PART–B
COMPUTER ENGINEERING

51. A bit-stuffing based framing protocol uses an 8-bit delimiter pattern of 01111110. If the output bit-string after stuffing is 01111100101, then the input bit-string is

(A) 0111110100

(B) 0111110101

(C) 0111111101

(D) 0111111111

52. Consider the following three statements about link state and distance vector routing protocols, for a large network with 500 network nodes and 4000 links

[S1] The computational overhead in link state protocols is higher than in distance vector protocols.

[S2] A distance vector protocol (with split horizon) avoids persistent routing loops, but not a link state protocol.

[S3] After a topology change, a link state protocol will converge faster than a distance vector protocol.

Which one of the following is correct about S1, S2, and S3?

(A) S1, S2, and S3 are all true

(B) S1, S2, and S3 are all false.

(C) S1 and S2 are true, but S3 is false

(D) S1 and S3 are true, but S2 is false.

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

(A) 255.255.252.0

(B) 255.255.128.0

(C) 255.255.64.0

(D) 255.255.0.0

54. If DHCP snooping is configured on a LAN switch, then clients having specific _____ can access the network.

(A) MAC address

(B) IP address

(C) Both MAC address and IP address

(D) None of the mentioned

55. 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

Which is the application level protocol used in each activity?

(A) m1: HTTP m2: SMTP m3: POP

(B) m1: SMTP m2: FTP m3: HTTP

(C) m1: SMTP m2: POP m3: HTTP

(D) m1: POP m2: SMTP m3: IMAP

56. Which one is the guideline of Referential integrity in a relationship?
    (A) Do not enter a value in the primary key field of child table if that value does not exist in the primary key of the parent table
    (B) Do not enter a value in the foreign key field of a parent table if that value does not exist in the primary key of the child table
    (C) Do not enter a value in the foreign key field of a child table if that value does not exist in the primary key of the parent table
    (D) Do not enter a value in the foreign key field of child table if that value does not exist in the foreign key of the parent table

57. Drop Table cannot be used to drop a table referenced by a _____ constraint.
    (A) Primary Key
    (B) Local Key
    (C) Foreign Key
    (D) Composite Key

58. Which of the following relational algebra operations do not require the participating tables to be union-compatible?
    (A) Union
    (B) Intersection
    (C) Difference
    (D) Join

59. Suppose a database schedule SS involves transactions T1, T2...,Tn. Construct the precedence graph of SS with vertices representing the transactions and edges representing the conflicts. If SS is serializable, which one of the following orderings of the vertices of the precedence graph is guaranteed to yield a serial schedule?
    (A) Topological order
    (B) Depth-First order
    (C) Breath-First order
    (D) Ascending order of transaction indices

60. Precedence graphs help to find a…..
    (A) Serializable schedule
    (B) Recoverable schedule
    (C) Deadlock free schedule
    (D) Cascadeless schedule.

61. Match all items in Group 1 with correct options from those given in Group 2.

    Group 1

    P. Regular expression
    Q. Pushdown automata
    R. Dataflow analysis
    S. Register allocation

    Group 2

    1. Syntax analysis
    2. Code generation
    3. Lexical analysis
    4. Code optimization

    (A) P - 4. Q - 1, R - 2, S - 3
    (B) P - 3, Q - 1, R - 4, S - 2
    (C) P - 3, Q - 4, R - 1, S - 2
    (D) P - 2, Q - 1, R - 4, S - 3

62. Consider the grammar defined by the following production rules, with two operators * and +

$S \rightarrow T*P$

$T \rightarrow U|T*U$

$P \rightarrow Q+P|Q$

$Q \rightarrow id$

$U \rightarrow id$

Which one of the following is TRUE?

(A) + is left associative, while * is right associative

(B) + is right associative, while * is left associative

(C) Both + and * are right associative

(D) Both + and * are right associative

63. In the context of abstract-syntax-tree (AST) and control-flow-graph (CFG), which one of the following is TRUE?

(A) In both AST and CFG, let node N2 be the successor of node N1. In the input program, the code corresponding to N2 is present after the code corresponding to N1

(B) For any input program, neither AST nor CFG will contain a cycle

(C) The maximum number of successors of a node in an AST and a CFG depends on the input program

(D) Each node in AST and CFG corresponds to at most one statement in the input program

64. Consider the following statements.

I. Symbol table is accessed only during lexical analysis and syntax analysis.

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

III. Errors violating the condition 'any variable must be declared before its use' are detected during syntax analysis.

Which of the above statements is/are TRUE?

(A) I and III only

(B) II only

(C) I only

(D) None of I, II and III

65. How many bits are in the "tag" filed in the cache?

(A) 6

(B) 8

(C) 5

(D) 7

66. Logical addressing system is used by which device?

(A) Hub

(B) Switch

(C) Bridge

(D) Router

67. Give the correct matching for the following pairs :

Group - 1

A. O(log n)

B. O(n)

C. O(n log n)

D. $O(n^2)$

Group - 2

P. Selection

Q. Insertion sort

R. Binary search

S. Merge sort

(A) A - R, B - P, C - Q, D - S

(B) A - R, B - P, C - S, D - Q

(C) A - P, B - R, C - S, D - Q

(D) A - P, B - S, C - R, D - Q

68. If one uses straight two-way merge sort algorithm to sort the following elements in ascending order 20, 47, 15, 8, 9, 4, 40, 30, 12, 17 then the order of these elements after the second pass of the algorithm is :

(A) 8, 9, 15, 20, 47, 4, 12, 17, 30, 40

(B) 8, 15, 20, 47, 4, 9, 30, 40, 12, 17

(C) 15, 20, 47, 4, 8, 9, 12, 30, 40, 17

(D) 4, 8, 9, 15, 20, 47, 12, 17, 30, 40

69. Let $f(n) = n^2 \log n$ and $g(n) = n(\log n)^{10}$ be two positive functions of n. Which of the following statements is correct?

(A) $f(n) = O(g(n))$ and $g(n) \neq O(f(n))$

(B) $g(n) = O(f(n))$ and $f(n) \neq O(g(n))$

(C) $f(n) \neq O(g(n))$ and $g(n) \neq O(f(n))$

(D) $f(n) = O(g(n))$ and $g(n) = O(f(n))$

70. The Floyd-Warshall algorithm for all-pair shortest paths computation is based on

(A) Greedy paradigm.

(B) Divide-and-Conquer paradigm.

(C) Dynamic Programming paradigm.

(D) Neither Greedy nor Divide-and-Conquer nor Dynamic Programming paradigm.

71. Shadow paging has…

(A) no redo

(B) no undo

(C) redo but no undo

(D) neither redo nor undo

72. A query in the tuple relational calculus is expressed as :

(A) {t | P() | t}

(B) {P(t) | t }

(C) {t | P(t)}

(D) All of the mentioned

73. Consider the following C program segment.

```
#include < stdio.h >
int main()
{
    char s1[7] = "1234", *p;
    p = s1 + 2;
   *p = '0';
    printf("%s", s1);
}
```

What will be printed by the program?

(A) 12

(B) 120400

(C) 1204

(D) 1034

74. The result evaluating the postfix expression 105+60105+60 6/*8–6/*8– is

(A) 284

(B) 213

(C) 142

(D) 71

75. A queue is implemented using an array such that ENQUEUE and DEQUEUE operations are performed efficiently. Which one of the following statements is CORRECT (n refers to the number of items in the queue)?

(A) Both operations can be performed in O(1) time

(B) At most one operation can be performed in O(1) time but the worst case time for the other operation will be $\Omega(n)$

(C) The worst case time complexity for both operations will be $\Omega(n)$

(D) Worst case time complexity for both operations will be $\Omega(\log n)$

76. In the worst case, the number of comparisons needed to search a singly linked list of length n for a given element is

(A) $\log_2 n$

(B) n/2

(C) $\log_2 n - 1$

(D) n

77. The preorder traversal of a binary search tree is 15, 10, 12, 11, 20, 18, 16, and 19. Which one of the following is the postorder traversal of the tree?

(A) 20, 19, 18, 16, 15, 12, 11, 10

(B) 10, 11, 12, 15, 16, 18, 19, 20

(C) 11, 12, 10, 16, 19, 18, 20, 15

(D) 19, 16, 18, 20, 11, 12, 10, 15

78. A B-tree of order 4 and of height 3 will have a maximum of _____ keys.

(A) 255

(B) 63

(C) 127

(D) 188

79. The division operator divides a dividend A of degree m+n by a divisor relation B of degree n and produces a result of degree

(A) m - 1

(B) m + 1

(C) m * m

(D) m

80. Consider a relation R(A,B,C,D,E) with the following functional dependencies :

ABC -> DE and

D -> AB

The number of superkeys of R is :

(A) 2

(B) 7

(C) 10

(D) 12

81. If a multivalued dependency holds and is not implied by the corresponding functional dependency, it usually arises from one of the following sources.

(A) A many-to-many relationship set

(B) A multivalued attribute of an entity set

(C) A one-to-many relationship set

(D) Both A many-to-many relationship set and A multivalued attribute of an entity set

82. In a two-level cache system, the access times of L_1 and L_2 1 and 8 clock cycles, respectively. The miss penalty from the L_2 cache to main memory is 18 clock cycles. The miss rate of L_1 cache is twice that of L_2. The average memory access time (AMAT) of this cache system is 2 cycles. The miss rates of L_1 and L_2 respectively are :

(A) 0.056 and 0.111

(B) 0.0892 and 0.1784

(C) 0.1784 and 0.0892

(D) 0.111 and 0.056

83. Consider a pipelined processor with the following four stages :

- IF: Instruction Fetch
- ID: Instruction Decode and Operand Fetch
- EX: Execute
- WB: Write Back

The IF, ID and WB stages take one clock cycle each to complete the operation. The number of clock cycles for the EX stage depends on the instruction. The ADD and SUB instructions need 11 clock cycle and the MUL instruction needs 33 clock cycles in the EX stage. Operand forwarding is used in the pipelined processor. What is the number of clock cycles taken to complete the following sequence of instructions?

ADD R2, R1, R0 R2 $\leftarrow$ R1+R0
MUL R4, R3, R2 R4 $\leftarrow$ R3*R2
SUB R6, R5, R4 R6 $\leftarrow$ R5–R4

(A) 7

(B) 10

(C) 8

(D) 14

84. A CPU has a five-stage pipeline and runs at 1 GHz frequency. Instruction fetch happens in the first stage of the pipeline. A conditional branch instruction computes the target address and evaluates the condition in the third stage of the pipeline. The processor stops fetching new instructions following a conditional branch until the branch outcome is known. A program executes 109 instructions out of which 20% are conditional branches. If each instruction takes one cycle to complete on average, the total execution time of the program is :

(A) 1.4 seconds

(B) 1.0 second

(C) 1.2 seconds

(D) 1.6 seconds

85. A multiplexer combines four 100-Kbps channels using a time slot of 2 bits. What is the bit rate?

(A) 100 Kbps

(B) 1000 Kbps

(C) 200 Kbps

(D) 400 Kbps

86. How many 3-to-8 line decoders with an enable input are needed to construct a 6-to-64 line decoder without using any other logic gates?

(A) 7

(B) 8

(C) 9

(D) 10

87. Which of the following sets can be recognized by a Deterministic Finite-state Automaton?

(A) The number 1, 2, 4,...., 2^n ^n, ... written in unary.

(B) The set of binary strings in which the number of zeros is the same as the number of ones.

(C) The set {1, 101, 11011, 1110111, …….}

(D) The number 1, 2, 4, 8……, 2^n,……. written in binary.

88. Which of the following statements in true?

(A) If a language is context free it can always be accepted by a deterministic push-down automaton

(B) The union of two context free languages is context free

(C) The intersection of two context free languages is context free

(D) The complement of a context free language is context free

89. Given an arbitrary non-deterministic finite automaton (NFA) with N states, the maximum number of states in an equivalent minimized DFA is at least.

(A) N^2

(B) 2^N

(C) 2N

(D) N!

90. Consider the following two statements:

S1: { 0^2n |n >= 1} is a regu1ar language

S2: { 0^m 0^n 0^(m+n) 1 m >= 1 and n >= 2} is a regu1ar language

Which of the following statements is correct?

(A) Only S1 is correct

(B) Only S2 is correct

(C) Both S1 and S2 are correct

(D) None of S1 and S2 is correct

91. Given the language L = {ab, aa, baa}, which of the following strings are in L*?

1. abaabaaabaa
2. aaaabaaaa
3. baaaaabaaaab
4. baaaaabaa

(A) 1, 2 and 3
(B) 2, 3 and 4
(C) 1, 2 and 4
(D) 1, 3 and 4

92. The lexical analysis for a modern language such as Java needs the power of which one of the following machine models in a necessary and sufficient sense?

(A) Finite state automata
(B) Deterministic pushdown automata
(C) Non-deterministic pushdown automata
(D) Turing machine

93. If n(A) = 20 and n(B) = 30 and n(A $\cup$ B) = 40 then n(A $\cap$ B) is?

(A) 20
(B) 30
(C) 40
(D) 10

94. The cardinality of the Power set of the set {1, 5, 6} is _____.

(A) 5
(B) 6
(C) 8
(D) 10

95. Which search compares each element with the searching element till not found?

(A) Merge search
(B) Sequential Search
(C) Binary search
(D) None of the mentioned

96. Let the players who play cricket be 12, the ones who play football 10, those who play only cricket are 6, then the number of players who play only football are _____, assuming there is a total of 16 players.

(A) 16
(B) 8
(C) 4
(D) 10

97. Which algorithm uses the previous outputs for finding the new outputs?

(A) Dynamic Programming algorithms
(B) Divide and Conquer algorithm
(C) Brute Force algorithm
(D) None of them

98. If x is a set and the set contains the real number between 1 and 2, then the set is _____.

(A) Empty set
(B) Finite set
(C) Infinite set
(D) None of the mentioned

99. Which of the following function is also referred to as an injective function?
    (A) Many-to-one
    (B) Onto
    (C) One-to-One
    (D) None of the mentioned

100. Which of the following Law of Boolean proofs the X.X = X?
    (A) Identity Law
    (B) Double Complement Law
    (C) Complement Law
    (D) Idempotent Law

ROUGH WORK

ROUGH WORK

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ANSWER KEY: Computer Engineering

Question	Key	Question	Key
51	b	76	d
52	d	77	c
53	a	78	a
54	c	79	d
55	c	80	c
56	c	81	d
57	c	82	d
58	d	83	c
59	a	84	a
60	a	85	d
61	b	86	c
62	b	87	d
63	c	88	b
64	d	89	b
65	a	90	c
66	d	91	c
67	b	92	a
68	b	93	d
69	b	94	c
70	c	95	b
71	a	96	c
72	c	97	a
73	c	98	c
74	c	99	c
75	a	100	d