(Answer ALL questions)

56. Four channels are multiplexed using TDM. If each channel sends 100 bytes/second and we multiplex 1 byte per channel, then the bit rate for the link is

1. 400 bps
2. 800 bps
3. 1600 bps
4. 3200 bps

57. In a typical mobile phone system with hexagonal cells, it is forbidden to reuse a frequency band in adjacent cells. If 840 frequencies are available, how many can be used in a given cell?

1. 280
2. 210
3. 140
4. 120

58. Match the following port numbers with their uses :

List – I		List – II
(a)	23	(i) World wide web
(b)	25	(ii) Remote Login
(c)	80	(iii) USENET news
(d)	119	(iv) E- mail

Codes :

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

59. Which of the following is widely used inside the telephone system for long-haul data traffic?

1. ISDN
2. ATM
3. Frame Relay
4. ISTN

60. Consider the following three SQL queries (Assume the data in the people table) :

(a) Select Name from people where Age>21;

(b) Select Name from people where Height>180;

(c) Select Name from people where (Age>21) or (Height>180);

In the SQL queries (a) and (b) above, return 10 rows and 7 rows in the result set respectively, then what is one possible number of rows returned by the SQL query (c) ?

1. 3
2. 7
3. 10
4. 21

61. Select the False statement from the following statements about Normal forms.

1. Loss less preserving decomposition in to 3NF is always possible
2. Loss less preserving decomposition in to BCNF is always possible
3. Any relation with two attributes is in BCNF
4. BCNF is stronger than 3NF

62. The relation vendor order (v_no, v_ord_no, v_name, qty_sup, unit_price) is in 2NF because

1. Non key attribute V_name is dependent on V_no which is part of composite key
2. Non key attribute V_name is dependent on qty_sup
3. Key attribute qty_sup is dependent on primary_key unit price
4. Key attribute v_ord_no is dependent on primary_key unit price

63. The best normal form of relation scheme R(A, B, C, D) along with the set of functional dependencies F = {AB → C, AB → D, C → A, D → B} is

1. Boyce-Codd Normal form
2. Third Normal form
3. Second Normal form
4. First Normal form

64. A virtual memory has a page size of 1k words. There are 8 pages and 4 blocks. The associate memory page table contains the following entries

Page	Block
0	3
2	1
5	2
7	0

Which of the following list of virtual addresses (in decimal) will not cause any page fault if referenced by the CPU?

1. 1024, 3072, 4096, 6144
2. 1234, 4012, 5000, 6200
3. 1020, 3012, 6120, 8100
4. 2021, 4050, 5112, 7100

65. Consider a system with twelve magnetic tape drives and three processes P_1, P_2 and P_3. Process P_1 requires maximum ten tape drives, process P_2 may need as many as four tape drives and P_3 may need upto nine tape drives. Suppose that at time t_1, process P_1 is holding five tape drives, process P_2 is holding two tape drives and process P_3 is holding three tape drives. At time t_1, system is in

1. safe state
2. unsafe state
3. deadlocked state
4. starvation state

66. The translator which performs macro calls expansion is called

1. macro processor
2. micro preprocessor
3. macro preprocessor
4. dynamic linker

67. Which one from the following is false?

1. LALR parser is Bottom - Up parser
2. A parsing algorithm which performs a left to right scanning and a right most deviation is RL (1)
3. LR parser is Bottom - Up parser
4. In LL(1), the 1 indicates that there is a one - symbol look - ahead

68. Bully algorithm is used for

1. Failure detector
2. Election
3. Deadlock detection
4. Backward validation

69. The name of the deadlock that is detected but is not really a deadlock in distributed deadlock detection

1. Virtual deadlock
2. Re-lock deadlock
3. Phantom deadlock
4. None of the above

70. Middleware exists in between

1. Kernel and Network OS services
2. Applications and Network OS services
3. Applications and Kernel
4. Kernel and Hardware

71. Which routing technique is used in distributed system?

1. Fixed routing
2. Virtual routing
3. Dynamic routing
4. All of the above

72. Using p=3, q=13, d=7 and e=3 in the RSA algorithm, what is the value of ciphertext for a plain text 5?

1. 13
2. 21
3. 26
4. 33

73. A message "COMPUTERNETWORK" is encrypted using columnar transposition cipher with a key "LAYER". The encrypted message is:

1. CTTOEWMROPNRUEK
2. MROUEKCTTPNROEW
3. OEWPNRCTTUEKMRO
4. UEKPNRMROOEWCTT

74. What are the main requirements of contract protocol?

1. Authentication, Confidentiality
2. Non-repudiation, Integrity
3. Commitment, Unforgeability
4. Error checking, File lock

75. Which model is not used for multilevel security?

1. Lattice model
2. Biba model
3. Bell-La Padula model
4. DFL model

76. The intersymbol interference in cellular TDMA systems can be so severe that ———— equalizers are insufficient to overcome its ———— effects.

1. Non-linear, negative
2. Linear, negative
3. Non-linear, positive
4. Linear, positive

77. Match the following about wireless LANs.

(a)	IEEE 802.11a	(i)	uses FHSS technique and each time slot lasts 625μs.
(b)	IEEE 802.11b	(ii)	Provides up to 54 Mbps in the 5-GHz band.
(c)	Bluetooth	(iii)	Provides11-Mbps transmission (with a fallback to 5.5, 2, and 1 Mbps) in the 2.4-GHz band

1. (a)-(iii), (b)-(ii), (c)-(i)
2. (a)-(ii), (b)-(i), (c)-(iii)
3. (a)-(iii), (b)-(i), (c)-(ii)
4. (a)-(i), (b)-(iii), (c)-(ii)

78. State true (T) or false (F) statements related to Cluster-Based Routing Protocol (CBRP)

(a) In Cluster-Based Routing Protocol (CBRP), the nodes are divided into clusters
(b) Each node maintains a neighbor table
(c) When a source has to send data to destination, it floods route request packets (but only to the neighboring cluster heads)
(d) The cluster head maintains complete knowledge of cluster membership and intercluster members

1. (a)-T, (b)-T, (c)-T, (d)-T
2. (a)-T, (b)-T, (c)-F, (d)-T
3. (a)-T, (b)-F, (c)-T, (d)-F
4. (a)-T, (b)-T, (c)-F, (d)-F

79. How is the contention channel constructed for MAC protocol?

1. By a series of short contention slots that are monitored for a signal carrier or energy for Carrier Sense Multiple Access (CSMA)–based transmissions
2. By a series of short contention slots that are monitored for a signal carrier or energy for DAMA based transmissions
3. By a series of short contention slots that are monitored for a signal carrier or energy for CDMA based transmissions
4. By a series of short contention slots that are monitored for a signal carrier or energy for FDMA based transmissions

80. What can be said about a regular language L over {a} whose minimal finite state automation has two states?

1. L must be $\{ a^n \mid n \text{ is odd}\}$
2. L must be $\{ a^n \mid n \text{ is even}\}$
3. L must be $\{ a^n \mid n > 0\}$
4. Either L must be $\{a^n \mid n \text{ is odd}\}$, or L must be $\{a^n \mid n \text{ is even}\}$

81. Consider a grammar with the following productions

$S \rightarrow$ aab | bac | aB

$S \rightarrow \alpha S \mid b$

$S \rightarrow \alpha b b \mid ab$

$S\alpha \rightarrow bdb \mid b$

The above grammar is

1. Context free
2. Regular
3. Context Sensitive
4. LR(k)

82. Consider a complete bipartite graph $k_{m,n}$. For which values of m and n does this, complete graph have a Hamilton circuit

1. $m = 3, n = 2$
2. $m = 2, n = 3$
3. $m = n \geq 2$
4. $m = n \geq 3$

83. The notation $\exists!\, xp(x)$ denotes the proposition "there exists a unique x such that P(x) is true"

Give the truth values of the following statements :

I. $\exists!\, xP(x) \rightarrow \exists xP(x)$
II. $\exists!\, x \neg P(x) \rightarrow \neg \forall xp(x)$

1. Both I and II are true
2. Both I and II are false
3. I-false, II-true
4. I-true, II-false

84. Which of the following is a correct example about good reporting error methods?

(a) Missing right parenthesis in line 5
(b) Cryptic error 'OH17'
(c) ZAP not declared in procedure BLAH
(d) Missing declaration

1. (a), (b), (c) and (d)
2. (b) only
3. (a) and (b)
4. None of the above

85. Given the following expression grammar

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

$F \rightarrow E - F \mid id$

Which of the following is true?

1. *has higher precedence than+
2. –has higher precedence than*
3. + and – have same precedence
4. + has higher precedence than*

86. Consider the following statements

S_1 : The set of string described by a rule is called pattern associated with the token.

S_2 : A lexeme is a sequence of character in the source program that is matched by Pattern for a token.

Which of the above statements is/are true?

1. Both S_1 and S_2 are true
2. S_1 is true S_2 is false
3. S_2 is true S_1 is false
4. Both S_1 is true S_2 is false

87. Consider the grammar :

$S \rightarrow (S) \mid a$

Let the number of states in SLR (1), LR (1) and LALR (1) parsers for the grammar be n_1, n_2 and n_3 respectively. The following relationship holds good

1. $n_1 \square n_2 \square n_3$
2. $n_1 = n_3 \square n_2$
3. $n_1 = n_2 = n_3$
4. $n_1 \geq n_3 \geq n_2$

88. The Content of accumulator after this operation

MOV A, #0BH

SAR A, 02H will be

1. 11000101
2. 11100010
3. 11110001
4. 11111000

89. In a microprocessor, the service routine for a certain interrupt starts from a fixed location of memory which cannot be externally set, but the interrupt can be delayed or rejected. Such an interrupt is

1. non-maskable and non-vectored
2. maskable and non-vectored
3. non-maskable and vectored
4. maskable and vectored

90. In 8051 an external interrupt 1 vector address is of ———— and causes of interrupt if ————.

1. 000BH, a high to low transition on pin INT1
2. 001BH, a low to high transition on pin INT1
3. 0013H, a high to low transition on pin INT1
4. 0023H, a low to high transition on pin INT1

91. A system as an I/O Mapped I/O. The Address lines A0, A1 of 8085 are used by the 8255 chip to decode internally its three ports and the control register. The address lines A3-A7 and IO/M signal are used for address decoding. The range of the addresses for which the 8255 chip would get selected is

1. F8H-FBH
2. F8H-FCH
3. F8H-FFH
4. F0H-F7H

92. What is the appropriate pairing of items in the two columns listing various activities encountered in a software life cycle?

P. Requirements Capture	1. Module Development and Integration
Q. Design	2. Domain Analysis
R. Implementation	3. Structural and Behavioral Modeling
S. Maintenance	4. Performance Tuning

1. P-3,Q-2,R-4,S-1
2. P-2,Q-3,R-1,S-4
3. P-3,Q-2,R-1,S-4
4. P-2,Q-3,R-4,S-1

93. Which one of the following is TRUE?

1. The requirements document also describes how the requirements that are listed in the document are implemented efficiently
2. Consistency and completeness of functional requirements are always achieved in Practice
3. Prototyping is a method of requirements validation
4. Requirements review is carried out to find the errors in system design

94. Software integrity of a system can be defined as
1. integrity = summation [(1 – threat) + (1 – security)]
2. integrity = summation [(1 + threat) – (1 + security)]
3. integrity = summation [(1 – threat) – (1 – security)]
4. integrity = maximum [(1 – threat) – (1 – security)]

95. ———— allow the software planner to (1) determine the critical path—the chain of tasks that determines the duration of the project; (2) establish "most likely" time estimates for individual tasks by applying statistical models; and (3) calculate "boundary times" that define a time "window" for a particular task.
1. PERT
2. PERT and CPM
3. CPM
4. WBS

96. Which is true for Decision theory?
1. Decision Theory = Probability theory + Utility theory
2. Decision Theory = Inference theory + Utility theory
3. Decision Theory = Uncertainty + Utility theory
4. Decision Theory = Probability theory + Preference

97. A ———— is used to demonstrate, on a purely syntactic basis, that one formula is a logical consequence of another formula.
1. Deductive Systems
2. Inductive Systems
3. Reasoning with Knowledge Based Systems
4. Search Based Systems

98. Which can be converted to inferred equivalent CNF sentence?
1. Every sentence of propositional logic
2. Every sentence of inference
3. Every sentence of first order logic
4. All of the above

99. A problem solving approach works well for
1. 8-Puzzle problem
2. 8-queen problem
3. Finding an optimal path from a given source to a destination
4. Robot Navigation

100. What is the ROC of the signal x (n) = δ (n-k), k>0?
1. z = 0
2. z = ∞
3. Entire z-plane, except at z = 0
4. Entire z-plane, except at z = ∞

101. The z-transform of a sequence x(n) which is given as $X(z)=\sum_{n=-\infty}^{\infty} x(n)z^{-n}$, is known as
1. Uni-lateral Z-transform
2. Bi-lateral Z-transform
3. Tri-lateral Z-transform
4. Quadra-lateral Z-transform

102. What is the highest frequency that is contained in the sampled signal?
1. 2Fs
2. Fs/2
3. Fs
4. 2Fs/3

103. If {x(n)} is the signal to be analyzed, limiting the duration of the sequence to L samples, in the interval $0 \le n \le L-1$, is equivalent to multiplying {x(n)} by
1. Kaiser window
2. Hamming window
3. Hanning window
4. Rectangular window

104. Consider a hash table with 100 slots. Collisions are resolved using chaining. Assuming simple uniform hashing, what is the probability that the first 3 slots are unfilled after the first 3 insertions?
1. $(97 \times 97 \times 97)/100^3$
2. $(99 \times 98 \times 97)/100^3$
3. $(97 \times 96 \times 95)/100^3$
4. $(97 \times 96 \times 95) / (3! \times 100^3)$

105. Which of the following statements are CORRECT?
(a) Static allocation of all data areas by a compiler makes it impossible to implement recursion.
(b) Automatic garbage collection is essential to implement recursion.
(c) Dynamic allocation of activation records is essential to implement recursion.
(d) Both heap and stack are essential to implement recursion.
1. (a) and (b) only
2. (b) and (c) only
3. (c) and (d) only
4. (a) and (c) only

106. Assuming P! = NP, which of the following is true?
1. NP-complete = NP
2. NP-complete $\cap P = \varphi$
3. NP-hard = NP
4. P = NP-complete

107. In an arbitrary tree (not a search tree) of order M. Its size is N, and its height is K. The computation time needed to find a data item on T is
1. O(K*K)
2. O(M*M)
3. O(N)
4. O(K)

108. For the bubble sort algorithm, what is the time complexity of the best/worst case?(assume that the computation stops as soon as no more swaps in one pass)
1. best case : O(n) worst case: O(n*n)
2. best case : O(n) worst case: O(n*log(n))
3. best case : O(n*log(n)) worst case: O(n*log(n))
4. best case : O(n*log(n)) worst case: O(n*n)

109. What is the output of the following program ? (Assume that the appropriate pre-processor directives are included and there is no syntax error)

```
main ( )
{
    char S[ ] = "ABCDEFGH";
    printf ("%C",* (& S[3]));
    printf ("%s", S+4);
    printf ("%u", S);
    /* Base address of S is 1000 */
}
```

1. ABCDEFGH1000
2. CDEFGH1000
3. DDEFGHH1000
4. DEFGH1000

110. Which of the following differentiates between overloaded functions and overridden functions?
1. Overloading is a dynamic or runtime binding and overridden is a static or compile time binding.
2. Overloading is a static or compile time binding and overriding is dynamic or runtime binding.
3. Redefining a function in a friend class is called overloading, while redefining a function in a derived class is called as overridden function.
4. Redefining a function in a derived class is called function overloading, while redefining a function in a friend class is called function overriding.

111. If a class C is derived from class B, which is derived from class A, all through public inheritance, then a class C member function can access
1. Protected and public data only in C and B
2. Protected and public data only in C
3. Private data in A and B
4. Protected data in A and B

112. Formula in which binomial distribution approaches normal probability distribution with the help of normal variable is written as
1. x – qn divided by square root of pq
2. x – np divided by square root of npq
3. x + np divided by square root of np
4. x – pq divided by square root of npq

113. Which one is not an example of random experiment?
1. A coin is tossed and the outcome is either a head or a tail
2. A six-sided die is rolled
3. Some number of persons will be admitted to a hospital emergency room during any hour
4. All medical insurance claims received by a company in a given year

114. For which of the following does there exist a simple graph G = (V, E) satisfying the specified conditions?
1. It has 3 components 20 vertices and 16 edges
2. It has 6 vertices, 11 edges, and more than one component
3. It is connected and has 10 edges, 5 vertices and fewer than 6 cycles
4. It has 7 vertices, 10 edges, and more than two components

115. In each case the depth-first sequence of an ordered rooted spanning tree for a graph G is given. Also given are the non-tree edges of G Which of these spanning trees is a depth-first spanning tree?
1. 123242151 and {3,4},{1,4}
2. 123242151 and {4,5},{1,3}
3. 123245421 and {2,5},{1,4}
4. 123245421 and {3,4},{1,4}