

1. A function  $2^{2^n}$  is -----  
A)  $O(2^n)$  B)  $\Omega(2^n)$   
C)  $\Theta(2^n)$  D) All of the above
2. Which of the following statement(s) are true?  
i. The class of regular language is closed under the union operation  
ii. The class of regular language is closed under concatenation operation  
iii. The class of regular language is not closed under star operation  
A) All of the above B) Only i and ii  
C) Only i and iii D) Only i
3. Assume that the alphabet  $\Sigma$  is  $\{0, 1\}$  then the regular expression  $\Sigma^* 1 \Sigma^* =$  -----  
A)  $\{w \mid w \text{ starts and ends with the same symbol}\}$   
B)  $\{w \mid w \text{ has at least one 1}\}$   
C)  $\{w \mid w \text{ contains a single 1}\}$   
D) None of the above
4. Which of the following language is not regular? Assume alphabet  $\Sigma = \{0, 1\}$   
i.  $\{w \mid w \text{ contains an even number of 0s, or contain exactly 2 1s}\}$   
ii.  $w = \{0^i 1^j \mid i > j\}$   
iii.  $w = \{0^n 1^n \mid n \geq 0\}$   
A) All of the above B) Only ii  
C) Only ii and iii D) Only iii
5. On a system with  $n$  CPUs what is the minimum and maximum number of processes that can be in the run state?  
A) 0,  $n$  B) 1,  $n$   
C) 0,  $\infty$  D) 1, 1
6. Given a system with  $n$  processes, how many possible ways can those processes can be scheduled?  
A)  $2^n$  B)  $n!$   
C)  $n(n+1)/2$  D) None of the above
7. On a system using non preemptive scheduling, processes with expected run times of 5, 18, 9 and 12 are in the ready queue. In what order should they be run to minimize wait time?  
A) 5, 18, 9, 12 B) 5, 9, 12, 19  
C) 5, 9, 18, 12 D) 5, 12, 9, 18
8. On a simple paging system with  $2^{24}$  bytes of physical memory, 256 pages of logical address space, and a page size of  $2^{10}$  bytes, how many bits are in logical address space?  
A) 24 B) 10 C) 34 D) 18

9. Demand paging
  - A) Fetches a page only when needed
  - B) Fetches a page that is likely to be demanded
  - C) Pages out pages when that page frame is needed
  - D) None of the above
10. Which of the following page replacement policies, Belady's anomaly occurs?
  - A) LRU
  - B) NRU
  - C) LFU
  - D) FIFO
11. Which command used to get the Kernel Version being used in linux?
  - A) vname -r
  - B) uname -r
  - C) vername -r
  - D) None of the above
12. Set of paging algorithms in which the set of pages loaded with an allocation of  $m$  is always a subset of the set of pages that has a page frame allocation of  $m + 1$  is called
  - A) Static algorithms
  - B) Dynamic algorithms
  - C) Stack algorithms
  - D) None of the above
13. Consider the reference string  $R = 0, 1, 2, 3, 0, 1, 4, 0, 1, 2, 3, 4$  and number of page frames = 4. Then the number of page faults if applied FIFO algorithm will be
  - A) 9
  - B) 10
  - C) 11
  - D) 8
14. Which statement(s) about thread is true?
  - i. It takes less time to create a new thread than a process
  - ii. It takes less time to terminate a thread than a process
  - iii. Communication overhead is more
  - A) All of the above
  - B) Only i and ii
  - C) Only ii and iii
  - D) Only i and iii
15. Part of program where the shared memory is accessed and which should be executed individually is called -----
  - A) Semaphores
  - B) Directory
  - C) Critical section
  - D) None of the above
16. Which is not a software life cycle model?
  - A) Water fall model
  - B) Spiral model
  - C) Prototyping model
  - D) Capability maturity model
17. Which one is the most important feature of spiral model?
  - A) Quality management
  - B) Risk management
  - C) Performance management
  - D) Efficiency management

18. Level-0 DFD is similar to  
 A) Use case diagram B) Context diagram  
 C) System diagram D) None of the above
19. A **COCOMO** model is  
 A) Common cost estimation model  
 B) Constructive cost estimation model  
 C) Complete cost estimation model  
 D) Comprehensive cost estimation model
20. Which level of CMM is for basic project management?  
 A) Initial B) Repeatable  
 C) Defined D) Managed
21. Regression testing is primarily related to  
 A) Functional testing B) Dataflow testing  
 C) Development testing D) Maintenance testing
22. Purpose of reverse engineering is to  
 A) Recover information from the existing code or any other intermediate document  
 B) Redocumentation and / or document generation  
 C) Understand the source code and associated documents  
 D) All of the above
23. Which of the following is not a black box testing?  
 A) Syntax testing B) Cause effect graph  
 C) Path coverage D) Boundary value analysis
24. A cable break in ----- topology stops all transmission  
 A) Mesh B) Bus  
 C) Star D) Primary
25. What is the main function of transport layer?  
 A) Node to Node delivery  
 B) Process to Process delivery  
 C) Synchronization  
 D) Updating and maintenance of routing table
26. Consider a noiseless channel with a bandwidth of 3,000Hz transmitting a signal with two signal levels. Then maximum bit rate will be -----  
 A) 6,000 bps B) 3,000 bps C) 1,500 bps D) 9,000 bps
27. ----- has a higher transmission rate in the downstream direction than in the upstream direction  
 A) VDSL B) ADSL C) SDSL D) A & B

28. When a collision is detected in a network using CSMA/CD, -----?
- The frame is immediately resent
  - A jam signal is send by the station
  - Backoff value is set to zero
  - Backoff value is decremented by one
29. Which one of the following statement (s) is true?
- In FDMA the bandwidth is divided into channels
  - In TDMA the bandwidth is just one channel that is time shared
  - In CDMA one channel carries all transmission simultaneously
- Only i & ii
  - Only ii & iii
  - Only i
  - All the three
30. WiMAX uses ----- Protocol
- IEEE 802.11
  - IEEE 802.15
  - IEEE 802.16
  - None of the above
31. 227.12.14.87 is a ----- Class address
- Class A
  - Class B
  - Class C
  - Class D
32. ICMP is a ----- layer protocol
- Data link layer
  - Network layer
  - Transport layer
  - Application layer
33. RIP uses ----- algorithm for calculating the routing tables
- Dijkstra's algorithm
  - Floyd Warshal algorithm
  - Bellman Ford algorithm
  - None of the above
34. Port number associated with RPC is
- 111
  - 123
  - 161
  - 153
35. If 10 people need to communicate using Symmetric Key Cryptography, ----- Symmetric keys are needed
- 20
  - 10
  - 45
  - 55
36. In the digital signature
- Private Key is used for encryption and Public Key for decryption
  - Public Key is used for encryption and Private Key for decryption
  - Private Key is used for encryption and decryption
  - Public Key is used for encryption and decryption
37. How many comparisons does the insertion sort used to sort the list 1, 2, -----, N?
- $N^2$
  - $N(N+1)/2$
  - $(N^2+N-2)/2$
  - $N(N-1)/2$

38. Solution to recurrence  $T(n) = T(n/2) + \Theta(1)$  is  
 A)  $\Theta(n \log n)$  B)  $\Theta(\log n)$  C)  $\Theta(n^2)$  D)  $\Theta(2^n)$
39. Insertion sort is suitable when  
 A) The size of the input is small  
 B) The input list is almost sorted  
 C) The size of the input is large  
 D) None of the above
40. Maximum number of nodes in a binary tree of depth  $k$  where  $k \geq 1$  is -----  
 A)  $2^k$  B)  $2^{k-1}$  C)  $2^k - 1$  D)  $2^{k+1}$
41. Given the Preorder and inorder traversal travel of a binary tree is as follows  
 Preorder : ABDHECFG  
 Inorder : DHBEAFCG  
 What is the postorder traversal?  
 A) HDBEAFGC B) HDEBFGCA  
 C) HDBEAFCG D) HDBEACFG
42. Which of the following is essential for converting a infix expression to postfix form efficiently?  
 A) An operator stack  
 B) An operand stack  
 C) An operand and operator stack  
 D) A parse tree
43. What will be the output after the first pass of selection sort algorithm for the following input?  
 12, 36, 8, 3, 18, 11, 2, 45  
 A) 36, 12, 8, 3, 18, 11, 2, 45  
 B) 45, 2, 11, 18, 3, 8, 36, 12  
 C) 2, 36, 8, 3, 18, 11, 12, 45  
 D) 45, 36, 18, 12, 11, 8, 3, 2
44. Suppose the stack is implemented using singly linked list. Then the time needed for push and pop operation is  
 A)  $O(n)$  B)  $O(1)$  C)  $O(\log n)$  D)  $O(\sqrt{n})$
45. Randomize quick sort expected running time is  
 A)  $\Omega(n \log n)$  B)  $\Omega(n^2)$   
 C)  $\Omega(n^2 \log n)$  D) None of the above
46. What is the height of an  $n$  element heap?  
 A)  $\lceil \log n^2 \rceil$  B)  $\lceil \log n \rceil$   
 C)  $\lceil \sqrt{n} \log n \rceil$  D)  $\lceil n \log n \rceil$

47. Which property will be satisfied by a max heap for every node  $i$  other than the root if  $A$  is the array representation of max heap?
- A)  $A[\text{PARENT}(i)] > A[i]$       B)  $A[\text{PARENT}(i)] \geq A[i]$   
 C)  $A[\text{PARENT}(i)] \leq A[i]$       D)  $A[\text{PARENT}(i)] < A[i]$
48. Any comparison sort algorithm requires ----- comparisons in the worst case
- A)  $\Omega(n^2)$       B)  $\Omega(\log n)$   
 C)  $\Omega(\sqrt{n} \log n)$       D)  $\Omega(n \log n)$
49. Dynamic programming typically apply to
- A) Recursive Problems      B) Optimization Problems  
 C) NP Complete Problems      D) None of the above
50. The complexity class NP is
- A) Class of languages that can be solved by a polynomial time algorithm  
 B) Class of languages that can be verified by a polynomial time algorithm  
 C) Class of languages that can be verified by an exponential time algorithm  
 D) None of the above
51. Which statement about class of NP language is correct?
- A) Class of NP language is not closed under union  
 B) If  $\text{NP} \neq \text{co-NP}$ , then  $\text{P} = \text{NP}$   
 C) Class of NP language is closed under Kleene star  
 D) Class of NP language is not closed under concatenation
52. What is the output of the following recursive function if the value of  $m$  and  $n$  are 3 and 12?
- ```

int fun(int m, int n)
{
if (n == 0) return m;
else return(fun(n, m%n));
}
  
```
- A) 1      B) 3      C) 12      D) 4
53. The running time of Floyd-Warshall algorithm is
- A)  $\Theta(n^2)$       B)  $\Theta(n^3)$       C)  $\Theta(n \log n)$       D)  $\Theta(n^2 \log n)$
54. We use little-Oh notation to denote
- A) Lower bound  
 B) Upper bound  
 C) Lower bound that is not asymptotically tight  
 D) Upper bound that is not asymptotically tight

55. Which of the following statement is false?
- A)  $f(n) = \Theta(g(n))$  iff  $g(n) = \Omega(f(n))$
  - B)  $f(n) = \Theta(f(n))$
  - C)  $f(n) = \Theta(g(n))$  iff  $g(n) = \Theta(f(n))$
  - D)  $f(n) = \Theta(g(n))$  and  $g(n) = \Theta(h(n)) \Rightarrow f(n) = \Theta(g(n))$
56. Merge sort algorithm closely follows ----- approach
- A) Divide and Conquer
  - B) Dynamic programming
  - C) Back tracking
  - D) Greedy
57. Quadratic probing use the hash function of the form
- A)  $h(k, i) = (h_1(k) + i) \bmod m$
  - B)  $h(k, i) = (h_1(k) + ih_2(k)) \bmod m$
  - C)  $h(k, i) = (h_1(k) + c_1i + c_2i^2) \bmod m$
  - D)  $h(k, i) = (h_1(k) + k) \bmod m$
58. Consider a B-tree with degree  $t$ , then any internal node can have at most ----- children
- A)  $2t - 1$
  - B)  $t - 1$
  - C)  $2t$
  - D)  $t$
59. A language  $L$  is NP-hard iff
- A)  $L \in NP$
  - B)  $L^1 \leq_p L$  for every  $L^1 \in NP$
  - C)  $L \in co-NP$
  - D) All of the above
60. Consider a relation with a single-attribute key and  $n$  ( $n > 0$ ) tuples. If we do a projection on the key attribute of this relation, what can we say about cardinality of the projection relation?
- A) Cardinality will be less than  $n$
  - B) Cardinality will be equal to  $n$
  - C) Cardinality will be greater than  $n$
  - D) Cardinality will be less than or equal to  $n$
61. Armstrong's axioms on FD are said to be sound because
- A) Axioms allow us to derive all valid FD's that are satisfied by given relation
  - B) If the axioms are correctly applied they cannot derive false dependencies
  - C) Both A and B
  - D) None of the above
62. Given the relational schema  $R(A,B,C,D)$  and the FD's  $A \rightarrow B$  and  $BC \rightarrow D$ , which of the following FD's can be derived by using inference axioms
- i.  $AC \rightarrow D$
  - ii.  $B \rightarrow D$
  - iii.  $AD \rightarrow B$
- A) Only (i)
  - B) (i) & (ii)
  - C) (ii) & (iii)
  - D) (i) & (iii)

63. Consider the relation r(A,B,C,D,E) and the set F = {AB → CE, E → AB, C → D}. What is the highest normal form of this relation?

A) 1NF                                      B) 2NF  
C) 3NF                                      D) BCNF
64. Consider the relation r(A,B,C,D), the set F = {A → B, C → D} and the decomposition R<sub>1</sub>(AB) and R<sub>2</sub>(CD). The decompositions are

A) Lossless  
B) Dependency preserving  
C) Lossless and dependency preserving  
D) Not lossless
65. Which statement about 2PL protocol is wrong?

A) 2PL guarantees serializability  
B) 2PL does not produce deadlock  
C) 2PL is a concurrency control protocol  
D) 2 phases of 2PL are growing phase and shrinking phase
66. SELECT COUNT(\*) FROM R will return

A) Number of distinct rows in the relation R  
B) Number of rows in the relation R  
C) Number of attributes in the relation R  
D) None of the above
67. Normal form associated with MVD is

A) BCNF                                      B) 3NF  
C) PJNF                                      D) 4NF
68. Incompatible operands to an operator is a

A) Lexical error                            B) Syntactic error  
C) Semantic error                         D) Logical error
69. LR parser uses ----- technique

A) Shift-Reduce                          B) Predictive parsing  
C) Recursive descent parsing         D) None of the above
70. YACC can be used to generate automatically a ----- Parser for a grammar from its specification

A) LR                                         B) LL  
C) SLR                                       D) LALR
71. Implicit type conversion is called

A) Narrowing                               B) Widening  
C) Coercion                                 D) Type expression



72. Which parameter passing mechanism is used in C language?  
 A) Call by value                      B) Call by reference  
 C) Call by Name                      D) Call by value and Call by reference
73. A typical activation record does not contain  
 A) Parameter passed to procedure  
 B) Book keeping information  
 C) Space for global variables  
 D) Space for local data
74. Of the following which is not a high level intermediate representation  
 A) Abstract Syntax Tree              B) Directed Acyclic graphs  
 C) P-code                              D) Three address code
75. The output of the following C program fragment will be  

```
int a=8;
printf("%d", a >> 2);
```

  
 A) 32                      B) 2                      C) 4                      D) 64
76. What is the output of the following C program fragment?  

```
int x, y, z;
x = y = z = 1;
++x || ++y && ++z;
printf("%d...%d...%d\n",x, y, z);
```

  
 A) 2 2 2                      B) 2 1 1                      C) 2 2 1                      D) 1 1 1
77. The period of time during which memory associated with a variable is called ----- of the variable  
 A) Scope                              B) Visibility  
 C) Extent                              D) None of the above
78. Given the declaration statement in C is as follows  

```
int a , b , *p , *q;
```

  
 Which of the following is valid use of pointer  
 A)  $p = p - b$               B)  $p = -q$                       C)  $p \leq 1$                       D)  $p = p + q$
79. Which of the following expressions is not equivalent to  $\bar{x}$  ?  
 A)  $x \text{ NAND } x$               B)  $x \text{ NOR } x$                       C)  $x \text{ NAND } 1$                       D)  $x \text{ NOR } 1$
80. How many full adders are required to construct an n bit parallel adder?  
 A)  $n + 1$                       B)  $n - 1$                       C)  $n$                       D)  $n/2$

81. In 8086 Processor, if segment address =1005H and offset address =2410, then what is the physical address?  
 A) 12460H B) 2410H  
 C) 10050H D) 1005H
82. Which of the following is the zero address instruction?  
 A) CLC B) MOVE  
 C) ADD D) All of the above
83. ----- instruction is used to restore all registers from the stack  
 A) POPF B) POPA C) POP D) RSTA
84. ----- interrupt provide terminate and state resident service  
 A) INT 21H B) INT 23H C) INT 25H D) INT 27H
85. Which logical family dissipates the minimum power?  
 A) ECL B) CMOS C) TTL D) DTL
86. Which of the following statement is false?  
 A) Web servers and clients communicate with each other through the platform independent HTTP  
 B) Web servers often cache web pages for quick reloading  
 C) The information tier implements business logic to control the type of information that is presented to the client  
 D) The apache web server is said to be platform independent
87. ----- is Microsoft's XML parser  
 A) MSXML B) KXML C) BareXML D) LibXML2
88. Which statement about XML is true?  
 A) XML is not case sensitive  
 B) Forward and backward slashes delimit XML mark up text  
 C) XML displays information  
 D) All XML start tags must have corresponding end tags
89. Windows 2000 uses an authentication protocol called  
 A) Diffie-Hellman B) Needham-Schroeder  
 C) Otway-Rees D) Kerberos
90. Which MAC sub layer does IEEE 802.11 define?  
 A) LLC B) PCF C) DCF D) B and C
91. Which of the following memory allocation scheme suffers from External fragmentation?  
 A) Segmentation B) Pure demand paging  
 C) Swapping D) Multiple contiguous fixed partitions

92. A high paging rate  
 A) May cause high I/O rate  
 B) Keeps the system well running  
 C) Is a symptom of too much processor activity  
 D) Always creates a slow system
93. Which of the following is not a function of bootstrap program?  
 A) Initializing the CPU  
 B) Initializing the memory contents  
 C) Loading the operating systems  
 D) Loading the compiler
94. A processor that assigns new absolute address to a computer program during execution so that program may be executed from a different area of main storage  
 A) Dynamic linking  
 B) Dynamic relocation  
 C) Dynamic loading  
 D) None of the above
95. What is the result when a number and its two's complement are added to each other?  
 A) 1  
 B) Number itself  
 C)  $2 * \text{number}$   
 D) None of the above
96. What is binary equivalent of hexadecimal FACE?  
 A) 1111101011001110  
 B) 1111101111001110  
 C) 1111101011111100  
 D) 1100110011001100
97. An SR flip flop does not accept the input entry when  
 A) Both inputs at one  
 B) Zero at R and one at S  
 C) Zero at S and one at R  
 D) Both inputs zero
98. A sniffer is  
 A) A protocol  
 B) A virus  
 C) A program that monitors and analyzes network traffic  
 D) None of the above
99. DLP is  
 A) Dynamic Link Protocol  
 B) Digital Light Processing  
 C) Dynamic Library Package  
 D) None of the above
100. An IPv6 address is a ----- bit address  
 A) 32  
 B) 64  
 C) 128  
 D) 256