

Sample Test Paper**CS : Computer Science and Engineering**

Duration : 30 Min.

Maximum Marks : 24

Q.1–6 carry one mark each

1. Given a regular expression r and an input string x the NFA constructed from r has space complexity as _____
 (A) $O(2^{|r|})$ (B) $O(2|r|)$
 (C) $O(|r| \times |x|)$ (D) $O(|r|)$

2. If a code for the entire TM M consists of all codes for the transitions, in some order, separated by pairs of 1's :
 $C_1 1 1 C_2 1 1 C_3 1 1 \dots C_{n-1} 1 1 C_n$
 where each of the C 's is the code form one transition of M ; and if the given machine has only five transition rules, how many 1's will be there in the code for TM ?
 (A) 13
 (B) 28
 (C) 30
 (D) Not fixed. Depends on the transition rule

3. A box contains 9 tickets numbered from 1 to 9 inclusive. If 3 tickets are drawn from the box, one at a time, then the probability that they are alternately either odd, even, odd or even, odd, even, is
 (A) $\frac{1}{18}$ (B) $\frac{5}{18}$
 (C) $\frac{7}{18}$ (D) None of these

4. Consider the following relation schemas
 Movie (Title, Year, Producer, length)
 StarsIn(MovieTitle, MovieYear, StarName)
 Consider the following SQL query
 (SELECT Title, Year FROM Movie)
 UNION
 (SELECT MovieTitle, AS Title, MovieYear AS Year FROM StarsIn)

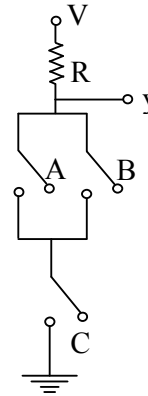
 If for instance, a movie appeared once in the Movie relation and there were three stars for that movie listed in StarsIn (so the movie appeared in three different tuples of StarsIn), then that movie's title and year would appear _____
 (A) only once in the result
 (B) 3 times in the result
 (C) 4 times in the result
 (D) cannot be determined

5. You have an IP of 156.233.42.56 with a subnet mask of 7 bits. How many hosts and subnets are possible?
 (A) 126 hosts and 510 subnets (B) 128 subnets and 512 hosts
 (C) 510 hosts and 126 subnets (D) 512 subnets and 128 hosts

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6. If in the switching circuits switches A, B have value 0 for OFF, 1 for ON and the output Y has 0 for 0 volts, 1 for V volts then the expression

- (A) $y = \overline{(A + B)}C$
 (B) $y = (A + B)\overline{C}$
 (C) $y = \overline{A} \cdot \overline{B} + \overline{C}$
 (D) $y = (A + B)C$



Q.7–25 carry two marks each

7. Use the information given below for estimation

Basic COCOMO Table

Software Project	a_b	b_b	c_b	d_b
Organic	2.4	1.05	2.5	0.38
Semi detached	3.0	1.12	2.5	0.35
Embedded	3.6	1.20	2.5	0.32

Find the approximate effort in person months for a simpler application of 25 KLOC.

- (A) 70.5 (B) 81.5
 (C) 85 (D) 97
8. If the probability that an individual suffers a bad reaction from injection of a given serum is 0.001, then the probability that out of 2000 individuals, more than 2 will suffer a bad reaction is

- (A) 0.222 (B) 0.323
 (C) 0.422 (D) None of these

9. Consider the following declaration

- (a)

```
for (j = 2; j <= 13; ++j)
{
    sum = 0;
    i = 2;
    while (i < 100)
    { sum += i;
      i += j;
    }
    printf ("%d", sum);
}
```
- (b)

```
for (j = 2; j <= 13; ++j)
{
    sum = 0;
    i = 2;
    do
    { sum += i;
      i += j;
    } while (i < 100);
    printf ("%d", sum);
}
```

- (A) The (a) and (b) performs the same operation of finding the sum of series $2 + 4 + 8 + \dots + 98$
 (B) The (a) finds the sum of series $2 + 4 + 6 + \dots + 98$ but (b) is not logically correct.
 (C) The (a) is find the sum of series $2 + 4 + 6 + \dots + 98$ and (b) is find the sum of series $2 + 4 + 8 + \dots + 98$
 (D) The (a) and (b) both finds the series $2 + 4 + 6 + \dots + 98$

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10. Consider the following program

```
#include <stdio.h>
void main ( )
{
    int m[10] [10], n, x, y;
    scanf("%d", &n);
    for (x = 0; x <= n-1; x++)
    for (y = 0; y <= n-1; y++)
    {
        scanf("%d", & m[x] [y]);
    }
    for (x = 0; x <= n - 1; x++)
        for (y = 0; y <= n-1; y++)
            if (y > x)
                printf ("%d", m[x] [y]);
    printf ("\n");
    for (x = 0; x <= n - 1; x++)
        for (y = 0; y <= n-1; y++)
            if (x > y)
                printf ("%d", m[x] [y]);
}
```

The above program can be used to _____

- (A) print upper triangular elements of any matrix
 - (B) print lower triangular elements of any square matrix
 - (C) print upper and lower triangular elements of an any matrix
 - (D) print upper and lower triangular elements of any square matrix.
11. How many times the copy constructor called in the following code :

```
widget f (widget u)
{
    widget v(u);
    widget w = v;
    return w;
}
main ( )
{
    widget x;
    widget y = f (f(x));
}
```

- (A) 7
- (B) 6
- (C) 1
- (D) 8

12. Consider the following algorithm which is design to achieve safety state.
1. Let Work and Finish be vectors of length m and n, respectively. Initialize Work := Available and Finish [i] := false for $i = 1, 2, 3, \dots n$.
 2. Find an i such that both
 - (a) Finish [i] = false
 - (b) $Need_i \leq Work$If no such i exists, go to step 4.
 3. Work = Work + Allocation;
Finish [i] = true
go to step 2.
 4. If Finish [i] = true for all i, then the system is in a safe state.
This algorithm may require an order of operations to decide whether a state is safe.
- (A) $m \times n^2$ (B) $m^2 \times n$
(C) $\log (m \times n^2)$ (D) $\log (m^2 \times n)$
13. Let's assume that
 $F = \{ A \rightarrow BC, CD \rightarrow E, E \rightarrow C, D \rightarrow AEH, ABH \rightarrow BD, DH \rightarrow BC \}$
then $(CD)^+$ under $\{F - (CD \rightarrow E)\}$ is equal to _____
- (A) ABCD (B) ABCEH
(C) BCDEH (D) ABCDEH
14. A channel has a bit rate of 20kbps and a propagation delay of 100msec. For what sizes does stop and wait gives an efficiency of 50 % ?
- (A) 250 bits (B) 500 bits
(C) 1000 bits (D) 4000 bits
15. Suppose propagation delay time of flip flop is 0.2 nsec and it is followed by 2 decoders with a propagation delay time of 0.1 nsec each.
The time required for data input to settle before the triggering edge of clock is 2 nsec and the time for which data remains stable is just 1 nsec. Then maximum operating frequency of flip flop will be _____
- (A) 294 MHz (B) 400 MHz
(C) 450 MHz (D) 434 MHz

