(Answer ALL questions)

56. Consider the following left associative operators, in decreasing order of precedence :

    – subtraction (highest precedence)

    * multiplication

    $ exponentiation (lowest precedence)

    What is the result of the following expression?

    $$3 - 2 * 4 \$ 2 \$ 3$$

    1. −61
    2. 64
    3. 512
    4. 4096

57. A shift-reduce parser carriers out the actions specified within braces immediately after reducing with the corresponding rule of the grammar

    S → xxW {print "1"}

    S → Y {print "2"}

    W → Sz {print "3"}

    What is the translation of 'xxxxyzz'?

    1. 11231
    2. 11233
    3. 23131
    4. 23321

58. For which of the following reasons, a compiler is preferable to an interpreter?

    1. It can generate stand-alone programs that often takes less time for execution
    2. It is much helpful in the initial stages of program development
    3. Debugging can be faster and easier
    4. If one changes a statement, only that statement needs recompilation

59. Consider the following syntax directed definition representation :

Production	Semantic rules
L → En	Print (E.val)
E → E₁ + T	E.val : = E₁ val + T.val
E → T	E.val : = T.val
T → T₁ * F	T.val : T₁ val × F.val
T → F	T.val = F.val
F → (E)	F.val = E.val
F → digit	F.val = digit.lexval

    The above representation has... synthesized attribute.

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

60. If a processor clock is rated as 1250 million cycles per second, then its clock period is

    1. $1.9 * 10^{-10}$ sec
    2. $1.6 * 10^{-9}$ sec
    3. $1.25 * 10^{-10}$ sec
    4. $8 * 10^{-10}$ sec

61. _____ type circuits are generally used for interrupt service lines.

    (i) open-collector

    (ii) open-drain

    (iii) XOR

    (iv) XNOR

    1. (i), (ii)
    2. (ii)
    3. (ii), (iii)
    4. (ii), (iv)

62. Consider a hypothetical processor with an instruction of type LW R1, 20(R2), which during execution reads a 32-bit word from memory and stores it in a 32-bit register R1. The effective address of the memory location is obtained by the addition of constant 20 and the contents of register R2. Which of the following best reflects the addressing mode implemented by this instruction for the operand in memory?

    1. Immediate Addressing
    2. Register Addressing
    3. Register Indirect Scaled Addressing
    4. Base Indexed Addressing

63. Consider two processors P1 and P2 executing the same instruction set. Assume that under identical conditions, for the same input, a program running on P2 takes 25% less time but incurs 20% more CPI (clock cycles per instruction) as compared to the program running on P1. If the clock frequency of P1 is 1GHz, then the clock frequency of P2 (in GHz) is

    1. 1.6
    2. 2.6
    3. 3.0
    4. 4.0

64. In a system designed to work out the tax to be paid :

An employee has Rs. 4,000 of salary tax free. The next Rs. 1,500 is taxed at 10%. The next Rs. 28,000 is taxed at 22%. Any further amount is taxed at 40%. Which of these groups of numbers would fall into the same equivalence class?
1. Rs. 4,800; Rs. 14,000; Rs. 28,000
2. Rs. 5,200; Rs. 5,500; Rs. 28,000
3. Rs. 28,001; Rs. 32,000; Rs. 35,000
4. Rs. 5,800; Rs. 28,000; Rs. 32,000

65. Which of the following helps in monitoring the Test Progress
   (i) Percentage of test case execution
   (ii) Percentage of work done in test environment preparation
   (iii) Defect information e.g. defect density, defects found and fixed
   (iv) The size of the testing team and skills of the engineers
   1. (iv) is correct and (i), (ii), (iii) are incorrect
   2. (i), (ii), (iii) are correct and (iv) is incorrect
   3. (i), (ii) are correct and (iii), (iv) are incorrect
   4. (i), (iv) are correct and (ii), (iii) are incorrect

66. Which of the following is true about White and Black Box Testing Technique
   1. Equivalence partitioning, decision table and control flow are white box testing techniques
   2. Equivalence partitioning, boundary value analysis, data flow and black box testing techniques
   3. equivalence partitioning, state transition, use case testing are black box testing techniques
   4. equivalence partitioning, state transition, use case testing and decision table are white box testing techniques

67. A piece of software has been given _____ what tests in the Following will you perform?
   (i) Test the areas most critical to business processes
   (ii) Test the areas where faults will be maximum
   (iii) Test the easiest functionalities
   1. (i) and (ii) are true and (iii) is false
   2. (i), (ii) and (iii) are true
   3. (i) is true, (ii) and (iii) are false
   4. (i) and (ii) are false, (iii) is true

68. Which of the following statements is true?
   1. Decision theory is a normative theory because it describes how agents make their decisions
   2. Psychological research has shown that people do not behave rational in the sense of AI
   3. The value of perfect information can be negative as well as positive
   4. Experimental research has shown that there is a linear relation between the amount of money people have and the utility of the state of wealth people are in when they have this amount of money

69. A 3-input neuron is trained to output a zero when the input is 110 and a one when the input is 111. After generalization, the output will be zero when and only when the input is
   1. 000 or 110 or 011 or 101
   2. 010 or 100 or 110 or 101
   3. 000 or 010 or 110 or 100
   4. 100 or 111 or 101 or 001

70. One of the main cons of hill-climbing search is,
   1. Terminates at local optimum
   2. Terminates at global optimum
   3. Find optimum solution
   4. Fail to find a solution

71. For a robot unit to be considered a functional industrial robot, typically, how many degrees of freedom would the robot have?
   1. Three
   2. Four
   3. Six
   4. Eight

72. If $x(n) = \cos \omega_0 n$ and $W(\omega)$ is the Fourier transform of the rectangular signal $W(n)$ then what is the Fourier transform of the signal $x(n) \cdot W(n)$?
   1. $1/2[W(\omega - \omega_0) - W(\omega + \omega_0)]$
   2. $1/2[W(\omega - \omega_0) + W(\omega + \omega_0)]$
   3. $[W(\omega - \omega_0) + W(\omega + \omega_0)]$
   4. $[W(\omega - \omega_0) - W(\omega + \omega_0)]$

73. By means of the DFT and IDFT, determine the response of the FIR filter with impulse response $h(n) = \{1, 2, 3\}$ to the input sequence $x(n) = \{1, 2, 2, 1\}$?
   1. $\{1, 4, 11, 9, 8, 3\}$
   2. $\{1, 4, 9, 11, 8, 3\}$
   3. $\{1, 4, 9, 11, 3, 8\}$
   4. $\{1, 4, 9, 3, 8\ldots\}$

74. Which of the following is true in case of Overlap add method?
    1. M zeros are appended at last of each data block
    2. M zeros are appended at first of each data block
    3. M–1 zeros are appended at last of each data block
    4. M–1 zeros are appended at first of each data block

75. If L be a language recognizable by a finite automaton, then language front $\{L\} = \{w$ such that w is prefix of v where $v \in L\}$ is a
    1. Regular language
    2. Context free language
    3. Context sensitive language
    4. Recursive enumeration language

76. The space factor when determining the efficiency of algorithm is measured by
    1. Counting the maximum memory needed by the algorithm
    2. Counting the minimum memory needed by the algorithm
    3. Counting the average memory needed by the algorithm
    4. Counting the maximum disk space needed by the algorithm

77. The Worst case occur in linear search algorithm when
    1. Item is somewhere in the middle of the array
    2. Item is not in the array at all
    3. Item is the last element in the array
    4. Item is not there at all

78. A list of n strings, each of length n, is sorted into lexicographic order using the merge-sort algorithm. The worst case running time of this computation is
    1. O (n log n)
    2. O (n² log n)
    3. O (n² + log n)
    4. O (n2)

79. Let A be an adjacency matrix of a graph G. The thij entry in the matrix K A, gives
    1. The number of paths of length K from vertex Vi to vertex Vj
    2. Shortest path of K edges from vertex Vi to vertex Vj
    3. Length of a Eulerian path from vertex Vi to vertex Vj
    4. Length of a Hamiltonian cycle from vertex Vi to vertex Vj

80. If $x_1(n)$ and $x_2(n)$ are two real valued sequences of length N, and let $x(n)$ be a complex valued sequence defined as $x(n) = x_1(n) + jx_2(n)$, $0 \le n \le N - 1$, then what is the value of $x_2(n)$?
    1. $(x(n) - x*(n))/2$
    2. $(x(n) + x*(n))/2$
   3. $(x(n) + x*(n))/2j$
    4. $(x(n) - x*(n))/2j$

81. According to pumping lemma for context free languages :
    Let L be an infinite context free language, then there exists some positive integer m such that any
    $w \in L$ with $|w| \ge m$ can be decomposed as
    $w = u\,v\,x\,y\,z$
    1. with $|vxy| \le m$ such that $uv^i x y^i z \in L$ for all $i = 0, 1, 2$
    2. with $|vxy| \le m$ and $|vy| \ge 1$, such that $uv^i x y^i z \in L$ for all $i = 0, 1, 2,...$
    3. with $|vxy| \ge m$ and $|vy| \le 1$, such that $uv^i x y^i z \in L$ for all $i = 0, 1, 2,...$
    4. with $|vxy| \ge m$ and $|vy| \ge 1$, such that $uv^i x y^i z \in L$ for all $i = 0, 1, 2,...$

82. In the following splay tree, list the order of rotations required to access c
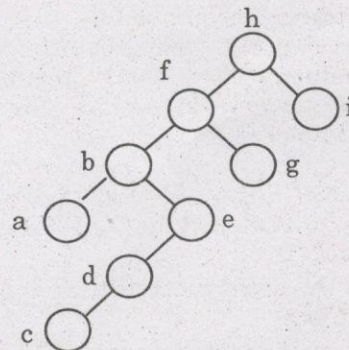
    1. zig-zag, zig-zig, zig
    2. zig-zig, zag-zig, zig
    3. zig-zig, zig-zag, zag
    4. zig-zag, zag-zig, zig

15   NG 17 (GROUP A)

83. Match the following :

	List – I		List – II
(a)	Context free grammar	(i)	Linear bounded automaton
(b)	Regular grammar	(ii)	Pushdown automaton
(c)	Context sensitive grammar	(iii)	Turing machine
(d)	Unrestricted grammar	(iv)	Deterministic finite automaton

Codes :

	(a)	(b)	(c)	(d)
1.	(ii)	(iv)	(iii)	(i)
2.	(ii)	(iv)	(i)	(iii)
3.	(iv)	(i)	(ii)	(iii)
4.	(i)	(iv)	(iii)	(ii)

84. The number of simple digraphs with $|V| = 3$ and exactly 3 edges is
1. 92
2. 88
3. 84
4. 80

85. Define an RP-tree by the parent-child adjacency lists as follows :
(i) Root B: J, H, K;
(ii) J: P, Q, R;
(iii) Q: S, T;
(iv) K: L, M, N.
The preorder vertex sequence of this tree is
1. B, J, H, K, P, Q, R, L, M, N, S, T
2. B, J, P, Q, S, T, R, H, K, L, M, N
3. B, J, P, Q, S, T, R, H, L, M, N, K
4. B, J, Q, P, S, T, R, H, L, M, N, K

86. Consider an undirected random graph of eight vertices. The probability that there is an edge between a pair of vertices is 1/2. What is the expected number of unordered cycles of length three?
1. 1/8
2. 1
3. 7
4. 8

87. Let G be a simple undirected planar graph on 10 vertices with 15 edges. If G is a connected graph, then the number of bounded faces in any embedding of G on the plane is equal to
1. 3
2. 4
3. 5
4. 6

88. Electronic Data Interchange software consists of the following four layers
1. Business application, Internal format conversion, Network translator, EDI envelope
2. Business application, Internal format conversion, EDI translator, EDI envelope
3. Application layer, Transport layer, EDI translator, EDI envelope
4. Application layer, transport layer, IP layer, EDI envelope

89. The baud rate of a signal is 600 baud/second. If each signal unit carries 6 bits, then the bit rate of a signal is
1. 3600
2. 100
3. 6/600
4. None of the above

90. In hierarchical routing with 4800 routers, what region and cluster sizes should be chosen to minimize the size of the routing table for a three-layer hierarchy?
1. 10 clusters, 24 regions and 20 routers
2. 12 clusters, 20 regions and 20 routers
3. 16 clusters, 16 regions and 25 routers
4. 15 clusters, 16 regions and 20 routers

91. Given the IP address 201.14.78.65 and the subnet mask 255.255.255.224. What is the subnet address?
1. 201.14.78.32
2. 201.14.78.64
3. 201.14.78.65
4. 201.14.78.224

92. Suppose ORACLE relation R(A, B) currently has tuples {(1, 2), (1, 3), (3, 4)} and relation S(B, C) currently has {(2, 5), (4, 6), (7, 8)}. Consider the following two SQL queries SQ1 and SQ2 : SQ1 : Select * From R Full Join S On R.B = S.B; SQ2 : Select * From R Inner Join S On R.B = S.B; The numbers of tuples in the result of the SQL query SQ1 and the SQL query SQ2 are given by
1. 2 and 6 respectively
2. 6 and 2 respectively
3. 2 and 4 respectively
4. 4 and 2 respectively

93. Which of the following concurrency protocol ensures both conflict serializability and freedom from deadlock?
(a) 2 – phase Locking
(b) Time stamp – ordering
1. Both (a) and (b)
2. (a) only
3. (b) only
4. Neither (a) nor (b)

94. Which of the following is true?
   I.   Implementation of self-join is possible in SQL with table alias.
   II. Outer-join operation is basic operation in relational algebra.
   III. Natural join and outer join operations are equivalent.
   1. I and II are correct
   2. II and III are correct
   3. Only III is correct
   4. Only I is correct

95. Consider the schema
   R = {S, T, U, V} and the dependencies $S \rightarrow T$, $T \rightarrow U$, $U \rightarrow V$ and $V \rightarrow S$ If R = (R1 and R2) be a decomposition such that R1 ∩ R2 = ϕ then the decomposition is
   1. not in 2NF
   2. in 2NF but not in 3NF
   3. in 3NF but not in 2NF
   4. in both 2NF and 3NF

96. Consider a system with five processes P_0 through P_4 and three resource types R_1, R_2 and R_3. Resource type R_1 has 10 instances, R_2 has 5 instances and R_3 has 7 instances. Suppose that at time T_0, the following snapshot of the system has been taken :

   Allocation

	R_1	R_2	R_3
P_0	0	1	0
P_1	2	0	0
P_2	3	0	2
P_3	2	1	1
P_4	0	2	2

   Max

R_1	R_2	R_3
7	5	3
3	2	2
9	0	2
2	2	2
4	3	3

   Available

R_1	R_2	R_3
3	3	2

   Assume that now the process P_1 requests one additional instance of type R_1 and two instances of resource type R_3. The state resulting after this allocation will be
   1. Ready State
   2. Safe State
   3. Blocked State
   4. Unsafe State

97. In Unix, the login prompt can be changed by changing the contents of the file
   1. contrab
   2. init
   3. gettydefs
   4. inittab

98. Which of the following derivations does a top-down parser use while parsing an input string? The input is scanned from left to right.
   1. Leftmost derivation
   2. Leftmost derivation traced out in reverse
   3. Rightmost derivation traced out in reverse
   4. Rightmost derivation

99. The process of assigning load addresses to the various parts of the program and adjusting the code and data in the program to reflect the assigned addresses is called
   1. Symbol resolution
   2. Parsing
   3. Assembly
   4. Relocation

100. Which Object Invocation Model does not supported by CORBA?
   1. Sequential
   2. Parallel
   3. Deferred Synchronous
   4. One-way

101. What is IOGR?
   1. Integrated Object Group Register
   2. Interoperable Object Group Register
   3. Integrated Object Group Reference
   4. Interoperable Object Group Reference

102. Which one is non-deterministic Fault Tolerance Technique?
   1. Active replication
   2. Passive replication
   3. Check pointing
   4. Both (a) & (b)

103. Christian's method used for
   1. Multicast navigation
   2. Nested transaction
   3. Failure detector
   4. Clock synchronization

104. Consider a code with five valid code words of length ten :
   0000000000, 0000011111,
   1111100000, 1110000011,
   1111111111
   Hamming distance of the code is
   1. 5
   2. 10
   3. 8
   4. 9

105. Using the RSA public key crypto system, if $p = 13$, $q = 31$ and $d = 7$ then the value of e is
1. 101
2. 103
3. 105
4. 107

106. A —————— can forward or block packets based on the information in the network layer and transport layer header.
1. Proxy firewall
2. Firewall
3. Packet filter firewall
4. Message digest firewall

107. In —————— substitution, a character in the plaintext is always changed to the same character in the cipher text, regardless of its position in the text.
1. Polyalphabetic
2. Monoalphabetic
3. Transpositional
4. Multialphabetic

108. The uplink frequency of P-GSM system is
1. 1850 – 1910 MHz
2. 1710 – 1785 MHz
3. 890 – 915 MHz
4. None of the above

109. —————— are typically characterized by very small cells, especially in densely populated areas.
1. 2G system
2. 3G system
3. 2.5G system
4. 3.5 system

110. —————— is based on a mathematical concept called Fast Fourier Transform (FFT).
1. Universal Mobile Telecommunication System (UMTS)
2. Dynamic Host Configuration Protocol version (DHCP)
3. Dynamic Packet Assignment (DPA)
4. Orthogonal Frequency Division Multiplex (OFDM)

111. —————— is written in RDF, W3C's language for modeling metadata, descriptive information about items on the Web.
1. BB/PP
2. DD/CC
3. CC/PP
4. XML

112. Consider the following statements :
(i) A graph in which there is a unique path between every pair of vertices is a tree.
(ii) A connected graph with $e = v - 1$ is a tree.
(iii) A graph with $e = v - 1$ that has no circuit is a tree.
Which of the above statements is/are true?
1. (i) and (iii)
2. (ii) and (iii)
3. (i) and (ii)
4. All of the above

113. The context free grammar for language $L = \{a^n b^m c^k \mid k = |n - m|, n \geq 0, m \geq 0, k \geq 0\}$ is
1. $S \to S_1 S_3$, $S_1 \to aS_1 c \mid S_2 \mid \lambda$, $S_2 \to aS_2 b \mid \lambda$, $S_3 \to aS_3 b \mid S_4 \mid \lambda$, $S_4 \to bS_4 c \mid \lambda$
2. $S \to S_1 S_3$, $S_1 \to aS_1 S_2 c \mid \lambda$, $S_2 \to aS_2 b \mid \lambda$, $S_3 \to aS_3 b \mid S_4 \mid \lambda$, $S_4 \to bS_4 c \mid \lambda$
3. $S \to S_1 \mid S_2$, $S_1 \to aS_1 S_2 c \mid \lambda$, $S_2 \to aS_2 b \mid \lambda$, $S_3 \to aS_3 b \mid S_4 \mid \lambda$, $S_4 \to bS_4 c \mid \lambda$
4. $S \to S_1 \mid S_3$, $S_1 \to aS_1 c \mid S_2 \mid \lambda$, $S_2 \to aS_2 b \mid \lambda$, $S_3 \to aS_3 b \mid S_4 \mid \lambda$, $S_4 \to bS_4 c \mid \lambda$

114. A simple graph G with n-vertices is connected if the graph has
1. $(n - 1)(n - 2)/2$ edges
2. More than $(n - 1)(n - 2)/2$ edges
3. Less than $(n - 1)(n - 2)/2$ edges
4. $\sum k_i = 1 \, C(n_i, 2)$ edges

115. Which of the following is not accepted by a PDA but accepted by a two-stack PDA?
1. $a^n b^n$
2. $a^n b^m c^m d^n$
3. $a^n b^n c^i$
4. $a^n b^n c^n d^n$