

Seat No. _____

SUB: COMPUTER ENGINEERING (CO)

Time: 1 Hour 30 minutes

Instructions:

1. Ensure that all pages are printed
2. Use Black ball pen only
3. Change in option is not allowed
4. There is no negative marking
5. Use of non-programmable scientific calculator is allowed

1. Consider following C statements
`int *p;`
`p = (???) malloc(100);`
The ??? Is replaced with which of the following?

A <code>int</code>	B <code>int &</code>
C <code>int *</code>	D <code>int **</code>
2. if a structure inside structure is used in C program, it is called

A nested structure	B recursive structure
C self-referential structure	D Any of the above
3. Which of the following is valid sequence in an array representing 3-ary max-heap?

A 1 3 5 6 8 9	B 9 5 6 8 3 1
C 9 6 3 1 8 5	D None of the above
4. Assume that a string is defined in C with name str, which of the following is valid operation?

A <code>str = "Hello";</code>	B <code>strcpy(str, "Hello");</code>
C <code>str + "Hello";</code>	D All are valid
5. Which of the following specifies is used in C to read number in Hex?

A <code>%x</code>	B <code>%o</code>
C <code>%u</code>	D <code>%h</code>
6. A binary tree is created by inserting following sequence.
6 10 25 12 4 7 15 8 33
Which traversal does following sequence shows?
6 4 10 7 25 8 12 33 15

A Inorder	B Preorder
C Postorder	D Level order

7. What would be output of following?
`int x, y = 7;
If (x = y) printf("Hello"); else printf("Fine");`

A Hello B Fine
C Compilation error D HelloFine

8. No. of nodes at level = 4 in a full binary tree (level of root is 0) are

A 4 B 8
C 16 D 32

9. The size of long double in ANSI C is

A 4 Bytes B 8 Bytes
C 10 Bytes D None of the above

10. Preorder traversal is same as

A breadth first search B depth first search
C level order traversal D None of the above

11. Which of the following can be used to immediately exit from C program ?

A break B continue
C exit() D All of the above

12. Which of the following is an homogeneous data structure ?

A Array B Structure
C Union D None of the above

13. Which of the following is true for structures and functions ?

A A pointer to a structure can be passed as a function argument B It is possible to return a structure variable from a function
C The structure variable used in the actual argument and the formal argument must be of the same structure type. D All of the above

14. A balance factor in AVL tree is used to check

A Which rotation to perform B Whether tree is unbalanced
C When last rotation occurred D Whether all the child nodes are at same level

15. Which of the following is an application of queue data structure ?

- A Load balancing
B Asynchronous data transfers
C When a resource is shared among multiple consumers
D All of the above

16. If the array is already sorted, which of these algorithms will exhibit the best performance?
A Insertion sort
B Merge sort
C Quick sort
D Heap sort

17. The recurrence relation capturing the optimal time of the Tower of Hanoi problem with n disc is
A $T(n) = 2T(n-2) + 2$
B $T(n) = 2T(n-1) + 1$
C $T(n) = 2T(n-1) + n$
D $T(n) = 2T(n/2) + 1$

18. What is the best time complexity of bubble sort ?
A N^2
B $N \log N$
C N
D $N(\log N)^2$

19. The time factor when determining the efficiency of algorithm is measured by
A Counting microseconds
B Counting the size of the algorithm in Bytes
C Counting the number of statements
D Counting the number of key operations

20. The best case occur in linear search algorithm
A When Item is somewhere in the middle of the array
B When Item is not in the array at all
C When Item is the last element in the array
D None of the above

21. Total Degree of a Triangle is
A 3
B 6
C 9
D 12

22. A sorted array in ascending order is
A MAX Heap
B MIN Heap
C Not a Heap Tree
D None of the above

23. Analyzing algorithm means
A Evaluating the complexity of algorithm only
B Validating the algorithm

33. The main use of the Multiplexer is to
- | | | | |
|---|---|---|---|
| A | Select data from multiple sources and to route it to a single Destination | B | Select data from Single source and to route it to a multiple Destinations |
| C | Select data from Single source and to route to single destination | D | None of the above |
34. ASCII code is a bit code.
- | | | | |
|---|----|---|-------------------|
| A | 7 | B | 8 |
| C | 16 | D | None of the above |
35. A set of Boolean connectives is functionally complete if all Boolean functions can be synthesized using those. Which of the following sets of connectives is NOT functionally complete?
- | | | | |
|---|-----------------------|---|--------------|
| A | Implication, negation | B | OR, negation |
| C | NAND | D | EX-NOR |
36. How many bits are needed to encode 26 alphabets, 10 digits and 10 numerals?
- | | | | |
|---|---|---|---|
| A | 2 | B | 3 |
| C | 5 | D | 6 |
37. The speed imbalance between memory access and CPU operation can be reduced by
- | | | | |
|---|-------------------------------|---|---------------------|
| A | Memory Compaction | B | Memory interleaving |
| C | Increasing the size of memory | D | All of the above |
38. Instructions which are not meant for execution are known as
- | | | | |
|---|---------------------|---|-------------------|
| A | Fake instructions | B | Extra instruction |
| C | Pseudo instructions | D | None of the above |
39. _____ does not hold data but holds the address of data
- | | | | |
|---|----------------------------------|---|------------------------------------|
| A | Pointer, Index, or Base Register | B | Pointer, Segment, or Base Register |
| C | General Registers | D | Instruction Pointer |
40. A microprogramed control unit
- | | | | |
|---|--|---|--|
| A | is faster than a hard wired control unit | B | facilitate easy implementation of new instructions |
| C | is useful when very small programs to be run | D | usually refers to the control unit of a microprocessor |
41. Due to mismatch in speed of sender and receiver, TCP does
- | | | | |
|---|-------------------------------|---|-------------------------------|
| A | Increases speed of slower one | B | Decreases speed of faster one |
|---|-------------------------------|---|-------------------------------|

- C Uses buffers on both the sides D Does not provide any solution
42. A group of networks and router under a single administrative authority is known as
- A Autonomous System B Internet Service Provider
- C Intranet D WAN
43. A subnet mask in class C has 25 1s. How many subnets does it define?
- A 1 B 2
- C 4 D 8
44. ICMP protocol works at Layer.
- A Data Link B Application
- C Transport D Network
45. Which of the following protocol is used by Ethernet to access the media?
- A CDMA B CDMA/CD
- C ALOHA D Slotted ALOHA
46. Which of the following pair represents the socket?
- A IP address, MAC address B IP address, Physical address
- C IP address, Port address D Any one of them
47. Which of the following is not applicable to IP protocol?
- A Best-effort delivery B Datagram service
- C Connection oriented D All are applicable
48. SET is protocol used for
- A Online payment B Confidentiality in e-commerce
- C Both A and B D None of the above
49. The main element of the digital certificate is
- A Public key of the subject B Passport number of the subject
- C Address of the subject D None of the above
50. Why does hacker use the proxy server ?
- A To obtain a remote access B To create a stronger connection with the target.
- C To create a stronger connection with the target D To hide malicious activity on the network

51. Which of the following symmetric key algorithm uses streaming cipher ?
- | | |
|------------|-------|
| A Blowfish | B RC4 |
| C MD5 | D SHA |
52. Which of the following commands is used to perform an Nmap XMAS scan every 15seconds?
- | | |
|------------------------|----------------------|
| A nmap -sX -sneaky | B nmap -sX -paranoid |
| C nmap -sX -aggressive | D None of the above |
53. How is IP address spoofing detected?
- | | |
|--|---|
| A Implementing a firewall to the network | B Identify all TCP sessions that are initiated but does not complete successfully |
| C Comparing the TTL values of the actual and spoofed addresses | D All of the above |
54. Phishing is a one kind of
- | | |
|------------------|-----------------|
| A Spamming | B Impersonation |
| C Identity Theft | D Scanning |
55. COCOMO is used to estimate
- | | |
|---|---|
| A Effort and duration based on the size of the software | B Size and duration based on the effort of the software |
| C Size, effort and duration based on the cost of software | D None of the above |
56. Which of the following is not desired in a good SRS document ?
- | | |
|---------------------------|--|
| A Functional requirements | B Non-functional requirements |
| C Goals of implementation | D Algorithms for software implementation |
57. Which of the following combination is desirable for modular software design ?
- | | |
|--------------------------------|-------------------------------|
| A High cohesion, high coupling | B High cohesion, low coupling |
| C Low cohesion, high coupling | D Low cohesion, low coupling |
58. Which of the following testing technique uses fault simulation technique ?
- | | |
|------------------|--------------------|
| A Unit testing | B Beta testing |
| C Stress testing | D Mutation testing |

59. Given the following expression grammar
 $E \rightarrow E * F \mid F + E \mid F$
 $F \rightarrow F - F \mid id$
 Which of the following is true ?
- A '*' has higher precedence than '+' B '-' has higher precedence than '*'
 C '+' has higher precedence than '*' D '+' and '-' have same precedence
60. Which of the following suffices to convert an arbitrary CFG to an LL(1) grammar ?
- A Removing left recursion alone B Factoring the grammar alone
 C Both A and B D None of the above
61. In which machine all of the moves for an alphabet must be specified?
- A Finite Automata B NFA
 C NFA – Λ D All of the above
62. $(a+b)^*$ represents
- A Null String B String starting with a
 C All Strings of a's and b's D None of the above
63. Conversion from NFA to DFA is done by
- A Kleen's Theorem B Cook's Theorem
 C Minimization Algorithm D Subset construction
64. Which of the following is a top down parser ?
- A Recursive descent parser B Operator precedence parser
 C An LR (k) parser D An LALR (k) parser
65. Which of the following is not performed during compilation ?
- A Type checking B Dynamic memory allocation
 C Inline expansion D Symbol Table Management
66. Which one of the following is FALSE?
- A User level threads are not scheduled by the kernel. B Context switching between user level threads is faster than context switching between kernel level threads.
 C Kernel level threads cannot share the code segment D When a user level thread is blocked, all other threads of its process are blocked.

67. Which of the following requires a device driver ?

A Register	B Cache
C Main Memory	D Disk

68. The root directory of a disk should be placed

A At a fixed address in main memory	B At a fixed location on the disk
C At a fixed location on the system disk	D Any where on the disk

69. Which of the following scheduling does not suffer from starvation ?

A Shortest Job First	B Round Robin
C Priority queuing	D None of the above

70. An operating system implements a policy that requires a process to release all the resources before making a request to another resource. Select the TRUE statement from the following.

A Starvation can occur but deadlock can not occur	B Starvation cannot occur but deadlock can occur
C Both starvation and deadlock can occur	D None of the above

71. Which of the following is not shared by the threads of the same process ?

A Stack	B Address space
C File Descriptor Table	D Message queue

72. A counting semaphore was initialized to 10. Then 6 P(wait) operations and 4 V(signal) operations were completed on this semaphore. The resulting value of semaphore is

A 0	B 8
C 10	D 12

73. If the time-slice used in RR scheduling policy is more than the maximum time required to execute any process, then policy will

A Degenerate to SJF scheduling	B Degenerate to priority scheduling
C Degenerate to FCFS scheduling	D Can't say

74. Consider the join of a relation R with a relation S. If R has m tuples and S has n tuples, then the maximum and minimum sizes of the join respectively are:

A $m+n$ and 0	B mn and 0
C $m+n$ and $m-n$	D mn and $m+n$

75. In functional dependency Armstrong inference rules refers to

- A Reflexive, Augmentation and Decomposition B Augmentation, Transitive, Reflexive and Decomposition
- C Reflexive, Transitive and Decomposition D Transitive, Augmentation and Reflexive
76. Which of the following concurrency control protocols ensure both conflict serializability and freedom from deadlock?
I. 2-phase locking
II. Time-stamp ordering
A I only B II only
C Both I and II D Neither I nor II
77. Precompiled queries are faster in RDBMS as
A They are stored in special memory B Database engines gives them priority
C They are compiled once only D All of the above
78. RDBMS uses Mathematical concepts to relate the tables.
A Set Theory B Boolean Algebra
C Both A and B D None of the above
79. Which of the following is correct with respect to Two phase commit protocol?
A Prevents Deadlock B Detects Deadlock
C Recover from Deadlock D Ensures serializability
80. Which one of these is characteristic of RAID 5?
A Dedicated parity B Double parity
C Distributed parity D Hamming code parity
81. The rank of a matrix $\begin{bmatrix} 6 & 0 & 0 \\ 4 & 2 & 0 \\ 1 & 5 & 3 \end{bmatrix}$ is
A 2 B 3
C 0 D 1
82. A linear system $x + 3y + 5z = 1$, $2x + 6y + 10z = 2$, $x - y - 2z = 5$ has
A Unique solution B No Solution
C Infinite number of solutions D None of these
83. If $A = \begin{bmatrix} 5 & 1 & 3 \\ 0 & 6 & 2 \\ 0 & 0 & 7 \end{bmatrix}$ then eigen values of A^{-1} are
A 5, 6, 7 B 1, 2, 3
C $\frac{1}{5}, \frac{1}{6}, \frac{1}{7}$ D 6, 2, 3
84. If $A = \begin{bmatrix} 1 & 0 & 0 \\ 2 & 4 & 0 \\ 5 & 3 & 2 \end{bmatrix}$ then $A^3 - 7A^2 + 14A - 8I$ is equal to
A Null Matrix B Identity Matrix

- 85 C Non-Singular Matrix D None of these
 $\lim_{x \rightarrow 0} \frac{8 \tan x - 7 \sin x}{x^2}$ is equal to
A 1 B 2
C 3 D 0
- 86 The value of improper integral $\int_0^\infty e^{-x} dx$ is
A 0 B 1
C 2 D -1
- 87 If $U = \tan^{-1} \left(\frac{xy}{x^2 - y^2} \right)$ then $x \frac{\partial U}{\partial x} + y \frac{\partial U}{\partial y}$ is equal to
A 0 B U
C 2U D 3U
- 88 If $\phi = xyz$ then $\text{curl}(\text{grad} \phi)$ is
A $\nabla \phi$ B $\nabla^2 \phi$
C $\mathbf{0}$ D $\nabla^3 \phi$
- 89 The value of $\oint_C xy dx + 3x^2 dy$, where C is square bounded by $x = 0$, $x = 1$, $y = 0$ and $y = 1$ is
A $\frac{5}{2}$ B $\frac{2}{5}$
C 5 D 2
- 90 Solution of $(2xy + e^y)dx + (x^2 + xe^y)dy = 0$ is
A $xy + x e^y = c$ B $xy + e^y = c$
C $x^2 y + x e^y = c$ D $x^2 y^2 + e^y = c$
- 91 Solution of $\frac{d^2 y}{dx^2} - 4 \frac{dy}{dx} + 4y = e^{2x}$ is
A $C_1 e^{2x} + C_2 e^{-2x} + x^2 e^{2x}$ B $(C_1 + C_2 x) e^{-2x} + x^2 e^{-2x}$
C $(C_1 + C_2 x) e^{2x} + \frac{x^2}{2} e^{2x}$ D $(C_1 x + C_2 x^2) e^{2x} + \frac{x^2}{2}$
- 92 Inverse Laplace transformation of $\frac{1}{(s-3)(s-4)(s-7)}$ is
A $\frac{1}{4} e^{3t} - \frac{1}{3} e^{4t} + \frac{1}{12} e^{7t}$ B $e^{3t} - e^{4t} + e^{7t}$
C $e^{2t} - e^{3t} + e^{7t}$ D $t(e^{3t} - e^{4t} + e^{7t})$
- 93 Which one is Analytic function
A \bar{Z} B $Z\bar{Z}$
C $|Z|$ D Z^2
- 94 Value of $\int_C \frac{z^2}{z-2} dz$, (where C is $|Z - 2| < 1$) is
A πi B $6\pi i$
C $8\pi i$ D $2\pi i$
- 95 Residue of $f(Z) = \frac{Z-1}{Z^2(Z-3)}$ at simple pole is
A 2 B 9
C $\frac{2}{9}$ D 0
- 96 Newton-Raphson iteration formula for $x^2 + x - 1 = 0$ is
A $x_{n+1} = \frac{2x_n^2 + 1}{2x_n}$ B $x_{n+1} = \frac{x_n^2 - 1}{2x_n + 1}$

- C $x_{n+1} = \frac{x_n^2 + 1}{2x_n - 1}$ D $x_{n+1} = \frac{x_n^2 + 1}{2x_n + 1}$
- 97 Value of integral $\int_0^1 \frac{1}{1+x^2} dx$ using Simpson's 1/3 rule with step size $h = 0.5$ is
 A 0.78333 B 0.87333
 C 0.68333 D 0.74333
- 98 If $\frac{dy}{dx} = x^2 - y$, $y(0) = 1$, $h = 0.1$, by Rungee-Kutta third order method to what is an approximate value of $y(0.1)$
 A 0.9832 B 0.9578
 C 0.8048 D 0.9051
- 99 If a card is chosen from a standard deck of cards, what is the probability of getting a diamond or club ?
 A $\frac{1}{2}$ B $\frac{1}{4}$
 C $\frac{1}{3}$ D $\frac{1}{6}$
- 100 In a normal distribution $E(X - \mu)^2$ is
 A Variance B Mean
 C Percentile D Quantile