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JECA 2025

PAPER

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(MCA-JNU)

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Duration: 2 Hours **No. of MCQ :** 100 **Full Marks:** 120

INSTRUCTIONS

1. All questions are of objective type having four answer options for each.
2. Category-1 : Carries 1 mark each and only one option is correct. In case of incorrect answer or any combination of more than one answer, ¼ mark will be deducted.
3. Category-2 : Carries 2 marks each and one or more option(s) is/are correct. If all correct answers are not marked and no incorrect answer is marked, then score = 2 × number of correct answers marked · actual number of correct answers. If any wrong option is marked or if any combination including a wrong option is marked, the answer will be considered wrong, but there is **no negative marking** for the same and zero mark will be awarded.
4. Questions must be answered on OMR sheet by darkening the appropriate bubble marked A, B, C, or D.
5. Use only **Black/Blue ink ball point pen** to mark the answer by filling up of the respective bubbles completely.
6. Write question booklet number and your roll number carefully in the specified locations of the OMR Sheet. Also fill appropriate bubbles.
7. Write your name (in block letters), name of the examination center and put your signature (as is appeared in Admit Card) in appropriate boxes in the **OMR Sheet**.
8. The OMR sheet is liable to become invalid if there is any mistake in filling the correct bubbles for question booklet number/roll number or if there is any discrepancy in the name/signature of the candidate, name of the examination center. The OMR Sheet may also become invalid due tofolding or putting stray marks on it or any damage to it. The consequence of such invalidation due to incorrect marking or careless handling by the candidate will be the sole responsibility of candidate.
9. Candidates are not allowed to carry any written or printed material, calculator, pen, log-table, wristwatch, any communication device like mobile phones, bluetooth device etc. inside the examination hall. Any candidate found with such prohibited items will be **reported against** and his/her candidature will be summarily cancelled.
10. Rough work must be done on the question booklet itself. Additional blank pages are given in the question booklet for rough work.
11. Hand over the OMR Sheet to the invigilator before leaving the Examination Hall.

Category-1 (Q. 1 to 80)

(Carry 1 mark each. Only one option is correct. Negative marks: - 14)

1. Which of the following options with grep is used to ignore case while searching?
   (A) -n (B) -i
   (C) -r (D) -c
2. An artificially intelligent car decreases its speed based on its distance from the car in front of it. Which algorithm is used?
   (A) Naïve-Bayes
   (B) Decision Tree
   (C) Linear Regression
   (D) Logistic Regression
3. Which of the following statements is true about paging and fragmentation?
   (A) Paging suffers from internal fragmentation but not external fragmentation.
   (B) Paging suffers from external fragmentation but not internal fragmentation.
   (C) Paging suffers from both internal and external fragmentation.
   (D) Paging does not suffer from any kind of fragmentation.
4. What is the best case time complexity of deleting a node in a Singly Linked List?
   (A) O(n) (B) 0 (log n)
   (C) O(n log n) (D) 0(1)
5. Which process model is best suited when requirements are well understood and unlikely to change?
   (A) Incremental Model (B) Waterfall Model
   (C) Spiral Model (D) Agile Mode
6. Which one is not a part of Process Control Block (PCB)?
   (A) Process state
   (B) Program counter
   (C) CPU registers
   (D) Source code of the program
7. There is a possibility of a cascading rollback when
   (A) A transaction writes items that have been written only by a committed transaction.
   (B) A transaction writes items that is previously written by an uncommitted transaction.
   (C) A transaction reads an items that is previously written by an uncommitted transaction.
   (D) Both (B) and (C)
8. Which of the following traversal techniques lists the nodes of a binary search tree in ascending order?
   (A) Inorder (B) Preorder
   (C) Postorder (D) None of these
9. The IP address 10.5.6.7 belongs to which class?
   (A) Class A (B) Class B
   (C) Class C (D) Class D
10. What is the worst case time complexity to access an element in a binary search tree?
    (A) O(n) (B) O(n * logn)
    (C) 0(1) (D) 0(log n)
11. What will be output of the following code snippet?

```
#include <stdio.h>
int main() {
int i;
for (i = l; I < = 5; i++) {
if (i == i)
continue;
printf("%d", i);
}
return 0;
}
```

    (A) 12345 (B) 2345
    (C) 1234 (D) No output
12. Which of the following is not a type of computer code?
    (A) EDIC (B) ASCII
    (C) BCD (D) EBCDIC
13. The sequence of events that happen during a typical fetch operation is
    (A) PC → MAR → Memory → MDR → IR
    (B) PC → Memory → MDR → IR
    (C) PC → Memory → IR
    (D) PC → MAR → Memory → IR

14. Which of the following represents postorder traversal of a binary tree?
(A) Root → Left → Right
(B) Left → Root → Right
(C) Left → Right → Root
(D) Right → Left → Root

15. What is the range of unsigned int in C?
(A) 32,768 to + 32,767
(B) 1 to +32,767
(C) 0 to 65535
(D) 1 to 65536

16. Which of the following pairs correctly matches the type of testing with its main focus or environment?
(A) White Box End – user feedback
(B) Alpha Testing – Developer site
(C) Beta Testing – Internal logic testing
(D) Black Box – Code coverage analysis

17. Hidden Markov Models assume the system is
(A) Deterministic (B) Linear
(C) Stochastic (D) Static

18. A system has a 16-bit data bus and a 20-bit address bus. What is the maximum amount of data (in bytes) the system can directly address in memory?
(A) 2^{20} bytes = 1 MB (B) 2^{16} bytes = 64 KB
(C) 2^{20} words = 2 MB (D) 2^{36} bytes = 64 GB

19. Which of the following can be done with Linked List?
(A) Implementation of Stacks and Queues
(B) Implementation of Binary Trees
(C) Implementation of Data Structures that can simulate Dynamic Arrays
(D) All of the above

20. Which testing strategy is performed without knowledge of the internal code?
(A) Black-box Testing
(B) Unit Testing
(C) Structural Testing
(D) White-box Testing

21. Which of the following best distinguishes a sequential circuit from a combinational circuit?
(A) Sequential circuits produce output based only on current inputs.
(B) Sequential circuits use both current inputs and past states to determine output.
(C) Combinational circuits have memory elements to store past states.
(D) Combinational circuits require a clock signal to operate.

22. What is the key benefit of using deep learning for tasks like recognizing images?
(A) They need less training data than other methods.
(B) They're easier to explain and understand than other models.
(C) They can learn complex details from the data on their own.
(D) They work faster and are more efficient computationally.

23. What will be the output of the following C code?

```
#include <stdio.h>
int main() {
int a 10:
int p &a
printf("%d\n", *p);
return 0;
}
```

(A) Address of the variable a
(B) Garbage value
(C) Compilation error
(D) 10

24. The purpose of an activation function in a neural network is to
(A) Initialize weights
(B) Add non-linearity
(C) Normalize input
(D) Optimize gradients

25. Which testing approach specifically ensures that all logical conditions in a decision are tested at least once?
(A) Statement Coverage
(B) Branch Coverage
(C) Path Coverage
(D) Condition Coverage

26. What is the value of the postfix expression 6 3 2 4 + – * ?
(A) -18 (B) 18
(C) 22 (D) 40

27. Which of the following is a deadlock avoidance algorithm?
(A) First-Come, First-Served (FCFS)
(B) Banker's Algorithm
(C) Round Robin (RR)
(D) Shortest Remaining Time First (SRTF)

28. A data dictionary is a special file that contains
(A) The names of all fields in all files.
(B) The data types of all fields in all files.
(C) The width of all fields in all files.
(D) All of these

29. Which of the following is the correct sequence of stages in a basic instruction pipeline?
(A) Fetch → Decode → Execute
(B) Decode → Fetch → Execute
(C) Execute → Decode → Fetch
(D) Fetch → Execute → Decode

30. _____ contains firmware that boots the system.
(A) ROM (B) RAM
(C) Cache (D) DMA controller

31. In an operating system, a thread is best described as
(A) A program in execution.
(B) The smallest unit of CPU scheduling.
(C) A process that has finished execution.
(D) A collection of processes.

32. Which of the following protocols is connectionless and provides unreliable data delivery?
(A) TCP (B) IP
(C) UDP (D) Both (B) and (C)

33. Which application layer protocol is primarily used for sending email?
(A) IMAP (B) POP3
(C) SMTP (D) FTP

34. In the context of software quality management, which of the following focuses on preventing defects rather than detecting them?
(A) Quality Control
(B) Quality Assurance
(C) Software Testing
(D) Debugging

35. Which field in the IPv4 header helps uniquely identify fragments of a datagram so they can be reassembled correctly?
(A) Identification
(B) Time to Live (TTL)
(C) Protocol
(D) Flags

36. The physical relationship of record is determined by a mathematical formula that transforms a file key into a record location in
(A) a B-tree file.
(B) an indexed file.
(C) a hashed file.
(D) a sequential file.

37. Read the following statements about functions in C and choose the correct option:
(i) A function in C can return only one value directly.
(ii) Function names can be the same as variable names in the same scope.
(iii) A function must always take at least one argument.
(iv) Recursion is allowed in C functions.
(A) All statements are correct.
(B) Only statements (i) and (iv) are correct.
(C) Only statements (ii) and (iii) are correct.
(D) None of the statements are correct.

38. Which of the following statements about structures and unions in C is true?
(A) In a structure, all members share the same memory location.
(B) In a union, all members have separate memory locations.
(C) The size of a union is equal to the size of its largest member.
(D) The size of a structure is always equal to the sum of the sizes of its members, without any padding.

39. Which of the following scheduling algorithms can work in both preemptive and non-preemptive modes?
(A) First-Come, First-Served (FCFS)
(B) Shortest Job First (SJF)
(C) Priority Scheduling
(D) Round Robin (RR)

40. In a circular queue of size n, when is the queue considered full?
(A) Front = = Rear
(B) (Rear + 1) % n = = Front
(C) Rear = = n
(D) Front = = 0

41. Which of the following statements regarding relational algebra are true?
(i) $R \infty_{<condition>} S \equiv \sigma_{<condition>} (R \times S)$
(ii) $R \infty_{<condition>} S \equiv \prod_{<condition>} (R \times S)$
(iii) $R \infty_{<condition>} S \equiv R * \rho_{<list} S$
(A) Only (i). (B) Only (ii).
(C) Only (iii). (D) None of these

42. Which of the following types of memory is non-volatile?
(A) RAM (B) Cache
(C) Register (D) EPROM

43. Which type of fragmentation occurs inside allocated memory blocks?
(A) Internal fragmentation
(B) External fragmentation
(C) Paging fragmentation
(D) Compaction fragmentation

44. What will be output of the following code snippet?

```
#include <stdio.h>
int main() {
float x = 5;
if (x > 10)
printf ("Greater");
else if (x = 10)
printf("Equal");
else
printf("Smaller");
return 0;
}
```

(A) Greater (B) Equal
(C) Smaller (D) No output

45. What will be the output of the following program?

```
#include<stdio.h>
#include<string.h>
int main() {
char strl [20] "Hello"
char str2 [20] "Hello";
strcpy (str2, strl);
if (strcmp(strl, str2) 0)
printf("Equal\n");
else
printf("Not Equal\n");
return 0;
}
```

(A) Equal (B) Not Equal
(C) Compiler Error (D) Undefined Behavior

46. Packet switching means:
(A) Sending data as a continuous bit stream
(B) Using fixed data circuits for each transmission
(C) Dividing data into packets and sending independently
(D) Switching physical cables between transmissions

47. The order of an algorithm that finds whether a given Boolean function of n variables produces 1 is
(A) constant (B) linear
(C) logarithmic (D) exponential

48. In SVMs, the margin is defined as
(A) The perpendicular distance from the decision boundary to the closest support vector.
(B) The Euclidean distance between the two farthest data points in the dataset.
(C) The difference in predicted probabilities between the two classes.
(D) The perpendicular distance from any point to the hyperplane along the normal vector.

49. Choose the correct statement:
(A) An alternate key is a candidate key, that is not a primary key
(B) An alternate key is a primary key, that is not a candidate key.
(C) An alternate key is a candidate key, that is also a primary key
(D) None of the above

50. What happens when a recursive function in C lacks a proper base condition?
(A) The function executes only once and terminates.
(B) The compiler shows a syntax error.
(C) It leads to infinite recursion and eventually a stack overflow.
(D) The function automatically converts to an iterative form.

51. A functional dependency of the form $X \rightarrow Y$ is trivial if
(A) $Y \subseteq X$ (B) $Y \subset X$
(C) $X \subseteq Y$ (D) $X \subset Y$ and $Y \subset X$

52. In the OSI model, which layer is responsible for detecting errors cansed during physical transmission?
(A) Physical Layer (B) Transport Layer
(C) Data Link Layer (D) Session Layer

53. If one attribute is a determinant of a second, which in turn is a determinant of a third, then the relation cannot be
(A) well-structured (B) in INF
(C) in 2NF (D) in 3NF

54. Which Unix command will change the group ownership of the file report.txt to the group staff?
(A) chmod staff report.txt
(B) chown staff report.txt
(C) groupadd staff report.txt
(D) charp staff report.txt

55. In an entity relationship, y is the dominant entity and x is a subordinate entity. Then which one is incorrect?
(A) Operationally, if y is deleted, so is x.
(B) x is existence dependent on y
(C) Operationally, if x is deleted, so is y
(D) Operationally, if x is deleted, y remains same.

56. How many 2-input multiplexers are required to construct a 2^{10}-multiplexer?
(A) 1023 (B) 31
(C) 10 (D) 127

57. Which of the following is not a typical use of stacks?
(A) Expression evaluation
(B) Undo mechanism in editors.
(C) Recursion function call management
(D) Breadth-first search traversal

58. Which of the following is not a valid characteristic of SRAM?
(A) Faster than DRAM
(B) Expensive
(C) Volatile
(D) Requires frequent refreshing

59. Which of the following is not a supervised machine learning algorithm?
(A) K-means
(B) Naïve Bayes
(C) SVM for classification problems
(D) Decision tree

60. Which of the following statements about arrays in C is correct?
(A) Array indices in C start from 1.
(B) The size of an array must always be specified at runtime.
(C) An array name in C represents the address of the first element.
(D) Arrays in C can store elements of different data types.

61. Which type of routing automatically changes its path selection based on current network conditions like congestion or link failures?
(A) Static Routing (B) Default Routing
(C) Dynamic Routing (D) Adaptive Routing

62. A risk in a software project has a probability of occurrence of 0.3 and the potential loss if it occurs is estimated to be Rs.2,00,000. What is the Risk Exposure (RE) for this risk?
(A) Rs.60,000 (B) Rs.2,00,000
(C) Rs.6,000 (D) Rs.66,666

63. Which attack involves intercepting and altering communication between two parties without their knowledge?
(A) Phishing
(B) Man-in-the-Middle Attack
(C) Denial of Service (DoS)
(D) Spoofing

64. Which of the following testing methods is normally used as the acceptance test for a software system?
(A) Regression testing (B) Integration testing
(C) Unit testing (D) Functional testing

65. In the TCP/IP model, _____ is responsible for determining the best path for data packets to travel across interconnected networks.
(A) Application Layer
(B) Transport Layer
(C) Internet Layer
(D) Network Access Layer

66. In Unix, user wants to change the priority of a running process, which is the suitable command?
(A) nice (B) ps
(C) renice (D) kill

67. What is a dequeue?
(A) A queue implemented with both singly and doubly Linked Lists
(B) A queue with insert/delete defined for front side of the queue
(C) A queue with insert/delete defined for both front and rear ends of the queue
(D) A queue implemented with a doubly Linked List

68. Correct sequence of Risk Management process is
(A) Identification → Assessment → Prioritization → Mitigation → Monitoring → Documentation.
(B) Assessment → Identification → Prioritization → Mitigation → Monitoring → Documentation.
(C) Identification → Assessment → Mitigation → Prioritization → Monitoring → Documentation,
(D) Identification → Mitigation → Assessment → Prioritization → Monitoring → Documentation.

69. Which device is used to connect multiple devices within the same network segment and operates at the data link layer?
(A) Router (B) Gateway
(C) Switch (D) Modem

70. 1 nibble = _____ bits
(A) 2 bits (B) 4 bits
(C) 8 bits (D) 16 bits

71. Which command is used to find the number of lines, words and characters in a file in Unix?
(A) count (B) wc
(C) nl (D) cat

72. Which of the following points is/are not true about Linked List data structure when it is compared with an array?
(A) Random access is not allowed in a typical implementation of Linked Lists,
(B) Access of elements in Linked List takes less time than compared to arrays.
(C) Arrays have better cache locality that can make them better in terms of performance.
(D) It is easy to insert and delete elements in Linked List.

73. What is the key difference between supervised and unsupervised learning?
(A) Supervised learning requires labeled data, while unsupervised learning does not
(B) Supervised learning predicts labels, while unsupervised learning discovers patterns.
(C) Supervised learning is used for classification, while unsupervised learning is used for regression.
(D) Supervised learning is always more accurate than unsupervised learning.

74. In the process lifecycle, the queue where processes wait for CPU allocation is called the _____ queue.
(A) Ready (B) Waiting
(C) Job (D) Device

75. What does a firewall primarily do?
(A) Encrypts data
(B) Filters network traffic
(C) Detects viruses
(D) Manages network routing

76. In a graph of n nodes and n edges, how many cycles will be present?
(A) Exactly 1
(B) At most 1
(C) At most 2
(D) Depends on the graph

77. The running time T (n) of an algorithm for n input is given as follows:
T(n) = c + T(n-1), if n > 1
= d, if n≤ l.
Here c and d are constant.
(A) n^2 (B) n
(C) n^3 (D) n^n

78. Which metric gives the best measure of efficiency in a defect discovery process across software development phases?
(A) Defect Density
(B) Cyclomatic Complexity
(C) Defect Removal Efficiency (DRE)
(D) Mean Time to Failure (MTTF)

79. Which of the following statements about RAM is correct?
(A) Type of non-volatile memory used for permanent data storage.
(B) Retains data even when the power is turned off.
(C) Volatile memory used for temporary storage during program execution.
(D) Can only be read but not written to

80. Which design principle aims to reduce dependencies between modules?
(A) Cohesion (B) Coupling
(C) Modularity (D) Abstraction

Category-2 (Q. 81 to 100)

(Carry 2 marks each. One or more options are correct. No negative mark)

81. Which of the following are true about cyclomatic complexity?
(A) It measures the number of independent paths in a program.
(B) It measures the size of the program in lines of code.
(C) Higher Values indicate simpler code.
(D) It is calculated as E − N + 2, where E is edges and N is nodes.

82. Which of the following are advantages of using a linked list over arrays?
(A) Dynamic size allocation
(B) Faster random access
(C) Easier insertion and deletion
(D) All of these

83. A computer with 32 bit wide data bus uses 4K x 8 static RAM memory chips. The smallest memory of this computer is
(A) 32 KB (B) 16 KB
(C) 8 KB (D) 24 KB

84. A software module contains 1500 lines of code and 15 defects were found during testing. What is the defect density of the module?
(A) 0.01 defecta per KLOC
(B) 1 defect per KLOC
(C) 10 defects per KLOC
(D) 100 defecta per KLOC

85. A complete binary tree has 63 nodes. How many leaf nodes does it have?
(A) 16 (B) 32
(C) 42 (D) 48

86. Which of following units can be used to measure the speed of a computer?
(A) SYPS (B) MIPS
(C) BAUD (D) FLOPS

87. What is the output of the following C++ code?

```
#include <iostream>
using namespace std;
class Base {
public:
virtual void show() { cout<< "Base"; )
};
class Derived public Base
public:
void show() override (cout<<< "Derived"; }
};
int main() {
        Base* ptr;
        Derived d;
ptr &d
ptr->show();
return 0;
}
```

(A) Compilation error (B) Base
(C) Derived (D) Runtime error

88. A machine needs a minimum of 100 second to sort 1000 names by quick sort. The minimum time needed to sort 100 names will be approximately
(A) 6.7 second (B) 10 second
(C) 11.2 second (D) 50.2 second

89. Maximum data rate of a channel for noiseless 3 KHz binary channel is
(A) 3000 bps (B) 6000 bps
(C) 1500 bps (D) None of these

90. Consider the following operations on a singly linked list initially containing the elements:
10 → 20 → 30 → 40
(i) Insert 15 after 10.
(ii) Delete the node containing 30.
(iii) Insert 25 at the end of the list.
(iv) Delete the first node.
What will be the final sequence of elements in the linked list?
(A) 15 → 20 → 25 → 40
(B) 20 → 15 → 40 → 25
(C) 15 → 20 → 40→ 25
(D) 20 → 15 → 25→ 40

91. Find the output from the following C++ code snippet:

```
class A {
public:
void show () { cout<< "Class A\n", }
};
class B public A {
public:
void show() {
        A :: show();
cout<< "Class B"
        }
};
int main() {
        B obj;
obj.show();
return 0;
}
```

(A) Class A
(B) Class B
(C) Program will be in infinite loop
(D) Compilation error

92. The number of cross point needed for 10 lines cross point switch in full duplex in nature and there are no self connection is
(A) 45 (B) 100 (C) 50 (D) 20

93. What will be the output of this program?

```
#include <iostream>
using namespace std;
class Test {
public:
staticint x;
Test () { x++;}
void display() { cout<< x << " "; }
};
int Test : : x = 5;
int main() {
        Test tl;
t1.display();
        Test t2;
t2.display();
return 0;
}
```

(A) 67 (B) 66 (C) 77 (D) 55

94. In the context of Software Development Life Cycle (SDLC), which of the following statements is correct?
(A) The Spiral model focuses only on risk identification and not on risk mitigation.
(B) The Incremental model delivers the complete product only at the final iteration.
(C) In the Waterfall model, requirements can be changed at any phase without impact.
(D) The V-Model integrates testing activities corresponding to each development phase.

95. A testing phase executes 180 test cases out of 200 planned, with 162 passes and 18 failures. Which are true?
(A) Test execution coverage = 90%
(B) Test pass rate = 90%
(C) Requirement coverage = 85%
(D) All of these

96. What will be the output of the following C program?

```
#include <stdio.h>
int recur (int n) {
if (n = = 0)
return 0;
else
return n recur (n – 1);
}
int main() {
int result = recur (4);
printf("%d\n", result);
return 0;
}
```

(A) 10 (B) 6
(C) 4 (D) 0

97. A development team found 90 defects during the design phase of a project. However, 10 additional design defects were discovered during the testing phase. What is the Defect Removal Efficiency (DRE) for the design phase?
(A) 10% (B) 90%
(C) 80% (D) 95%

98. What will be the output of the following C code?

```
#include <stdio.h>
int main() {
int x;
        x = 4 < 3 ? 100 : 3 == 3 > 2 ? 50 : 75;
printf("%d", x);
return 0;
}
```

(A) Compilation Error (B) 100
(C) 50 (D) 75

99. Choose the correct answer:
If X is a Boolean variable then
(A) 0 + X = X (B) 1 + X = X
(C) X + X = X (D) None of these

100. Five elements P, Q, R, S, T are pushed onto a stack starting from P. The stack is then popped 4 times, and each popped element is inserted into a queue. Two elements are then deleted from the queue and pushed back onto the stack. Finally, one element is popped from the stack. What will be the popped element?
(A) P (B) Q
(C) R (D) S

ANSWER KEY

1	2	3	4	5	6	7	8	9	10
b	c	a	d	b	d	d	a	a	a
11	12	13	14	15	16	17	18	19	20
b	a	a	c	c	c	c	a	d	a
21	22	23	24	25	26.	27.	28.	29.	30.
b	c	d	b	d	a	b	d	a	a
31.	32.	33.	34.	35.	36.	37.	38.	39.	40.
b	d	c	b	a	c	b	c	c	b
41.	42.	43.	44.	45.	46.	47.	48.	49.	50.
a	d	a	b	a	c	d	a	a	c
51.	52.	53.	54.	55.	56.	57.	58.	59.	60.
a	c	d	d	c	a	d	d	a	c
61.	62.	63.	64.	65.	66.	67.	68.	69.	70.
c	a	b	d	c	c	c	a	c	b
71.	72.	73.	74.	75.	76.	77.	78.	79.	80.
b	b	a	a	b	a	b	c	c	c
81.	82.	83.	84.	85.	86.	87.	88.	89.	90.
a,d	a,c	b	c	b	b,d	c	a	b	c
91.	92.	93.	94.	95.	96.	97.	98.	99.	100.
a,b	a	a	d	a,b	a	b	d	a,c	d