) Go-Back-N protocol

(4) Selective Repeat protocol

146) Consider building a CSMA/CD network running at 1 Gbps over a 1-km cable with no repeaters. The signal speed in the cable is 200,000 km/sec. What is the minimum frame size?

(1) 10^6 bits   (2) 64 bytes   (3) 1250 bytes   (4) 125 bytes

147) Which one of the following statements is incorrect about Count-to-infinity problem?

(1) It reacts rapidly to good news

(2) It reacts slowly to good news

(3) It reacts leisurely to bad news

(4) Distance Vector Routing suffers from Count-to-infinity problem

148) A network on the Internet has a subnet mask of 255.255.240.0. What is the maximum number of hosts it can handle?

(1) 4096   (2) 3556   (3) 4080   (4) 4094

149) Consider a transport layer with maximum segment size as 1KB. Also, consider at a particular point of time, the parameters receiver's window, congestion window are set to 1024KB, 256KB respectively, at which time, the transmission of a packet resulted in a timeout. What will be the values of congestion window and threshold respectively for the next transmission?

(1) 1024KB, 256KB

(2) 1KB, 128KB

(3) 1KB, 256KB

(4) 1024KB, 128Kb

150) Dynamic Host Configuration Protocol (DHCP) is used to:

(1) assign CIDR subnet masks to routers

(2) allocate the host part of an IP address to a host

(3) assign the network component of an IP address to a router

(4) manage the assignment of MAC addresses

⊖⊖⊖