Paper Code No- **M51**

Question Booklet No. 651501

ENTRANCE EXAMINATION-2017

M.Tech. (Computer Engineering)

[Set A]

ROLL NO. | | | | | | | | | |

.....

Signature of Invigilator

Time: 2 Hours

Total Marks: 85

Instructions to Candidates

1. Do not write your name or put any other mark of identification anywhere in the OMR Answer Sheet. **IF ANY MARK OF IDENTIFICATIONS IS DISCOVERED ANYWHERE IN OMR ANSWER SHEET, the OMR sheet will be cancelled, and will not be evaluated.**
2. This Question Booklet contains this cover page and a total of **85 Multiple Choice Questions of 1mark.** Space for rough work has been provided at the beginning and end. Available space on each page may also be used for rough work.
3. Each correct answer carries one mark.
4. There is negative marking in Multiple Choice Questions. For each wrong answer 0.25 marks will be deducted.
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11. There are four alternative answers to each question marked A, B, C and D. Select one of the answers you consider most appropriate and fill up the corresponding oval/circle in the OMR Answer Sheet provided to you. The correct procedure for filling up the OMR Answer Sheet is mentioned below.
12. Use Black or Blue Ball Pen only for filling the ovals/circles in OMR Answer Sheet while answering the Questions. For your Choice of answers darken the correct oval/circle completely. If the correct answer is 'B', the corresponding oval/circle should be completely filled and darkened as shown below.

CORRECT METHOD

(A) (●) (C) (D)

WRONG METHOD

(A) (⊗) (C) (D) (A) (✓) (C) (D) (A) (●) (C) (D) (A) (●) (C) (D) ( ) (●) (C) (D) (A) (●) (C) (●)

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SET-A

1.	The output of initial permutation in DES ----------, if the input is 0x0002000000000001. A. 0x0000006000000020 B. 0x0000008000000020 C. 0x0000006000000002 D. 0x0000008000000002
2.	Which of the following is not used for the primality test? A. Naïve method B. Miller Rabin C. Divisibility D. Rabin Karp
3.	GAIT is a type of ---------- authentication method. A. Text password B. Biometric authentication C. Authentication token D. Certificate based authentication
4.	A hashing function for digital signature (i) Must give a hashed message which is shorter than the original message (ii) Must be hardware implementable (iii) Two different messages should not give the same hashed message (iv) Is not essential for implementing digital signature A. i and iii B. i and ii C. ii and iii D. iii and iv
5.	WPA2 is used for security in A. Ethernet B. Bluetooth C. Wi-Fi D. ZigBee
6.	The value of 23^{-1} mod 100 is: A. 97 B. 77 C. 87 D. 46
7.	An IP packet has arrived with the first few hexadecimal digits as: 45000028000100000102--------, How many hops can this packet travel before being dropped? A. One B. Two C. Three D. Four
8.	The Loopback address in IPV6 is A. ::/127 B. ::/128 C. ::/120 D. ::/124
9.	GRANT command of SQL is a: A. Data query language B. Data control language C. Data definition language D. Data manipulation language
10.	Which of the following transformation is referred as commutative of SELECTION in DBMS? A. $\sigma_{c1} \wedge \sigma_{c2}$ ------ $\wedge \sigma_{Cn}(R) \equiv \sigma_{c1}(\sigma_{c2}($ ------ $(\sigma_{Cn}(R)$ ---- $))$ B. $\sigma_{c1}(\sigma_{c2}(R)) \equiv \sigma_{c2}(\sigma_{c1}(R))$ C. $\pi_L \pi_M$ ---------- $\pi_N(R) \equiv \pi_L$ D. $\pi_{A1,A2}$ ---------- $\pi_{AN}(\sigma_\delta(R)) \equiv (\sigma_C(\pi_{A1,A2}$ ---------- $_{AN}(R))$
11.	For the renaming purpose, the symbol used in relational algebra is : A. ρ B. σ C. π D. Υ

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12. In an RDBMS a 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 :

A. 2 and 6 respectively
B. 6 and 2 respectively
C. 4 and 2 respectively
D. 2 and 4 respectively

13. The term granularity used in DBMS relates to

A. The size of the table
B. The size of the data item
C. The size of the tuple
D. The size of primary key

14. The following functional dependencies are given:
AB→CD, AF →D, DE→ F, C→ G, F→ E, G→ A, Which of the following option is false?

A.{CF}+ = {ACDEFG}
B. {BG}+ = {ABCDG}
C. {AF}+ = {ACDEFG}
D. {AB}+ = {ABCDFG}

15. A clustering index is defined on the fields which are of type

A. Non-key and ordering
B. Non-key and non-ordering
C. Key and ordering
D. Key and non-ordering

16. The function f: R-{2} →R defined by $f(x) = (x^2 + 2x)/(x-2)$ is:

A. one-one and onto
B. one-one but not onto
C. Neither one-one nor onto
D. Not one-one but onto

17. Suppose that the relation R on a set is represented by the matrix

$$M_R = \begin{pmatrix} 1 & 1 & 0 \\ 1 & 1 & 1 \\ 0 & 1 & 1 \end{pmatrix}$$

The above matrix is :

A. Reflexive, antisymmetric
B. Reflexive, symmetric
C. Reflexive, transitive
D. Equivalence relation

18. What is the solution of the linear non-homogeneous recurrence relation $a_n - 6a_{n-1} + 8a_{n-2} = 3^n$, where $a_0 = 3$, $a_1 = 7$?

A. $a_n = (7)(2^n) + (5)(4^n) + (-9)(3^n)$
B. $a_n = (5)(2^n) + (7)(4^n) + (-9)(3^n)$
C. $a_n = (7)(2^n) + (5)(4^n) + (9)(3^n)$
D. $a_n = (5)(2^n) + (7)(4^n) + (3^{n+2})$

19. Which of the following poset is a lattice?

A.1
B. 2
C. 3
D. 4

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20.	The sum of degrees in a graph is: A. 2|V| B. $\|V\|^2$ C. |E| D. 2|E|
21.	Kruskal's algorithm is used for finding: A. Minimal spanning tree B. Loop C. Path D. Cycle
22.	How many different non-isomorphic abelian groups of order 4 are there? A.2 B. 3 C. D. 5
23.	If the maximum degrees of a graph is equal to minimum degrees of graph, then the graph is called: A. Simple B. Planar C. Regular D. Bipartite
24.	Which of the following is tautology? A. $a \vee b \rightarrow b \wedge c$ B. $a \wedge b \rightarrow b \vee c$ C. $a \vee b \rightarrow b \vee c$ D. $a \wedge b \rightarrow b \wedge c$
25.	Assume that the operators '+', '-', '*' are left associative and '^' is right associative. The order of precedence (from highest to lowest) is ^, *, +, -. The postfix expression corresponding to the infix expression a + b * c – d ^ e ^ f is: A. abc * + def ^ ^ - B. abc * + de ^ f ^ - C. ab + c * d – e ^ f ^ D. - + * be ^ ^ def
26.	A binary search tree is generated by inserting the following integers in the order: 50, 15, 62, 5, 20, 58, 91, 3, 8, 37, 60, 60, 24. The number of nodes in the left subtree and right subtree of the root, respectively is: A.(4,7) B. (7,4) C. (8,3) D. (3,8)
27.	Which of the following sequences of array elements forms a heap? A. (23, 17, 14, 6, 13, 10, 1, 12, 7, 5) B. (23, 17, 14, 6, 13, 10, 1, 5, 7, 12) C. (23, 17, 14, 7, 13, 10, 1, 5, 6, 12) D. (23, 17, 14, 7, 13, 10, 1, 12, 5, 7)
28.	The number of leaf nodes in a rooted tree of n nodes, with each node having 0 or 3 children is: A. n/2 B.(n-1)/3 C. (n-1)/2 D. (2n-1)/3
29.	The balance factor of height balance tree is: A.1, 2, 1 B. -1, 2, -1 C. -1, 0, 1 D. 1, 0, 1
30.	A hash table contains 10 buckets and uses linear probing to resolve collisions. The key values are integers and the hash function used is key %10. If the values 43, 165, 62,123,142 are inserted in the table, in what location would the key value 142 be inserted? A. 2 B. 3 C. 4 D. 6

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31.	In tree construction, which one will be suitable and efficient data structure? A. Queue B. Linked list C. Heap D. String
32.	The best data structure to check whether an arithmetic expression has balanced parentheses is: A. Queue B. Linked list C. Tree D. Stack
33.	After evaluating the following postfix expression the result will be: 10 5 + 60 / * 8 - A.284 B. 213 C. 142 D. 71

34.	What will be the output of the program written in C?
	#include <stdio.h>
	void main()
	{
	printf("%x", -1<<4);
	}
	A. fff0
	B. ffff
	C. -1
	D. 0

35.	What will be the output of the program written in C?
	#include <stdio.h>
	int main()
	{
	char *str;
	str = "%s";
	printf(str, "K\n");
	return 0;
	}
	A. Error in the program
	B. No output
	C. K
	D. %s

36.	Runtime polymorphism in object oriented programming is achieved by A. Friend function B. Operator overloading C. Virtual function D. Function overloading
37.	Which of the statements are true ? I. Function overloading is done at compile time. II. Protected members are accessible to the member of derived class. III. A derived class inherits constructors and destructors. IV. A friend function can be called like a normal function. V. Nested class is a derived class. A. I, II, III B. II, III, V C. III, IV, V D. I, II, IV
38.	If we create a file by 'ifstream', then the default mode of the file is _____ A. ios :: app B. ios :: binary C. ios :: out D. ios :: in

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39. Which of the following is correct?
A. Constructors return values
B. Constructors can't be overloaded
C. Destructors do not have return values.
D. There can be any number of constructors and destructors.

40. The order in which operands are evaluated in an expression is predictable if the operator is:
A.* B. +
C. % D. &&

41. What is the difference between overloaded functions and overridden functions?
A. Overloading is a dynamic or run-time binding and Overriding is static or compile-time binding
B. Redefining a function in a friend class is called function overriding while redefining a function in a derived class is called an overloaded function.
C. Overloading is a static or compile-time binding and Overriding is dynamic or run-time binding
D. Redefining a function in a friend class is called function overloading while redefining a function in a derived class is called as overridden function.

42. Assume that we have constructor function for both Base and Derived classes. Now consider the declaration:

```
main ( )
{       Base *p = new Derived;          }
```

In what sequence, the constructor will be executed?
A. Derived class constructor is followed by Base class constructor.
B. Base class constructor is followed by Derived class constructor.
C. Base class constructor is never called.
D. Derived class constructor is never called.

43. If $f(n)= n^2 \log n$ and $g(n)= n(\log n)^{10}$ be two positive functions of n. Which of the following statement is correct?
A. $f(n) = O(g(n))$ and $g(n)\ O(f(n))$ B. $g(n) = O(f(n))$ and $f(n)\ O(g(n))$
C. $f(n) \neq O(g(n))$ and $g(n)\ O(f(n))$ D. $g(n) \neq O(f(n))$ and $f(n)\ O(g(n))$

44. Consider the following function

```
int unknown (int n) {
int i,j, k =0;
for(i =n / 2; i<= n; i++)
for(j= 2; j<= n; j= j*2)
k= k+ n/2;
return k;
}
```

The return value of the function is
A. $\Theta(n^2)$ B. $\Theta(n^3 \log n)$
C. $\Theta(n^3)$ D. $\Theta(n^2 \log n)$

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45.	What is the height of n-node, k-ary heap? A. $\Theta(\log_k n)$ B. $\Theta(nk)$ C. $\Theta(k \log_2 n)$ D. $\Theta(n/k)$
46.	The recurrence equation $T(1) = 1$ $T(n) = 2T(n-1) + n, \ n>=2$ evaluates to: A. $2^{n+1} - n - 2$ B. $2^n - n$ C. $2^{n+1} - 2n - 2$ D. $2^n + n$
47.	What is the minimum number of swaps required to sort n elements using selection sort in the worst case? A. $\Theta(n^2)$ B. $\Theta(n \log n)$ C. $\Theta(n)$ D. $\Theta(n^2 \log n)$
48.	To find all pairs of shortest distance in a graph, we can use: A. Recursion approach B. Bidirectional search approach C. Merging approach D. Dynamic programming approach
49.	The number of spanning trees for a complete graph with 7 vertices is : A. 5^7 B. 2^5 C. 7^7 D. 7^5
50.	A sorting technique is called stable if: A. It takes O (n log n) times. B. It maintains the relative order of occurrence non-distinct elements. C. It uses divide and conquer paradigm D. It takes o (n) space.
51.	Are we building the right product? This statement refers to: A. Testing B. Software quality assurance C. Validation D. Verification
52.	Alpha and beta testing are form of : A. Integration testing B. Acceptance testing C. System Testing D. Unit testing
53.	Modify the software to match changes in the ever-changing environment is called: A. Corrective maintenance B. Adaptive maintenance C. Perfective maintenance D. Preventive maintenance
54.	Booths coding in 8 bits for the decimal number -57 is: A. 0 – 100 + 1000 B. 0 – 1 + 100 – 10 + 1 C. 00 – 10 + 100 – 1 D. 0 – 100 + 100 -1

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55. Let f(w,x,y,z)= Σ (0,4,5,7,8,9,13,15). Which of the following expression are most equivalent to f?

I. $x'y'z'+w'xy'+wy'z+xz$

II. $w'y'z'+wx'y'+xz$

III. $x'y'z'+wx'y'+xyz+xy'z$

IV. $x'y'z'+wx'y'+w'y$

A. i only
B. ii and iv
C. iii and iv
D. iv only

56. How many 3 to 8 line decoders with an enable input are needed to construct a 6 to 64 line decoder without using any other logic gates?

A.7
B. 8
C. 9
D. 10

57. If P is a 16 bit signed integer. The 2's complement representation of P is $(F87B)_{16}$. The 2's complement representation of 8xP is:

A.$(987B)_{16}$
B. $(F878)_{16}$
C. $(187B)_{16}$
D. $(C3D8)_{16}$

58. Which one of the following expression doesn't represent exclusive NOR of x and y?

A. x ' XOR y '
B. x XOR y '
C. x ' XOR y
D. xy XOR x ' y '

59. A half adder is also known as:

A. NOR circuit
B. XNOR circuit
C. NAND circuit
D. XOR circuit

60. A ROM is used to store the table for multiplication of two 8 bit unsigned integers. The size of ROM required is:

A. 256k x 16
B. 64k x 8
C. 4k x 16
D. 64k x 16

61. The contents of the flag register after execution of the following program by 8085 microprocessor will be:

A. $(54)_H$
B. $(45)_H$
C. $(00)_H$
D. $(01)_H$

62. Which of the following addressing modes are suitable for program relocation at run time?

I. Absolute addressing
II. Based addressing
III. Relative addressing
IV. Indirect addressing

A. I and IV
B. I and II
C. II and III
D. I , II and IV

63. Consider a 4-way set-associative cache consisting of 128 lines with a line size of 64 words. The CPU generates a 20-bit address of a word in main memory. The number of bits in the TAG, LINE and WORD fields are:

A. 9, 6, 5
B. 7, 7, 6
C. 7, 5, 8
D. 9, 5, 6

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64. The term "cycle stealing" refers to:
A. Interrupt based data transfer
B. Polling mode data transfer
C. DMA based data transfer
D. Clock cycle overriding

65. Which of the following configurations for CPU is in decreasing order of operating speeds?
A. Hardwired control, vertical microprogramming, and horizontal microprogramming.
B. Hardwired control, horizontal microprogramming, and vertical microprogramming.
C. Horizontal microprogramming, vertical microprogramming, hardwired control.
D. Vertical microprogramming, horizontal microprogramming, hardwired control.

66. The correct matching for the following pairs is:

a. DMA I/O	1. High speed RAM
b. Cache	2. Disk
c. Interrupt I/O	3. Printer
d. Condition code registers	4. ALU

A. a→4, b→ 3, c → 1, d→ 2
B. a→ 4, b→ 3, c → 2, d→ 1
C. a→ 2, b→3, c → 4, d→ 1
D. a→2, b--> 1, c→3, d→4

67. The language generated by the following grammar is S→ aSa | bSb | ∈
A. $a^m b^n$ n >=0, m>= 0
B. $a^n b^m$ n >=1, m>= 1
C. Odd length palindrome
D. Even length palindrome

68. Given the following grammars:

G_1: S→AB | aaB

A→aA | ∈
B→bB | ∈

G_2: S→A | B

A→aAb | ab
B→abB | ∈

Which of the following is correct?

A. G_1 is ambiguous and G_2 is unambiguous grammars
B. G_1 is unambiguous and G_2 is ambiguous grammars
C. Both G_1 and G_2 are ambiguous grammars
D. Both G_1 and G_2 are unambiguous grammars

69. Which of the following four regular expressions are equivalent?
I. (00) * (∈ + 0)
II. (00)*
III. 0*
IV. 0(00)*

A. I and II
B. II and III
C. I and III
D. III and IV

70. Let L be a set of all binary strings whose last two symbols are the same. The number of states in the minimum state deterministic finite state automata accepting L is:
A. 5
B. 6
C. 7
D. 8

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71.	Given the language L= {ab, aa, baa}, which of the following strings are in L*? I. abaabaaabaa II. aaaabaaaa III. baaaaabaaaab IV. Baaaaaba A. I, II and III B. I, II and IV C. II, III and IV D. I, III and IV
72.	A language accepted by pushdown automata is: A. Context sensitive B. Regular C. Context free D. Recursive
73.	Given Σ = {a,b}, which one of the following is not countable? A. Set of all strings over Σ B. Set of all regular languages over Σ C. Set of all languages over Σ D. Set of all languages over Σ accepted by turing machine.
74.	Which of the following statement is true? A. SLR parser is more powerful than LALR B. LALR parser is more powerful than canonical LR parser C. The parsers SLR, canonical LR and LALR have the same power. D. Canonical LR parser is more powerful than LALR parser.
75.	Consider the grammar shown below: S→ CC C→ Cc | d The grammar is: A. LL(1) B. SLR(1) but not LL(1) C. LALR(1) but not SLR(1) D. LR(1) but not LALR(1)
76.	Which of the following is a top down parser? A. Operator precedence parser B. An LR(k) parser C. Recursive decent parser D. An LALR(k) parser
77.	Consider the following grammar S→ aB | aAb A→ bAb | a B→ Ab | ∈ How many backtracks are required to generate the string "aab" from the above grammar: A.1 B. 2 C. 3 D. 0

78.	Consider the grammar E → TE'
	E' → ∈/ +TE'
	T → FT'
	T' → ∈/ *FT'
	F → A / {E}
	What will be the Follow() of E?
	A.+, * B. a, {
	C. $, } D. $, {

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79.	A process executes the following code: for (i=0; i<n; i++) fork (); The total number of child process created is: A. n B. 2^n-1 C. 2^n D. 2^{n+1}-1
80.	Where does the swap space resides? A. RAM B. On chip cache C. ROM D. Disk
81.	The working set model is used in memory management to implement the concept of A. Segmentation B. Principle of locality C. Paging D. Thrashing
82.	A scheduling algorithm assigns priority proportional to the waiting time of a process. Every process starts with priority zero(the lowest priority). The scheduler re-evaluates the process priorities every T time units and decides the next process to schedule. Which one of the following is TRUE if the processes have no I/O operations and all arrive at time zero? A. This algorithm is equivalent to the round-robin algorithm B. This algorithm is equivalent to the first-come-first-serve algorithm C. This algorithm is equivalent to the shortest-job-first algorithm D. This algorithm is equivalent to the shortest-remaining-time-first algorithm
83.	Consider a disk system with 100 cylinders. the requests to access the cylinders occur in the following sequence: 4, 34, 10, 7, 19, 73, 2, 15, 6, 20 Assuming that the head is currently at cylinder 50. What is the time taken to satisfy all request if it takes 1 ms to move from one cylinder to adjacent one and shortest seek time first policy is used? A. 95 ms B. 110 ms C. 119 ms D. 276 ms
84.	Banker's algorithm is applied for: A. Deadlock avoidance B. Deadlock detection C. Deadlock recovery D. Both A and C
85.	Semaphore provides a solution for: A. Circular wait B. Mutual exclusion C. Process synchronization D. Deadlock detection

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Paper Code No- **BM51**

Question Booklet No. 651462

ENTRANCE EXAMINATION-2018

M.Tech. (Computer Engineering)

[Set B]

ROLL NO. | | | | | | | | | |

Signature of Invigilator

Time: 2 Hours

Total Marks: 85

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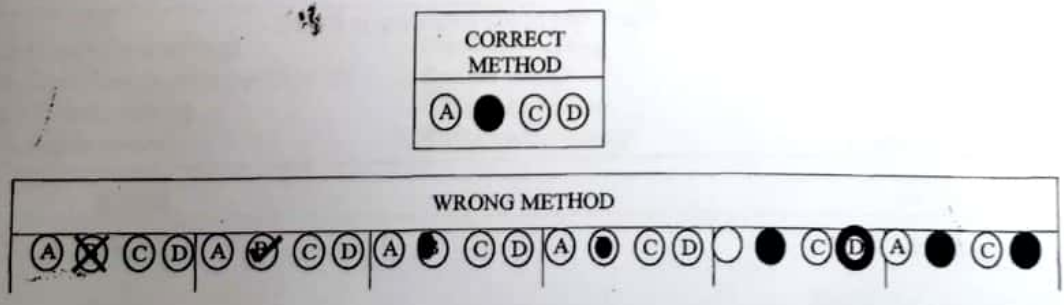

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SET-B

1. A process executes the code
fork ();
fork ();
fork ();
The total number of child processes created is:
A. 3
B. 4
C. 7
D. 8

2. If no exception is thrown:
A. a catch block will cause an error
B. the first catch block coded will execute
C. the last catch block coded will execute
D. any catch blocks coded will be bypassed

3. What is the time complexity of Bellman-Ford single-source shortest path algorithm on a complete graph of n vertices?
A. $\Theta(n^2)$
B. $\Theta(n^2 \log n)$
C. $\Theta(n^3)$
D. $\Theta(n^3 \log n)$

4. Match the following
List-I
a. Prim's algorithm for minimum spanning tree
b. Floyd-Warshall algorithm for all pairs shortest paths
c. Merge sort
d. Hamiltonian circuit
List-II
1. Backtracking
2. Greed method
3. Dynamic programming
4. Divide and conquer
Codes:

	a	b	c	d
A.	3	2	4	1
B.	1	2	4	3
C.	2	3	4	1
D.	2	1	3	4

5. Consider the following functions:
$f(n) = 2^n$
$g(n) = n!$
$h(n) = n^{\log n}$
Which of the following statements about the asymptotic behavior of f(n), g(n) and h(n) is true?
A. $f(n) = O(g(n)); g(n) = O(h(n))$
B. $f(n) = \Omega(g(n)); f(n) = O(h(n))$
C. $g(n) = O(f(n)); h(n) = O(f(n))$
D. $h(n) = O(f(n)); g(n) = \Omega(h(n))$

6. Suppose $T(n) = 2T(n/2) + n$, $T(0) = 1$. Which one of the following is False?
A. $T(n) = O(n^2)$
B. $T(n) = \theta(n \log n)$
C. $T(n) = \Omega(n^2)$
D. $T(n) = O(n \log n)$

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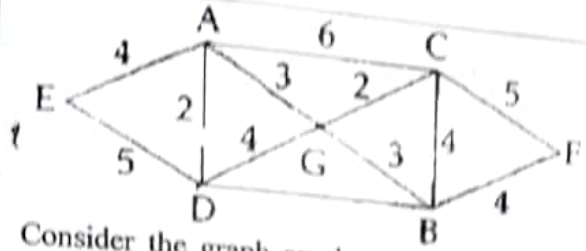
7. 

Consider the graph as above: Use Kruskal's algorithm to find a minimal spanning tree for the graph. The list of the edges of the tree in the order in which they are chosen, is?

A. AD, AE, AG, GC, GB, BF
B. GC, GB, BF, GA, AD, AE
C. GC, AD, GB, GA, BF, AE
D. AD, AG, GC, AE, GB, BF

8. The minimum number of scalar multiplication required, for parenthesization of a matrix-chain product whose sequence of dimensions for four matrices is <5,10,3,12,5>, is:

A. 630
B. 580
C. 480
D. 405

9. Consider the following binary search tree:

If we remove the root node, which of the node from the left subtree will be the new root?

A. 11
B. 12
C. 13
D. 16

10. All pair Shortest paths problem is efficiently solved using :

A. Dijkstra' algorithm
B. Bellman-Ford algorithm
C. Kruskal algorithm
D. Floyd-Warshall algorithm

11. Let S be an NP- complete problem and Q and R be two other problems not known to be in NP. Q is polynomial time reducible to S and S is polynomial time reducible to R. Which one of the following statement is true?

A. R is NP- complete
B. R is NP- hard
C. Q is NP- complete
D. Q is NP- hard

12. Match the following

List-I	List-II
a. Condition coverage	1. Black-box testing
b. Equivalence class partitioning	2. System testing
c. Volume testing	3. White-box testing
d. Alpha testing	4. Performance testing

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Codes:

	a	b	c	d
A.	2	3	1	4
B.	1	2	4	3
C.	3	1	4	2
D.	2	1	3	4

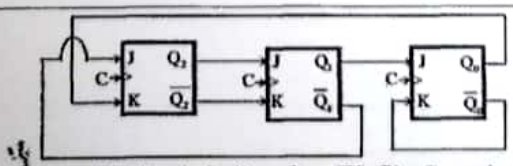
13. Software re-engineering is concerned with:
A. Re-constructing the original source code from the existing machine code program and modifying it to make it more user friendly
B. Scrapping the source code of a software and re-writing it entirely from scratch
C. Re-organizing and modifying existing software systems to make them more maintainable
D. Translating source code of an existing software to a new machine language.

14. Which of the following testing techniques ensures that the software products run correctly after the changes during maintenance?
A. Path testing
B. Integration testing
C. Unit testing
D. Regression testing

15. Which one of the following is not a software myth?
A. Once we write the program and get it to work, our job is done
B. Project requirement continually changes, but change can be easily accommodated because software is flexible
C. If we get behind schedule, we can add more programmers and catch up
D. If an organization does not understand how to control software project internally, it will invariably struggle when it outsources software projects

16. 58000 LOC gaming software is developed with effort of three person year. What is the productivity of person-month?
A. 1.0 KLOC
B. 1.6 KLOC
C. 4.8 KLOC
D. 4.2 KLOC

17. For a well understood data processing application. It is best to use the:
A. Waterfall model
B. Prototyping model
C. Evolutionary model
D. Spiral model

18. 

The above synchronous sequential circuit built using JK flip-flops is initialized with Q_2 Q_1 Q_0= 000. The state sequence for this circuit for the next 3 clock cycles is:
A. 001, 010, 011
B. 111, 110, 101
C. 100, 110, 111
D. 100, 011, 001

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19. A RAM chip has a capacity of 1024 words of 8 bits each (1K×8). The number of 2 × 4 decoders with enable line needed to construct a 16K ×16 RAM from 1K × 8 RAM is:
A. 4
B. 5
C. 6
D. 7

20. Consider a full adder with the following input values :
(a) x=1, y=0 and Ci(carry input) = 0
(b) x=0, y=1 and Ci = 1
Compute the values of S(sum) and C0 (carry output) for the above input values:
A. S=1 , C0= 0 and S=0 , C0= 1
B. S=0 , C0= 0 and S=1 , C0= 1
C. S=1 , C0= 1 and S=0 , C0= 0
D. S=0 , C0= 1 and S=1 , C0= 0

21. Which of the following is a correct statement?
A. In memory - mapped I/O, the CPU can manipulate I/O data residing in interface registers that are not used to manipulate memory words.
B. The isolated I/O method isolates memory and I/O addresses so that memory address range is not affected by interface address assignment.
C. In asynchronous serial transfer of data the two units share a common clock.
D. In synchronous serial transmission of data the two units have different clocks.

22.

CD \ AB	00	01	11	10
00	0	1	1	0
01	0	1	1	1
11	1	1	1	1
10	0	1	1	0

The Boolean function for the above Karnaugh map is:
A. (A + C).D + B
B. (A + B).C + D
C. (A + D).C + B
D. (A + C).B + D

23. The output of a logic gate is '1' when all its input are logic '0'. The gate is either:
A. A NAND or an EX-OR gate
B. A NOT or an EX-NOR gate
C. An OR or an EX-NOR gate
D. An AND or an EX-OR gate

24. Let A = 11111010 and B = 00001010 be two 8 bit 2's complement numbers. Their product in 2's complement is:
A. 11000100
B. 10011100
C. 10100101
D. 11010101

25. A positive AND gate is also a negative:
A. NAND gate
B. NOR gate
C. AND gate
D. OR gate

SET B

M.Tech. (C.E)

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26.	Which of the following circuit can be used as parallel to serial converter? A. Multiplexer B. Demultiplexer C. Decoder D. Digital counter
27.	Techniques that automatically move program and data blocks into the physical main memory when they are required for execution, are called: A. Associative Memory Mapping techniques B. Main Memory techniques C. Virtual Memory techniques D. Cache Memory techniques
28.	The contents of the flag register after execution of the following program by 8085 microprocessor will be: SUB A MVI B, $(01)_H$ DCR B HLT A. $(54)_H$ B. $(00)_H$ C. $(01)_H$ D. $(45)_H$
29.	Which of the following addressing modes are suitable for program relocation at run time? I. Absolute addressing II. Base addressing III. Relative addressing IV. Indirect addressing A. I and IV B. I and II C. II and III D. I, II and IV
30.	Which of the following code occupies more memory and worst performance in Booth's algorithm? A. 000111 B. 111000 C. 101010 D. 110011
31.	The minimum number of D flip flops needed to design a mod-258 counter, is: A. 9 B. 8 C. 512 D. 258
32.	For computers based on three-address instruction formats, each address field can be used to specify which of the following: S1: A memory operand S2: A processor register S3: An implied accumulator register A. Either S1 or S2 B. Either S2 or S3 C. Only S2 and S3 D. All S1, S2 and S3

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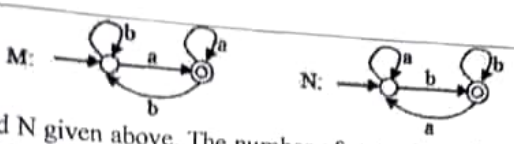
33. Which of the following is/are undecidable?
1. G is a CFG. Is L G ()= Φ ?
2. G is a CFG. Is L G () = Σ *?
3. M is a Turning machine. Is L(M) regular?
4. A is a DFA and N is a NFA. Is L(A)= L(N)?
A. 3 only
B. 3 and 4 only
C. 1, 2 and 3 only
D. 2 and 3 only

34. 

Consider the DFAs M and N given above. The number of states in a minimal DFA that accepts the language L(M) ∩ L(N) is ----------.
A. 0
B. 1
C. 2
D. 3

35. Which two of the following four regular expressions are equivalent:
I. (00)*(ε+0) II. (00)*
III. 0* IV. 0(00)*
A. I and II
B. II and III
C. I and III
D. I and IV

36. How many strings of length less than 4 contains the language described by the regular expression (x+y)*y(a+ab)*?.
A. 7
B. 10
C. 11
D. 12

37. Which of the following is not a regular expression?
A. [(a+b)*-(aa+bb)]*
B. [(0+1)-(0b+a1)*(a+b)]*
C. (01+11+10)*
D. (1+2+0)*(1+2)*

38. For a machine to surpass all the letters of alphabet excluding vowels, how much number of states in DFA would be required?
A. 3
B. 2
C. 22
D. 27

39. The total number of states and transitions required to form a Moore machine that will produce residue mod 3.
A. 3 and 6
B. 3 and 5
C. 2 and 4
D. 2 and 5

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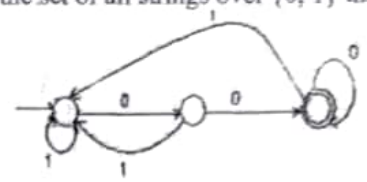
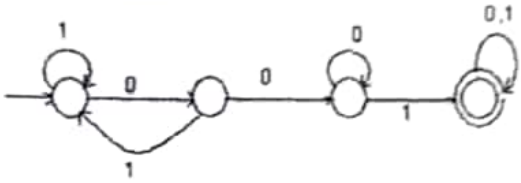
40. The DFA shown below accepts the set of all strings over {0, 1} that



A. End with 00
B. End with 0
C. Begin either with 0 or 1
D. Contain the substring 00

41. Figure shows deterministic finite state automaton M. Let the set of seven bit binary strings whose 1st, 4th and the last bits are 1, is denoted by S. How many strings in S is accepted by M?



A. 1
B. 3
C. 5
D. 9

42. Which one of the following statements is true for the C language?
A. It is a regular language
B. It is context-sensitive language
C. It is context-free language
D. It is parsable fully only by a Turing machine

43. Match the following:

P. Lexical analysis	1. Graph coloring
Q. Parsing	2. DFA minimization
R. Register allocation	3. Post-order traversal
S. Expression evaluation	4. Production tree

A. P-2, Q-3, R-1, S-4
B. P-2, Q-1, R-4, S-3
C. P-2, Q-4, R-1, S-3
D. P-2, Q-3, R-4, S-1

44. In a compiler, keywords of a language are recognized during the:
A. Parsing of the program
B. Code generation
C. Dataflow analysis
D. Lexical analysis of the program

45. Which of the following statements is false?
A. An unambiguous grammar has same leftmost and rightmost derivation
B. An LL(1) parser is a top-down parser
C. LALR is more powerful than SLR
D. An ambiguous grammar can never be LR(k) for any k

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46. Consider the grammar shown below.
$S \rightarrow C\ C$
$C \rightarrow c\ C \mid d$
The grammar is:
A. LL(1)
B. SLR(1) but not LL(1)
C. LALR(1) but not SLR(1)
D. LR(1) but not LALR(1)

47. The grammar $A \rightarrow AA \mid (A) \mid \varepsilon$ is not suitable for predictive-parsing because the grammar is:
A. Ambiguous
B. Left-recursive
C. Right-recursive
D. An operator-grammar

48. A system uses 3 page frames for storing process pages in main memory. It uses the Least Recently Used (LRU) page replacement policy. Assume that all the page frames are initially empty. What is the total number of page faults that will occur while processing the page reference string given below?

4, 7, 6, 1, 7, 6, 1, 2, 7, 2

A. 4
B. 5
C. 6
D. 7

49. An operating system uses shortest remaining time first scheduling algorithm for pre-emptive scheduling of processes. Consider the following set of processes with their arrival times and CPU burst times (in milliseconds):

Process	Arrival time	Burst time
P1	0	12
P2	2	4
P3	3	6
P4	8	5

The average waiting time (in milliseconds) of the processes is----------.
A. 4.5
B. 5.5
C. 6.5
D. 7.5

50. Consider a main memory with five page frames and the following sequence of page references: 3, 8, 2, 3, 9, 1, 6, 3, 8, 9, 3, 6, 2, 1, 3. Which one of the following is true with respect to page replacement policies First-In-First Out (FIFO) and Least Recently Used (LRU)?
A. Both incur the same number of page faults
B. FIFO incurs 2 more page faults than LRU
C. LRU incurs 2 more page faults than FIFO
D. FIFO incurs 1 more page faults than LRU

51. Which scheduling algorithm gives a minimum average waiting time?
A. RR
B. SJF
C. FCFS
D. Priority

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52.	In which of the following page replacement policies, Belady's anomaly may occur? A. FIFO B. Optimal C. LRU D. MRU
53.	An operating system contains three user processes each requiring 2 units of resource R. The minimum number of units of R such that no deadlocks will ever arise, is: A. 3 B. 4 C. 5 D. 6
54.	Relation R has eight attributes ABCDEFGH. Fields of R contain only atomic values. F= {CH →G, A →BC, B→ CFH, E→ A, F →EG} is a set of functional dependencies (FDs) so that F^+ is exactly the set of FDs that hold for R. How many candidate keys does the relation R have? A. 3 B. 4 C. 5 D. 6
55.	Which of the following is TRUE? A. Every relation is 3NF is also in BCNF B. A relation R is in 3NF if every non-prime attribute of R is fully functionally dependent on every key of R C. Every relation in BCNF is also in 3NF D. No relation can be in both BCNF and 3NF
56.	Consider the following transactions with data items P and Q initialized to zero: T1 : read (P) ; read (Q) ; if P = 0 then Q : = Q + 1 ; write (Q). T2 : read (Q) ; read (P) if Q = 0 then P : = P + 1 ; write (P). Any non-serial interleaving of T1 and T2 for concurrent execution leads to: A. A serializable schedule B. A schedule that is not conflict serializable C. A conflict serializable schedule D. A schedule for which precedence graph cannot be drawn
57.	Which one of the following is not a part of the ACID properties of database transactions? A. Atomicity B. Consistency C. Isolation D. Deadlock
58.	Which of the following concurrency control protocols ensure both conflict serializability and freedom from deadlock? I. Two phase locking II. Timestamping ordering A. I only B. II only C. Both I and II D. Neither I nor II

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59.	Which of the following is/are example(s) of stateful application layer protocols? I. HTTP II. FTP III. TCP IV. POP3 A. I and II only B. II and III only C. II and IV only D. IV only
60.	Which one of the following fields of an IP header is NOT modified by a typical IP router? A. Checksum B. Source address C. Time To Live D. Length
61.	The transport layer protocols used for real time multimedia, file transfer, DNS and email, respectively are: A. TCP, UDP, UDP and TCP B. UDP, TCP, TCP and UDP C. UDP, TCP, UDP and TCP D. TCP, UDP, TCP and UDP
62.	In class B network on the Internet has a subnet mask of 2555.255.248.0, then what is the maximum number of hosts per subnet? A. 1022 B. 1023 C. 2046 D. 2047
63.	One of the following is not the type of the active attack. A. Denial of Service B. Masquerades C. Fabrication D. Traffic analysis
64.	What is the value of $3^{12} \bmod 11$. A. 9 B. 10 C. 11 D. 12
65.	Digital signature is signed by a sender using: A. Sender public key B. Sender private key C. Receiver's public key D. Receiver's private key
66.	Consider the following statements: P: Good Laptops are not cheap Q: Cheap Laptops are not good L: P implies Q M: Q implies P N: P is equivalent to Q Which one of the following about L, M, and N is correct? A. Only L is true. B. Only M is true. C. Only N is true. D. L, M and N are true.

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67.	Consider the basic block given below. a=b +c c= a + d d= b + c e= d – b a =e – b The minimum number of nodes and edges present in the DAG representation of the above basic block respectively are: A. 6 and 6 B. 8 and 10 C. 9 and 12 D. 4 and 4
68.	A graph with one vertex and no edges is: A. Multigraph B. Digraph C. Isolated graph D. Trivial graph
69.	The correct formula for the sentence, "not all rainy days are cold" is: A. ∀ d(Rainy (d) ∧~ Cold (d)) B. ∀ d(~ Rainy (d) → Cold (d)) C. ∃d(~Rainy (d) → Cold (d)) D. ∃d(~Rainy (d) ∧~ Cold (d))
70.	Let a_n represent the number of bit strings of length n containing two consecutive 1s. What is the recurrence relation for a_n? A. $a_{n-2} + a_{n-1} + 2^{n-2}$ B. $a_{n-2} + 2a_{n-1} + 2^{n-2}$ C. $2a_{n-2} + a_{n-1} + 2^{n-2}$ D. $2a_{n-2} + 2a_{n-1} + 2^{n-2}$
71.	The worst case running times of Insertion sort, Merge sort and Quick sort, respectively, are: A. $\Theta(n \log n)$, $\Theta(n \log n)$ and $\Theta(n^2)$ B. $\Theta(n^2)$, $\Theta(n^2)$ and $\Theta(n \text{ Log } n)$ C. $\Theta(n^2)$, $\Theta(n \log n)$ and $\Theta(n \log n)$ D. $\Theta(n^2)$, $\Theta(n \log n)$ and $\Theta(n^2)$
72.	Let G be a connected planar graph with 10 vertices. If the number of edges on each face is three, then the number of edges in G is _____. A. 24 B. 20 C. 32 D. 64
73.	There are 8 different courses available, and each student must choose 5 courses to put in his/her plan of studies. What is the minimum number of students such that, no matter what they choose, there will be at least 10 students with the same plan? A. 499 B. 500 C. 505 D. 520

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74. The preorder traversal sequence of a binary search tree is 30, 20, 10, 15, 25, 23, 39, 35, 42. Which one of the following is the postorder traversal sequence of the same tree?
A. 10,20,15,23,25,35,42,39,30
B. 15,10,25,23,20,42,35,39,30
C. 15,20,10,23,25,42,35,39,30
D. 15,10,23,25,20,35,42,39,30

75. You have an array of n elements. Suppose you implement quick sort by always choosing the central element of the array as the pivot. Then the tightest upper bound for the worst case performance is:
A. $O(n^2)$
B. O (n log n)
C. θ(n log n)
D. $\theta(n^2)$

76. Which of the following statements is/are TRUE for undirected graphs?
P: Number of odd degree vertices is even.
Q: Sum of degrees of all vertices is even.
A. P only
B. Q only
C. Both P and Q
D. Neither P nor Q

77. Consider a max heap, represented by the array: 40, 30, 20, 10, 15, 16, 17, 8, 4. Now consider that a value 35 is inserted into this heap. After insertion, the new heap is
A. 40, 30, 20, 10, 15, 16, 17, 8, 4, 35
B. 40, 35, 20, 10, 30, 16, 17, 8, 4, 15
C. 40, 30, 20, 10, 35, 16, 17, 8, 4, 15
D. 40, 35, 20, 10, 15, 16, 17, 8, 4, 30

78. The number of integers between 1 and 500 (both inclusive) that are divisible by 3 or 5 or 7 is:
A. 269
B. 270
C. 271
D. 272

79. Consider a hash table of size 11 that uses open addressing with linear probing. Let h(k) = k mod 11 be the hash function used. A sequence of records with keys:
43 36 92 87 11 4 71 13 14
are inserted into an initially empty hash table, the bins of which are indexed from zero to ten. What is the index of the bin into which the last record is inserted?
A. 3
B. 4
C. 6
D. 7

80. When searching from the key value 60 in a binary search tree, nodes containing the key values 10, 20, 40, 50, 70, 80, 90 are traversed, not necessarily in the order given. How many different orders are possible in which these key values can occur on the search path from the root to the node containing the value 60?
A. 35
B. 64
C. 128
D. 196

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81.	The following sequence of operation is performed on stack: PUSH(10), PUSH(20), POP, PUSH(10), PUSH(20), POP, POP, POP, PUSH(20), POP. The sequence of values popped out is: A. 20,10,20,10,20 B. 20,20,10,10,20 C. 10,20,20,10,20 D. 20,10,10,20,10
82.	Runtime polymorphism is achieved by: A. Friend function B. Virtual function C. Operator overloading D. Function overloading
83.	Which of the statements are true? I. Function overloading is done at compile time. II. Protected members are accessible to the member of derived class. III. A derived class inherits constructors and destructors. IV. A friend function can be called like a normal function. V. Nested class is a derived class. A. I, II, III B. II, III, IV C. III, IV, V D. I, II IV
84.	Which of the following operator can be overloaded through friend function? A. -->> B. = C. ( ) D. *
85.	Member functions, when defined within the class specification: A. Are always inline B. Are not inline C. Are inline by default, unless they are too big or too complicated D. Are not inline by default

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