



**GATE-2018**  
**All India Mock GATE Test Series**  
**Computer Science and Information Technology**  
**Test Series 4**

Name: .....

Test ID: **CS-TS-04-18**

Duration: 3 hours

Maximum marks : 100

**Please read the following instructions carefully**

**General Instructions**

1. Total duration of examination is 180 minutes (3 hours).
2. The clock will be set at the server. The countdown timer in the top right corner of screen will display the remaining time available for you to complete the examination. When the timer reaches zero, the examination will end by itself. You will not be required to end or submit your examination.
3. The Question Palette displayed on the right side of screen will show the status of each question using one of the following:
  - a. You have not visited the question yet.
  - b. You have not answered the question.
  - c. You have answered the question.
  - d. You have NOT answered the question, but have marked the question for review.
  - e. You have answered the question, but marked it for review.

The **Marked for Review** status for a question simply indicates that you would like to look at that question again. If a question is answered and **Marked for Review**, your answer for that question will be considered in the evaluation.

**Navigating to a Question**

4. To answer a question, do the following:
  - a. Click on the question number in the Question Palette to go to that question directly.
  - b. Select an answer for a multiple choice type question by clicking on the bubble placed before the 4 choices namely A, B, C, D. Use the virtual numeric keypad to enter a number as answer for a numerical type question.
  - c. Click on **Save and Next** to save your answer for the current question and then go to the next question.
  - d. Click on **Mark for Review and Next** to save your answer for the current question, and also mark it for review, and then go to the next question.
  - e. **Caution:** Note that your answer for the current question will not be saved, if you navigate to another question directly by clicking on its question number without saving the answer to the previous questions.
  - f. You can view all the questions by clicking on the **Question Paper** button. This feature is provided, so that if you want you can just see the entire question paper at a glance.

**Answering a Question**

5. Procedure for answering a multiple choice (MCQ) type question:
  - a. To select your answer, click on the bubble button of one of the options
  - b. To deselect your chosen answer, click on the bubble button of the chosen option again or click on the clear response button
  - c. To change your chosen answer, click on the bubble button of another option
  - d. To save your answer, you **MUST** click on the **Save and Next button**.
  - e. To mark the question for review, click on the **Mark for Review and Next** button. If an answer is selected for a question that is Marked for Review, that answer will be considered in the evaluation.

**6. Procedure for answering a numerical answer type question:**

- a. To enter a number as your answer, use the virtual numerical keypad
  - b. A fraction (eg.  $-0.3$  or  $-.3$ ) can be entered as an answer with or without '0' before the decimal point. As many as four decimal points, e.g. 12.5435 or 0.003 or  $-932.6711$  or 12.82 can be entered.
  - c. To clear your answer, click on the Clear Response button
  - d. To save your answer, you **MUST** click on the **Save and Next** button
  - e. To mark a question for review, click on the **Mark for Review and Next button**. If an answer is selected (for MCQ) or entered (for numerical answer type) for a question that is Marked for Review, that answer will be considered in the evaluation.
7. To change your answer to a question that has already been answered, first select that question for answering and then follow the procedure for answering that type of question.
8. Note that **ONLY** Questions for which answers are saved or marked for review after answering will be considered for evaluation.

**Paper Specific Instructions:**

9. There are a total of 65 questions carrying 100 marks. Questions are of multiple choice type or numerical answer type. A multiple choice type question will have four choices for the answer with only one correct choice. For numerical answer type questions, the answer is a number and no choices will be given. A number as the answer should be entered using the virtual keyboard on the monitor.
10. Questions Q.1 – Q.10 belong to General Aptitude (GA) section and carry a total of 15 marks. Questions Q.1 – Q.5 carry 1mark each, and questions Q.6 – Q.10 carry 2marks each.
11. Questions Q.1 – Q.25 carry 1mark each. Questions Q.26 – Q.55 carry 2marks each.
12. Questions not attempted will result in zero mark. Wrong answers for multiple choice type questions will result in **NEGATIVE** marks. For all 1 mark questions,  $\frac{1}{3}$  mark will be deducted for each wrong answer. For all 2 marks questions,  $\frac{2}{3}$  mark will be deducted for each wrong answer. There is no negative marking for questions of numerical answer type.
13. Physical calculator is **NOT** allowed. All candidates will be provided with an online scientific calculator which has to be used to answer the questions.

**Website:** [www.thegateacademy.com](http://www.thegateacademy.com)

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## Test Series 4

### Computer Science and Information Technology

#### General Aptitude:

##### Q.1 - Q.5 Carry One Mark each.

1. In the following question choose the word which is the exact OPPOSITE of the given words.

**“QUIESCENT”**

- (A) Active (B) Dormant  
(C) Weak (D) Unconcerned

2. Which term of the series 5, 10, 20, 40, ..... is 1280?

3. A train normally covers a certain distance at a speed of 60 km/hr. However, if it were to halt for a fixed time interval in each hour, its average reduced to 50 km/hr. what is the time interval for which the train halts in each hour?

- (A) 10 minutes (B) 20 minutes  
(C) 6 minutes (D) 12 minutes

4. Radha moves towards South-East a distance of 7 km, then she moves towards West and travels a distance of 14 km. From here she moves towards North-West a distance of 7 km and finally she moves a distance of 4 km towards east. How far is she now from the starting point?

5. In the following question two statements are given and these statements are followed by two conclusions numbered (1) and (2). You have to take the given two statements to be true even if they seem to be at variance from commonly known facts. Read the conclusions and then decide which of the given conclusions logically follows from the two given statements, disregarding commonly known facts.

**Statements:** Some actors are singers. All the singers are dancers.

**Conclusions:**

1. Some actors are dancers.  
2. No singer is actor.  
(A) Only (1) conclusion follows (B) Only (2) conclusion follows  
(C) Either (1) or (2) follows (D) Neither (1) nor (2) follows

##### Q.6 - Q.10 Carry Two Mark each.

6. If Rupert has 4 more coins than Laxmi, Laxmi has 1 more coin than bill and bill has 1 more coin than Hawkins. Finally Hawkins has 4 more coins than Ajim. Then minimum number of coins that must be transferred, if all of them wish to have an equal number of coins:

7. The last digit of the expression  $4 \times 9^2 \times 4^3 \times 9^4 \times 4^5 \times 9^6 \times \dots \times 4^{99} \times 9^{100}$  is:  
(A) 4 (B) 6  
(C) 9 (D) 1
8. The average age of boys in class is 16.66, while the average age of girls is 18.75. Thus average age of all the 40 students of the class is 17.5. If the difference between the number of boys and girls is 8, then the number of girls in the class is:  
(A) 12 (B) 16  
(C) 18 (D) Data insufficient
9. In an election only two candidates contested 20% of the voters did not vote and 120 votes were declared as invalid. The winner got 200 votes more than his opponents thus he secured 41% votes of the total voters on the voter list. Percentage votes of the defeated candidate out of the total votes casted is :  
(A) 47.5% (B) 51.25%  
(C) 36% (D) 45%
10. The amount of work in a leather factory is increased by 50%. By what percent is it necessary to increase the number of workers to complete the new amount of work in previously planned time, if the productivity of the new labour is 25% more.

**Technical:**

**Q.1 - Q.25 Carry One Mark each.**

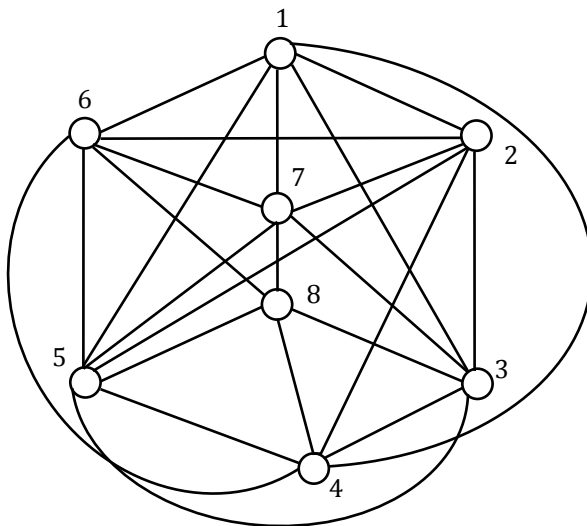
1. Which of the following proposition (?) is correct for the truth table?

P	Q	?
T	T	T
T	F	F
F	T	F
F	F	T

- (A)  $P \leftrightarrow Q$  (B)  $(\sim P \vee Q) \wedge (\sim Q \vee P)$   
 (C)  $(P \rightarrow Q) \wedge (Q \rightarrow P)$  (D) All of the above

2. A dice is rolled is the number is odd. Find the probability of prime is \_\_\_\_\_ [2 decimal accuracy]

3. What is clique number of the given graph?



4. Maximum number of linearly independent vectors of the vectors given below is \_\_\_\_\_.

$$X_1 = [3,0,1,2]$$

$$X_2 = [6,1,0,0]$$

$$X_3 = [12,1,2,4]$$

$$X_4 = [6,0,2,4]$$

$$X_5 = [9,0,1,2]$$

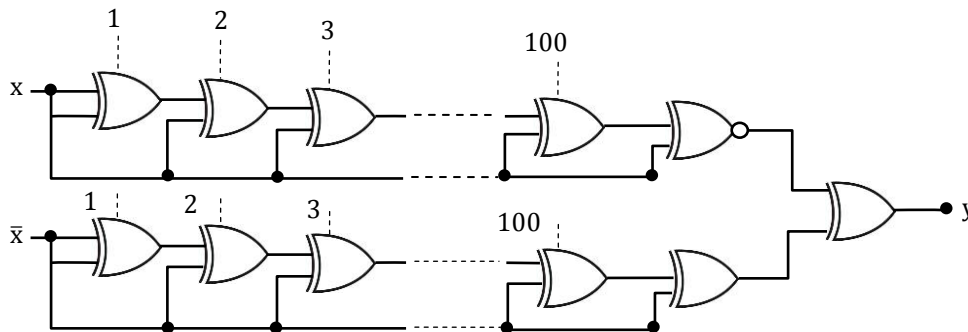
5. Given the matrix  $A = \begin{pmatrix} 1 & 3 & 1 & -4 \\ -1 & -3 & 1 & 0 \\ 2 & 6 & 2 & -8 \end{pmatrix}$  the rank of  $A^T A$  is \_\_\_\_\_.

6. For the given matrix  $A = \begin{bmatrix} a & 1 & 0 & 0 \\ 1 & a & 0 & 0 \\ 0 & 0 & 1 & -1 \\ 0 & 0 & -1 & 1 \end{bmatrix}$

Find the set of eigen values

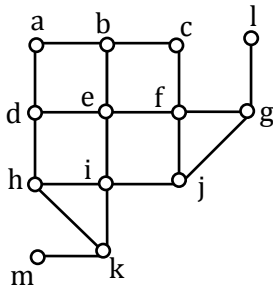
- (A)  $\lambda = 0, \lambda = 2a, \lambda = a + 1, \lambda = 2$  (B)  $\lambda = a + 1, \lambda = a - 1, \lambda = 0, \lambda = 2$   
 (C)  $\lambda = a + 1, \lambda = 2a, \lambda = 0, \lambda = 2$  (D)  $\lambda = a - 1, \lambda = a + 1, \lambda = 2, \lambda = 1$
7. Given two three bit numbers  $a_2a_1a_0$  and  $b_2b_1b_0$  and  $c$  the carry in, the function that represents the carry generate function when these two numbers are added is:  
 (A)  $a_2b_2 + a_2a_1b_1 + a_2a_1a_0b_0 + a_2a_0b_1b_0 + a_2b_2b_1 + a_1a_0b_2b_0 + a_0b_2b_1b_0$   
 (B)  $a_2b_2 + a_2b_1b_0 + a_2a_1b_1b_0 + a_1a_0b_2b_1 + a_1a_0b_2 + a_1a_0b_2b_0 + a_2a_0b_1b_0$   
 (C)  $a_2 + b_2 + (a_2 \oplus b_2)(a_1 + b_1 + (a_1 \oplus b_1) + (a_0 \oplus b_0))$   
 (D)  $a_2b_2 + \bar{a}_2a_1b_1 + \bar{a}_2\bar{a}_1b_0a_0 + \bar{a}_2a_0\bar{b}_1b_0 + a_1\bar{b}_2b_1 + \bar{a}_1a_0\bar{b}_2b_0 + a_0\bar{b}_2\bar{b}_1b_0$

8. The value of  $\bar{y}$  is \_\_\_\_\_



9. Two 2's complement numbers having sign bits  $x$  and  $y$  are added and the sign bit of the result is  $z$ . Then the occupancy of over flow is indicated by the Boolean function  
 (A)  $xyz$  (B)  $\bar{x}\bar{y}\bar{z}$   
 (C)  $\bar{x}\bar{y}z + xy\bar{z}$  (D)  $xy + yz + zx$
10. A computer has 24 bit instructions and 8 bit addresses. Which of the following combinations of two addresses, one address and zero address instructions respectively cannot be implemented in this machine?  
 (A) 250,1500,9216 (B) 254,256,65000  
 (C) 250,1530,1540 (D) 255,255,256

11. Consider the graph G



Which is correct for breadth-first search of G?

- (A) e b d f i a c h g j k l m  
 (B) e i f d k j g h c a m l  
 (C) e d i f b a h j k c g m l  
 (D) A and C both

12. Consider the following C-Code segment

```
int fun (int n, int * x1)
{ int x, y ;
  If (n<=1)
  { * x1=1; return 1;}
  x = fun (n - 1, x1);
  y = x + * x1;
  * x1 = x;
  return y;
}
int main ()
{int a1=15;
  Print f ("%d" , fun (6, & a1)) ;
  Return 0;
```

The output value is

- (A) 13  
 (B) 8  
 (C) 15  
 (D) 90

13. Consider the quick sort algorithm. It run on input shown below 1, 2, 3, .....n. The pivot is chosen by applying a algorithm having time complexity  $O(n^2)$  time. The worst case time complexity is

- (A)  $O(n^2)$   
 (B)  $O(n \log n)$   
 (C)  $O(n^3)$   
 (D) None of these

14. Consider a directed graph  $G$  with  $m$  nodes is maintained in memory by its adjacency matrix  $A$ . The algorithms find the Boolean path matrix of  $G$ .
1. Repeat for  $i, j = 1, 2, \dots, m$   
if  $A[i, j] = 0$  then  $P[i, j] = 0$ ;  
else  $P[i, j] = 1$   
End loop.
  2. Repeat ③ and ④ for  $k = 1, 2, \dots, m$
  3. Repeat ④ for  $i = 1, 2, \dots, m$
  4. Repeat for  $j = 1, 2, \dots, M$   
 $P(i, j) = P(i, j) \otimes (P[i, k] \vee P[k, j]) \odot$   
end loop  
end of ③ loop  
end of ② loop
  5. Exit
- The value of  $\otimes$  and  $\odot$  in above warshall's algorithm is
- (A)  $\vee, \wedge$  (B)  $\vee, \vee$   
(C)  $\vee, \wedge, \wedge$  (D)  $\wedge, \vee, \wedge$
15. Consider the following function  $f_1(n) = \frac{\log n}{\log \log n}$   
 $f_2(n) = \sqrt{n} \log n$   
 $f_3(n) = \log n^{\log n}$   
Which of the following is true?  
(A)  $f_1(n) = \Omega f_2(n), f_2(n) = O(f_3(n))$   
(B)  $f_1(n) = O(f_2(n)), f_3(n) = O(f_2(n))$   
(C)  $f_1(n) = O(f_3(n)), f_2(n) = O(f_3(n))$   
(D) None of these
16. The minimum number of states in the DFA for the following Regular Expression  $(11111 + 1111111111)^*$
17. Consider the following Regular Expression  $(0 + 1 + 01)^* 01(1 + 0 + 11)^*$   
Which of the following is true about Regular Expression?  
(A) Generate set of all strings that either end with 11 or 0 or 1.  
(B) Generate set of all strings where 01 as a Substring.  
(C) Generate set of all strings.  
(D) None of the above.



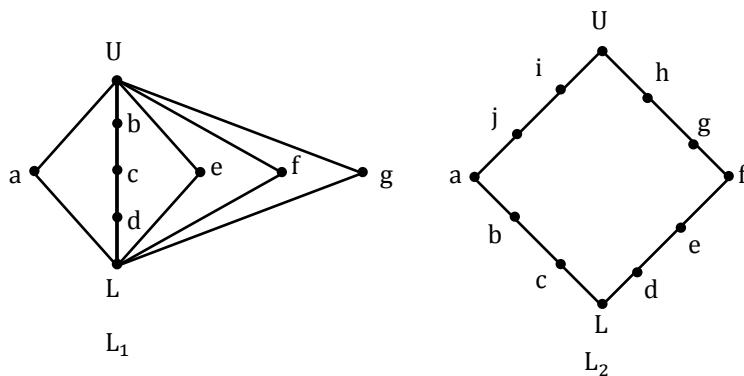
18. Consider the following languages  
 $L_1 = \text{Regular language}$   
 $L_2 = \text{Context free language}$   
 $L_3 = \text{Recursive language}$   
 $L_4 = \text{Recursive Enumerable language}$   
 $L = ((L_1 \cap L_2)' \cup (L_3 \cap L_4))'$   
 Which of the following statement is true about L?  
 (A) L is Regular language.  
 (B) L is CFL but not Regular.  
 (C) L may be Recursive Enumerable language.  
 (D) None of the above.
19. Consider the following grammar  
 $A \rightarrow SS/a$   
 $S \rightarrow AA/b$   
 After removing left Recursion from the above grammar the minimum number of production rule in resultant grammar is \_\_\_\_\_.
20. A set of processes perform wait (P) operation to enter critical section and signal (V) operation after they are done with critical section. Processes use counting semaphore with the initial value 12. Here is the summary of down and up operations.  
 10P,2V,6P,5P, 3V Number of processes in blocked state is \_\_\_\_\_
21. Consider a relation with 2 M tuples stored in heap structure. If we create a  $B^+$  tree index on this relation with block filled to maximum capacity. Assume following data  
 Disk page size  $B=1000$  byte  
 Key value size  $V=40$  byte  
 Disk page pointer  $P_b = 10$  byte  
 The number of entries a leaf page can have is  
 (A) 40 (B) 10  
 (C) 1000 (D) 20
22. Consider the following two statements:  
 $S_1$  : A serial schedule with n transactions can generate  $\angle n$  different conflict serializable schedules.  
 $S_2$  : A parallel schedule with n transaction can generate more than  $\angle n$  serial schedule.  
 Which of the following option is correct?  
 (A)  $S_1$  is true where  $S_2$  is false (B)  $S_2$  is true where  $S_1$  is false  
 (C) Both the statements are true (D) Both the statement are false

23. The value of the expression  $3^{16} \bmod 17$  is  
 (A) 0 (B) 1  
 (C) 2 (D) None of the above
24. Which of the following option is true?  
 $S_1$ : The vulnerable time for pure Aloha is  $2T_{fr}$   
 $S_2$ : The vulnerable time for slotted Aloha is  $T_{fr}$   
 $S_3$ : CSMA/CD can detect any kind of collision irrespective of frame size  
 (A)  $S_1$  and  $S_2$  are true (B) Only  $S_2$  is true  
 (C) Only  $S_1$  is true (D) All the statements are true
25. Which one of the following protocol delivers mail to receiver?  
 (A) Simple mail transfer protocol (B) Post office protocol  
 (C) Internet mail access protocol (D) HTTP

**Q.26 - Q.55 Carry Two Mark each.**

26. Which of the following set does not exist?  
 [I] A set X such that  $P(X) = \emptyset$   
 [II]  $\{\emptyset\} \in \{\emptyset, \{\emptyset, \{\emptyset\}\}$   
 [III]  $P(\{\emptyset\}) = \{\emptyset, \{\emptyset, \{\emptyset\}\}$   
 (A) I and II only (B) II and III only  
 (C) III only (D) All
27. Let  $A(x)$ : x is an integer. Which of the following predicate is true for "The square of every negative integer is positive".  
 (A)  $\forall x[(Ax \wedge (x > 0)) \rightarrow (x^2 > 0)]$  (B)  $\forall x[(Ax \wedge (x < 0)) \rightarrow (x^2 > 0)]$   
 (C)  $\forall x[(Ax \wedge (x < 0)) \wedge (x^2 > 0)]$  (D)  $\forall x[(Ax \wedge (x \geq 0)) \rightarrow (x^2 < 0)]$

28. Consider the following lattices



The number of complement of a in  $L_1$  is x and the number of complement of b in  $L_2$  is y then  $x^y = \underline{\hspace{2cm}}$

29. Evaluate by the stokes theorem  $\oint_C \vec{F} \cdot d\vec{r}$  where  $F = -y^3\hat{i} + x^3\hat{j}$  where S is the circular disc  $x^2 + y^2 = 1$  &  $z = 0$  (up to 2 decimal)
30. Consider set  $A = \{a, b, c\}$ . How many relations are possible on a set A that are asymmetric and ir-reflexive?
31. The memory locations 100 to 110 have data values from 1 to 11 in sequence respectively. Initial values of registers  $R_1$  and  $R_2$  are 0 and 1000 respectively. Consider the following two address instructions.  
Add  $R_1, \# 1$   
Add  $R_2, 100 (R_1)$ ; Displacement addressing  
The value of  $R_2$  after executing above sequence of instructions eight times is \_\_\_\_\_
32. An X-way set associative cache has 256 blocks. Main memory has 16384 blocks. Tag comparator requires 12 bits including a valid and a modified bit. The value of X is \_\_\_\_\_
33. Consider an instruction pipeline with five stages each with combinational circuit and delays of 2 ns, 2 ns, 5ns, 11 ns and 4ns. The pipeline registers are required between each stage and at the end of last stage. What is the speed up of pipelined machine when compared with the corresponding non-pipelined implementation? Delay of pipeline register is 1 ns.  
(A) 2 (B) 2.5  
(C) 1.5 (D) None of these
34. Consider a max heap for the following keys 90, 57, 25, 13, 11, 9, 17, 1, 2, 3. After deleting node 90, total number of exchange is \_\_\_\_\_

35. Consider the following C-code segment

```
void function (int*p, int **q, int***r)
{
*p=**q+4;
**q=***r+6;
*** r =* p - 3;
printf(“%d %d %d” , *p+2, **q, ***r);
if (**r<=10)
{ function (p, q, r);
printf ( “%d %d %d” , *p+4, **q+4,***r+10);
}
}
int i, j, k ;
void main ( )
{ i=2;
j=3;
k=4
int*p,**q,***r;
p=& i;
q=& p;
r=& q;
function (p, q, r);
}
```

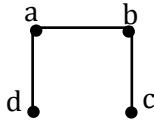
What is the output?

- (A) 755 141212 161612  
(B) 1199181616202026  
(C) 1199202024181616  
(D) None of these
36. An AVL tree is constructed using following keys 10, 6, 11, 12, 1, 7, 0, 2, 3 the post order traversal of resulting AVL tree is
- (A) 0 1 3 7 6 12 2 11 10  
(B) 0 1 3 7 6 2 12 11 10  
(C) 10 2 10 6 37 11 12  
(D) None of these

37. Consider the following C-Code Segment
- ```
typedef struct {char *name, int salary ;}job;
Void main () {
job a= {"ATM" 15};
job b= {"GATE", 25};
job c= {"SUCCESS",35};
int X=5;
job *arr [3] = {&a, &b, &c};
Printf ("%s %d", (3, x>>5 - 4) [*arr]);
}
```
- The output of above program is
- (A) ATM 15 (B) GATE 25  
(C) SUCCESS 35 (D) None of these
38. Which of the following statement is true about matric chain multiplication method having 'n' matrix?
- (A) The minimum number of scalar multiplication to multiply  $A_{10 \times 20}, B_{20 \times 20}, C_{20 \times 10}$  is 6000.  
(B) The total number of different function call is  $O(n^2)$   
(C) The time complexity is  $O(n^2)$   
(D) All the above
39. Consider the following C-Code segment
- ```
main ()
{ int i, n;
  for (i=1 ; i<=n*n ;i++)
  for (j=0 ; j<i ; j++)
  for (k=1 ; k<n*n ; k++)
  for (l=0 ; l<k ; l++)
  Sum++ ;
}
```
- The time complexity of following C-Code segment  $O(a^{x \log_2 n})$ . They a+x is \_\_\_\_\_
40. Consider a tree having three vertices. A matrix is formed by its pre-order, post order and in order traversal respectively. The rank of matrix X cannot be
- (A) 1 (B) 2  
(C) 3 (D) Can't be found

41. Consider the following statement

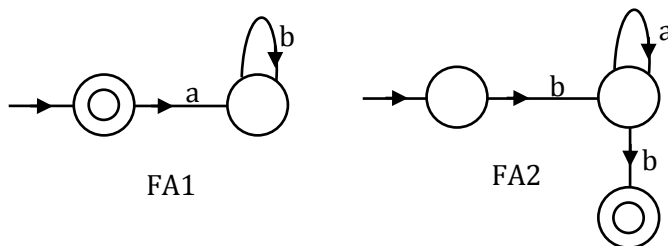
- (1) The product of incidence matrix and its transpose for an undirected graph is  $[a_{ij}]$  where  $a_{ij}$  is the number of edge from  $V_i$  to  $V_j$  where  $i \neq j$  and  $a_{ii}$  is the number of edges incident to  $V_i$
- (2) This graph is self-complementary



Which of the following true

- (A) 1 only (B) 2 only  
(C) Both (D) None of these

42. Consider the two FSA

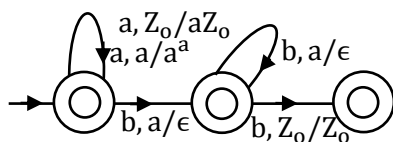


Language generated by FA1 is  $L_1$  and Language generated by FA2 is  $L_2$ . How many minimum numbers of states in DFA of language  $L = (L_1 \cdot L_2)'$

43. How many statements are true about the decidability and un-decidability of CFG.

- $S_1$ : Membership function of CFG is Undecidable.  
 $S_2$ : Intersection of two Undecidable language may be decidable.  
 $S_3$ : Equivalence of two Push down automata is Undecidable.  
 $S_4$ : Union of two Undecidable language may be decidable.

44. Consider the following DFA.



Consider the following language

- $L_1 = \{a^n | n \geq 0\}$   
 $L_2 = \{a^n b^n | n \geq 0\}$   
 $L_3 = \{a^n b^m | n \geq 0, m \geq 1\}$   
 $L_4 = \{a^n b^{m+1} | n \geq 0, m \geq 1\}$

Consider  $Z_0$  is initial symbol present on top of the stack and a, b are Input symbols.

Which of the following language is not accepted by given PDA?

- (A)  $L_1$  and  $L_2$  (B)  $L_1, L_2$  and  $L_3$   
(C)  $L_3$  and  $L_4$  (D) All of the above

45. Which of the following statement is true?  
 $S_1$ : Complement of CFL is always CSL.  
 $S_2$ : Complement of Recursive language may be CFL.  
 $S_3$ : Union of two infinite language may be finite.  
 $S_4$ : Intersection of two infinite language is always Regular.  
 (A)  $S_1$  and  $S_2$  only (B)  $S_2$  and  $S_3$   
 (C)  $S_3$  and  $S_4$  (D) All are true
46. Consider the following languages over Input  $\epsilon = \{a, b, c\}$   
 $L_1 = \{w | w \in (a, b, c)^*\}$   
 $L_2 = \{a^n b^n c^n | n \geq 0\}$   
 $L_3 = \{a^n b^n c^m | n, m \geq 0\}$   
 $L_4 = \{ww^R | w \in (a, b)^*\}$   
 Which of the following language is Deterministic CFL?  
 (A)  $L_1 - L_2$  (B)  $L_1 - L_3$   
 (C)  $L_1 - L_4$  (D) None of the above
47. Consider  $n$  processes  $P_i$  where  $0 \leq i \leq 10$  with CPU bursts of  $3^i$  time units. All processes arrive at time zero. Processes are scheduled using longest remaining time First (LRTF) algorithm. LRTF ties are broken by giving priority to process  $P_i$  with smallest  $i$ . The waiting time of  $P_0$  is \_\_\_\_\_
48. A process executes following code:  

```
int main () {
  fork ()
  fork () && fork () || fork ();
  fork ();
  printf(" forked\n");
  return 0;
}
```

 The number of times "Forked" will be printed after executing above program is \_\_\_\_\_
49. Suppose we want to synchronize two process P and Q. Using binary semaphores S and T
- | Process P   | Process Q   |
|-------------|-------------|
| while (1) { | while (1) { |
| W:          | Y:          |
| print '0';  | print '1';  |
| print '0';  | print '1';  |
| X           | Z           |
| }           | }           |
- Which of the following will always lead to output string '110011001100' ?  
 (A) P(S) at W, V(S) at X, P(T) at Y, V(T) at Z. S=T=1  
 (B) P(S) at W, V(T) at X, P(T) at Y, V(S) at Z. S=1, T=0  
 (C) P(S) at W, V(T) at X, P(T) at Y, V(S) at Z. S=1, T=1  
 (D) P(S) at W, V(T) at X, P(T) at Y, V(S) at Z. S=0, T=1

50. A disk system has following parameters:  
Number of tracks=512  
Number of Sectors/ track=256  
Number of bytes/sector=128  
Time taken to move head from one track to adjacent one = 1 milliseconds  
If average time taken to transfer 32 kB data from disk is 331 milliseconds. What is the rotational speed in RPM (Rotations Per Minute) of disk head?  
(A) 600 (B) 1200  
(C) 1800  
(D) 2400
51. Let, in a 2-PL there are 5 transactions,  $T_1, T_2, T_3, T_4$  and  $T_5$ . All the transactions lock and unlock resource in same order. This 2-PL will  
(A) Guarantee dead lock free, serializable schedule  
(B) Guarantee only serializable schedule  
(C) Not guarantee dead lock free schedule on there does not have any relation between orders of locking unlocking with dead lock.  
(D) Results a pure dead lock based schedule
52. Let a relation schema  $R=(A, B, C, D, E)$  is decomposed into two sub relations  $R_1 = (A, B, C)$  and  $R_2 = (A, D, E)$  based on certain constraints. If the said decomposition is lossy then which of the following is true?  
(A)  $(R_1 \bowtie R_2)$  will contain more tuples than R  
(B)  $(R_1 \bowtie R_2)$  will contain lesser number of tuples than R  
(C)  $(R_1 \bowtie R_2)$  will contain same number of tuples as R.  
(D) Number of tuples in  $(R_1 \bowtie R_2)$  and R can not be predicted.
53. A network using CSMA/CD has a bandwidth of 10Mbps. If the maximum propagation time is  $25.6\mu s$  then what is minimum frame size?  
(A) 64 byte (B) 32 byte  
(C) 512 byte (D) None of the above
54. A datagram of 4000 bytes arrives at a router and this datagram must be forwarded to a link with MTU of 1500 bytes. The data has successfully forwarded in three separate tranches. Which among the options is correct that specify the length of data field of three different segments in the forwarded packet?  
(A) 1500 byte, 1500 byte, 1000 byte (B) 1480 byte, 1480byte, 1020 byte  
(C) 1520 byte 1520 byte, 960 byte (D) 1480 byte, 1480 byte, 1000 byte



55. Let, the distance between KOLKATA to MUMBAI is 8000 km. A network is installed to make a communication between both the cities. The bandwidth of the network is  $500 * 10^6$  bit/sec and the propagation speed of signal in that media is  $4 * 10^6$  meters/sec. Assume that processing delay at node are negligible. What would be the minimum size in bits of the sequence number field if the packet size is  $10^7$  bits and selective repeat protocol is used, to its full capacity?
- (A) 9 (B) 8  
(C) 2.1 (D) 7