



Kunal Jha  
 Course: GATE  
 Computer Science Engineering(CS)

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## FULL SYLLABUS TEST-5 (ADVANCE LEVEL) (GATE - 2021) - REPORTS

OVERALL ANALYSIS    COMPARISON REPORT    **SOLUTION REPORT**

ALL(65)    CORRECT(0)    INCORRECT(0)    SKIPPED(65)

Q. 1

Solution Video

Have any Doubt ?



Out of the four alternatives, choose the one which best expresses the meaning of the given word.  
**Veracity**

**A** Freedom

**B** Truthfulness

Correct Option

**C** Wisdom

**D** Loyalty

QUESTION ANALYTICS



Q. 2

Solution Video

Have any Doubt ?



Out of the four alternatives, choose the one which best expresses the meaning of the given word.  
**Dulcet**

**A** Sweet

Correct Option

**B** Dull

**C** Hard

**D** Sour

QUESTION ANALYTICS



Q. 3

FAQ    Solution Video    Have any Doubt ?



Pankaj buys a table and a chair at price ratio 5 : 3. He sells the table at x% loss and their at y% profit such that overall there is no profit no loss. If the total selling price of table and chair together is Rs. 1600, then the possible value of x and y can be respectively.

**A** 30 and 40

**B** 24 and 36

**C** 12 and 20

Correct Option

**D** 9 and 12

**Solution :**  
 (c)  
 Since there is no profit no loss

$$5k + 3k = 1600$$

$$k = 200$$

$$\Rightarrow \text{Cost price of table} = 5 \times 200 = \text{Rs. 1000}$$

$$\Rightarrow \text{Cost price of Chair} = 3 \times 200 = \text{Rs. 600}$$

Now,

$$1000 \times \left( \frac{100-x}{100} \right) + 600 \times \left( \frac{100+y}{100} \right) = 1600$$

$$1000 - 10x + 600 + 6y = 1600$$

$$10x = 6y$$

$$\frac{x}{y} = \frac{6}{10} = \frac{3}{5}$$

Only the values given in option (c) satisfy this ratio.

**D** 9 and 12

QUESTION ANALYTICS



Q. 4

[▶ Solution Video](#)[Have any Doubt ?](#)

Given  $A$  and  $B$  are 2 distinct number such that  $A^2 = 2002 + B$  and  $B^2 = 2002 + A$ . The values of  $AB$  is \_\_\_\_\_.

**A** 2001**B** -2001

Correct Option

**Solution :**  
(b)

$$A^2 = 2002 + B$$

$$B^2 = 2002 + A$$

$$A^2 - B^2 = B - A$$

$$(A + B)(A - B) = B - A$$

$$A + B = -1$$

Since,

$$A \neq B$$

$$A^2 + B^2 = 4004 + A + B = 4003$$

$$(A + B)^2 = A^2 + B^2 + 2AB$$

$$2AB = 1 - 4003 = -4002$$

$$AB = -2001$$

**C** -2000**D** 1

QUESTION ANALYTICS



Q. 5

[FAQ](#)[▶ Solution Video](#)[Have any Doubt ?](#)

There are two groups of students A and B in a sport academy which offers three games volleyball, basketball, baseball. The ratio of the total number of student playing volleyball, basketball and baseball is 3 : 4 : 5 in both the groups. If the ratio of the total number of student in Group A and B is 2 : 3 and there are 40 more students in Group B than Group A who plays baseball, then total number of students is \_\_\_\_\_.

**A** 480

Correct Option

**Solution :**  
480

	Volleyball	Basketball	Baseball
Let the number of student in group A	6x	8x	10x
Let the number of student in group B	9x	12x	15x

$$15x - 10x = 40$$

$$x = 8$$

$$\text{Total number of student} = (6 + 8 + 10 + 9 + 12 + 15) \times 8 = 480$$

QUESTION ANALYTICS



Q. 6

[▶ Solution Video](#)[Have any Doubt ?](#)

6 men and 8 women can complete a work in 10 days. 26 men and 48 women can complete the same work in 2 days. 15 men and 20 women can do the same work in \_\_\_\_\_.

**A** 2 days**B** 3 days**C** 4 days

Correct Option

**Solution :**  
(c)

Let  $a$  and  $b$  the work done by a men and a women in one day respectively.

$$6a + 8b = \frac{1}{10} \quad \dots(i)$$

$$\text{Also,} \quad 26a + 48b = \frac{1}{2} \quad \dots(ii)$$

From (i) and (ii) we have  $a = \frac{1}{100}$  and  $b = \frac{1}{200}$  so work done by 15 men and 20 women in one day

$$= \frac{15}{100} + \frac{20}{200} = \frac{1}{4}$$

∴ Required time = 4 days

**D** 5 days

QUESTION ANALYTICS



Q. 7

[FAQ](#)
[Solution Video](#)
[Have any Doubt?](#)

The metro service has trains going from Mumbai to Pune and Pune to Mumbai every hour. The first one from either stations starts at 6:00 am. The trip from one city to another takes four and half hours and all the trains travels at same speed. If a train starts at 12.00 noon from Mumbai toward Pune, then the number of trains it will pass in its entire journey is

 A 7 B 8 C 9

Correct Option

**Solution :**

(c)

The trains starts at 6:00 am, 7:00 am, 8:00 am from both the stations.



The train reach at 10:30, 11:30, 12:30 pm.

The train which start at 12.00 pm from Mumbai will reach the Pune by 4:30 pm. This train first meets a train moving towards Mumbai to reach the destination by 12:30 pm, which started in Pune at 8:00 am. The train crosses the trains which starts from Pune between 8:00 am and 4:30 pm.

$\Rightarrow$  Total number of trains = 9

 D 10

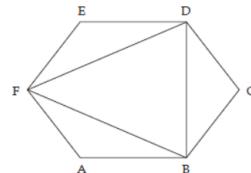
QUESTION ANALYTICS

+

Q. 8

[FAQ](#)
[Solution Video](#)
[Have any Doubt?](#)

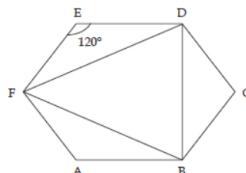
ABCDEF is a regular hexagon of side 6 cm. What is the area of triangle BDF?

 A  $32\sqrt{3} \text{ cm}^2$  B  $27\sqrt{3} \text{ cm}^2$ 

Correct Option

**Solution :**

(b)



Subtract the area of 3 triangles DEF, BAF, BCD from area of hexagon,

$$\text{Area of } \triangle DEF = \frac{1}{2} \times 6 \times 6 \times \sin 120^\circ = 9\sqrt{3} \text{ cm}^2$$

$$\text{Area of all 3 triangles} = 3 \times 9\sqrt{3} = 27\sqrt{3} \text{ cm}^2$$

$$\text{Area of regular hexagon} = \frac{3\sqrt{3}}{2} \times 6^2 = 54\sqrt{3} \text{ cm}^2$$

$$\text{Required area} = 54\sqrt{3} - 27\sqrt{3} = 27\sqrt{3} \text{ cm}^2$$

 C  $24 \text{ cm}^2$  D None of these

QUESTION ANALYTICS

+

Q. 9

[FAQ](#)
[Solution Video](#)
[Have any Doubt?](#)

A student is required to answer 6 out of 10 questions in IES examination. The question are divided in two groups, each containing 5 questions. She is not allowed to attempt more then 4 question from each group. The number of ways in which the student can choose 6 questions are \_\_\_\_\_.

 A 150 B 250

**Solution :**  
(d)

	Group-1	Group-2	Now number of ways
Case 1	4	2	${}^5C_4 \times {}^5C_2$
Case 2	3	3	${}^5C_3 \times {}^5C_3$
Case 3	2	4	${}^5C_2 \times {}^5C_4$

$$\text{Total ways} = {}^5C_4 \times {}^5C_2 + {}^5C_3 \times {}^5C_3 + {}^5C_2 \times {}^5C_4 \\ = 5 \times 10 + 10 \times 10 + 5 \times 10 = 200$$

 QUESTION ANALYTICS


Q. 10

[FAQ](#)[Solution Video](#)[Have any Doubt ?](#)

The real roots of equation  $|x - 2|^2 + |x - 2| - 2 = 0$  are \_\_\_\_\_.

A 1

Correct Option

B 0

C 3

Correct Option

D 4

YOUR ANSWER - NA

CORRECT ANSWER - a,c

STATUS - SKIPPED

**Solution :**

(a, c)

Lets's assume  $|x - 2| = m$   
Now,  $m^2 + m - 2 = 0$   
 $(m - 1)(m + 2) = 0$   
 $m = 1, m \neq 2$   
Only admissible value  $m = 1$   
 $|x - 2| = 1$   
 $x = 3, 1$

 QUESTION ANALYTICS




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Q. 11

? FAQ    Have any Doubt?   

Consider the following languages:

$L_1 = \{<M, x> \mid M \text{ is a DFA and } M \text{ accepts } x\}$

$L_2 = \{<M> \mid M \text{ is a DFA and } M \text{ accepts some string of the form } ww^R \text{ for some } w \in (a, b)^*\}$

Then which of the following is true?

- A  $L_1$  is recursive but  $L_2$  is undecidable.
- B  $L_1$  is undecidable but  $L_2$  is decidable.
- C  $L_1$  and  $L_2$  both are undecidable.
- D  $L_1$  and  $L_2$  both are decidable.

Correct Option

Solution :

(d)

Algorithm for  $L_1$  : Run  $M$  on  $x$

Algorithm for  $L_2$  : Intersect the DFA with a PDA that recognizes the language  $ww^R$  and test emptiness of the resulting PDA. Hence, decidable.

QUESTION ANALYTICS



Q. 12

Have any Doubt?   

Let  $M$  be a two-dimensional array declared as follows:

$M$ : array [5 .... 15] [5 .... 20] of integer;

Assuming that each integer takes one memory location, the array is stored in row-major order and the first element of the array is stored at location 200, what is the address of the element  $A[i][j]$ ?

- A  $11i + j + 140$
- B  $16j + i + 115$
- C  $16i + j + 115$

Correct Option

Solution :

(c)

For array  $[r_1 \dots r_2] [c_1 \dots c_2]$ , where each array element takes  $n$  memory locations.

In row major order,

Address of element  $A[i][j] = \text{Base address} + [(i - r_1)^*(c_2 - c_1 + 1) + (j - c_1)]^*n$

So, for the given question,

Address of element  $A[i][j] = 200 + [(i - 5)16 + (j - 5)]^*1 = 16i + j + 115$

- D  $11j + i + 140$

QUESTION ANALYTICS



Q. 13

? FAQ    Solution Video    Have any Doubt?   

Suppose in quick sort, we choose the middle element as pivot, every time. What will be the time complexity of quick sort if a sorted array is given?

- A  $O(\log n)$
- B  $O(n)$
- C  $O(n \log n)$

Correct Option

Solution :

(c)

Because we are selecting middle element as pivot and array is sorted, so, we have half-half partition every time.

Hence,  $n \log n$  time.

- D  $O(n^2)$

QUESTION ANALYTICS



Q. 14

Have any Doubt ?

Which language necessarily need heap allocation in the run time environment?

- A Those that support recursion.
- B Those that use dynamic scoping.
- C Those that allow dynamic data structure.
- D Those that uses global variables.

Correct Option

Solution :

(c)  
Heap allocation is needed for dynamic data structures like tree, linked list, etc.

QUESTION ANALYTICS



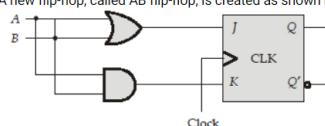
Q. 15

FAQ

Solution Video

Have any Doubt ?

A new flip-flop, called AB flip-flop, is created as shown below. What does the flip-flop do?



- A Set command when A = 0, B = 0
- B Reset command when A = 0, B = 1
- C Hold command when A = 1, B = 0
- D Toggle command when A = 1, B = 1

Correct Option

Solution :

(d)  
When both A and B are 1 then J = 1, K = 1, so, toggle.

QUESTION ANALYTICS



Q. 16

FAQ

Solution Video

Have any Doubt ?

For the relational schema R having n possible attributes in it. What is the maximum number of possible superkeys?

- A  $2^{n+1}$
- B  $2^n \cdot 1$
- C  $2^n - 1$
- D  $2^{\text{floor}(n/2)}$

Correct Option

Solution :

(b)  
Maximum number of possible superkeys for a table with n attributes =  $2^n - 1$ .

- A  $2^{n+1}$
- B  $2^n \cdot 1$
- C  $2^n - 1$
- D  $2^{\text{floor}(n/2)}$

QUESTION ANALYTICS



Q. 17

FAQ

Have any Doubt ?

Find the total number of subnets available and broadcast address given for subnet mask 255.255.255.224 and IP address as 192.168.0.102

- A 4, 192.168.0.127
- B 6, 192.168.0.217
- C 8, 192.168.0.184
- D 6, 192.168.0.127

Correct Option

Solution :

(d)

Q. 18

[▶ Solution Video](#)[Have any Doubt ?](#)

Alisha, Babita and Catty go to a Chinese restaurant at a busy time of the day. The waiter apologetically explains that the restaurant can provide only two pairs of chopsticks (for a total of four chopsticks) to be shared among the three people. Alisha proposes that all four chopsticks be placed in an empty glass at the center of the table and that each diner should obey the following protocol:

```
while (! had_enough_to_eat ()) {
    acquire_one_chopstick (); /* May block. */
    acquire_one_chopstick (); /* May block. */
    eat ();
    release_one_chopstick (); /* Does not block. */
    release_one_chopstick (); /* Does not block. */
}
```

Consider the following statements:

1. This dining plan may lead to deadlock.
2. This dining plan may lead to starvation of someone.

Which of the above is correct?

**A** Only I**B** Only II

Correct Option

**C** Both I and II**D** None of these

Q. 19

[Have any Doubt ?](#)

The number of bit strings of length eight that will either start with 'a' or end with two bits as 'bb' where  $\Sigma = \{a, b\}$

**A** 32**B** 64**C** 128**D** 160

Correct Option

**Solution :**

(d)

For string starting with *a*.

<i>a</i>							
<i>b</i>							

Other 7 places have two choices, so number of strings =  $2^7$ .

For string ending with *bb*.

<i>a</i>	<i>b</i>						
<i>b</i>							

Other 6 places have 2 choices for every slot so number of string =  $2^6$ .

Now, for string starting with *a* and ending with *bb*.

<i>a</i>	<i>b</i>						
<i>b</i>							

Using rule of inclusion – exclusion : Total number of string

$$\begin{aligned} &= 2^7 + 2^6 - 2^5 \\ &= 128 + 64 - 32 = 160 \end{aligned}$$

Q. 20

[FAQ](#)[▶ Solution Video](#)[Have any Doubt ?](#)

Consider the following relational schemes: R(A, B, C, D, E, F) and S(A, B, C) within the following functional dependencies:  $(AB \rightarrow C, C \rightarrow ABDE, ADE \rightarrow F)$ . Assume (A, B) is the key for both schemes. Which of the following statements is true?

**A** Both *R* and *S* are in 2NF only and *R* covers *S*.**B** Both *R* and *S* are in 3NF only and *R* covers *S*.**C** *R* is in 2NF and *S* is in 3NF and *R* covers *S*.

Correct Option

**Solution :**

(c) R is in 2NF and S is in 3NF and R covers S.

Because for the relation R FD's are {AB → C, C → ABDE, ADE → F} out of these 3 FD's 2<sup>nd</sup> one is giving (non-key → non-key) so it is not in 3NF, but there are no partial dependencies, you might be confused in 3<sup>rd</sup> FD (but it is not partial FD).

Regarding relation S, it is in BCNF means it is also in 3NF right.

So option (c) is more appropriate.

**D** R is in 2NF and S is in 3NF and S covers R.

 QUESTION ANALYTICS

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Item 11-20 of 65 « previous 1 2 3 4 5 6 7 next »



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Q. 21

Solution Video    Have any Doubt ?

The function  $y = |2 - 3x|$

- A** is continuous  $\forall x \in R$  and differentiable  $\forall x \in R$ .
- B** is continuous  $\forall x \in R$  and differentiable  $\forall x \in R$  except at  $x = \frac{3}{2}$ .
- C** is continuous  $\forall x \in R$  and differentiable  $\forall x \in R$  except at  $x = \frac{2}{3}$ .

Correct Option

Solution :

(c)

$$\begin{aligned} y &= |2 - 3x| \\ &= 2 - 3x, 2 - 3x \geq 0 \\ &= 3x - 2, 2 - 3x < 0 \end{aligned}$$

Therefore,  $y = 2 - 3x, x \leq \frac{2}{3}$   
 $= 3x - 2, x > \frac{2}{3}$

Since  $2 - 3x$  and  $3x - 2$  are polynomials, these are continuous at all points. The only concern is at

$$x = \frac{2}{3}.$$

Left limit at  $x = \frac{2}{3}$  is  $2 - 3 \times \frac{2}{3} = 0$

Right limit at  $x = \frac{2}{3}$  is  $3 \times \frac{2}{3} - 2 = 0$

$$f\left(\frac{2}{3}\right) = 3 \times \frac{2}{3} - 2 = 0$$

Since, Left limit = Right limit =  $f\left(\frac{2}{3}\right)$

$\Rightarrow$  Function is continuous at  $\frac{2}{3}$

$y$  is therefore continuous  $\forall x \in R$

Now since  $2 - 3x$  and  $3x - 2$  are polynomials, they are differentiable.

Only concern is at  $x = \frac{2}{3}$ .

Now at  $x = \frac{2}{3}$ , LD = left derivative = -3

RD = Right derivative = +3

LD  $\neq$  RD

Therefore the function  $y$  is not differentiable at  $x = \frac{2}{3}$ .

So, we can say that  $y$  is differentiable  $\forall x \in R$ , except at  $x = \frac{2}{3}$ .

- D** is continuous  $\forall x \in R$  except at  $x = 3$  and differentiable  $\forall x \in R$ .

QUESTION ANALYTICS

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Q. 22

? FAQ    Solution Video    Have any Doubt ?

$S: R_1(A), R_3(D), W_1(B), R_2(B), R_4(B), W_2(C), R_5(C), W_4(E), R_5(E), W_5(B)$   
 Number of serial schedules which are view equal to above S are \_\_\_\_\_.

10

Correct Option

Solution :

10

View serializability rules:

1. Initial read must be same
2. There is  $W - R$  dependency
3. Final write on some item should be same

There are 4 write-read conflict:

- $W_1 - R_4$  on B
- $W_1 - R_3$  on B
- $W_2 - R_5$  on C
- $W_4 - R_5$  on E

Transaction  $T_5$  is performing final write on items B, and it is fixed. Initial read is done by  $T_1$  on A.  $T_3$  has a read operation,  $R_3(D)$ . Not a write operation so if  $T_3$  is placed before  $T_1$  there is no  $W - R$  dependency, only  $R - R$  dependency. Same logic also applies if  $T_3$  place after  $T_5$ .

So all 3 rules are satisfying here.

- $T_1 — T_2 — T_4 — T_5 —$  ( $T_3$  can be placed anywhere out of 5 places) =  ${}^5C_1$
- $T_1 — T_4 — T_2 — T_5 —$  ( $T_3$  can be placed anywhere out of 5 places) =  ${}^5C_1$

Therefore, total orderings =  $5 + 5 = 10$

QUESTION ANALYTICS

Q. 23

Solution Video

Have any Doubt?



Find the exact value of  $\lim_{x \rightarrow 0} \frac{\sqrt{3+x} - \sqrt{3}}{x}$ .

A  $\sqrt{3}$

B 0

C  $\frac{1}{2\sqrt{3}}$

Correct Option

Solution :

$$\begin{aligned} \lim_{x \rightarrow 0} \frac{\sqrt{3+x} - \sqrt{3}}{x} &\times \frac{\sqrt{3+x} + \sqrt{3}}{\sqrt{3+x} + \sqrt{3}} = \lim_{x \rightarrow 0} \frac{3+x-3}{x(\sqrt{3+x} + \sqrt{3})} = \lim_{x \rightarrow 0} \frac{x}{x(\sqrt{3+x} + \sqrt{3})} \\ &= \frac{1}{2\sqrt{3}} \end{aligned}$$

D The limit does not exist

QUESTION ANALYTICS

Q. 24

FAQ

Have any Doubt?



Suppose there are four problems (languages) A, B, C and D. Each of these languages may or may not be recursively enumerable. However, we know the following about them:  
I. There is a reduction (i.e., an algorithm, not necessarily polynomial-time) from A to B.  
II. There is a reduction from B to C.

III. There is a reduction from D to C

Consider the following statements and select the statements that are never true, regardless of what A through D are.

A A is recursively enumerable but not recursive and C is recursive.

Correct Option

B A is not recursive and D is not recursively enumerable.

C The complement of A is not recursively enumerable, but the complement of B is recursively enumerable.

D The complement of B is not recursive, but the complement of C is recursive.

Correct Option

YOUR ANSWER - NA

CORRECT ANSWER - a,d

STATUS - SKIPPED

Solution :

(a, d)

Suppose  $L_1$  reduces to  $L_2$  and  $L_1$  is undecidable. Then  $L_2$  is undecidable. If  $A \leq m B$  and B is recursively enumerable then A is recursively enumerable. If  $A \leq m B$  and A is not recursively enumerable then B is not recursively enumerable. If  $A \leq m B$  and B is decidable then A is decidable. If  $A \leq m B$  and A is undecidable then B is undecidable.

QUESTION ANALYTICS

Q. 25

Have any Doubt?



You are assigning IP addresses to hosts in the 192.168.4.0/26 subnet. Which two of the following IP addresses are assignable IP addresses that reside in that subnet?

A 192.168.4.0

B 192.168.4.63

C 192.168.4.64

D 192.168.4.62

Correct Option

Solution :

(d)

The range of host in this subnet is 192.168.4.00 000001 to 192.168.4.00 111110  
Which is 192.168.4.1 to 192.168.4.62  
The option (d) is correct answer.

QUESTION ANALYTICS



Q. 26

[FAQ](#)
[Solution Video](#)
[Have any Doubt ?](#)

Which of the following solutions to the synchronization problem is/are implemented in the user mode?

 A Lock variable

Correct Option

 B Bakery algorithm

Correct Option

 C Strict alternation

Correct Option

 D None of the above

YOUR ANSWER - NA

CORRECT ANSWER - a,b,c

STATUS - SKIPPED

**Solution :**

(a, b, c)

All the three are implemented in the user mode. They don't require hardware support. These are software based solutions and are therefore desirable solutions.

QUESTION ANALYTICS



Q. 27

[FAQ](#)
[Solution Video](#)
[Have any Doubt ?](#)

Consider the following languages:

 $L_1 = \{<M> \mid M \text{ is a TM and } L(M) \text{ is not RE}\}$  $L_2 = \{<M> \mid M \text{ is a TM and } \{00, 11\} \notin L(M)\}$ 

Which of the above languages is decidable?

 A Only  $L_1$ 

Correct Option

**Solution :**

(a)

Since language of TM is always RE. Therefore checking  $L(M)$  is not RE is trivially false. So  $L_1$  is trivially decidable.•  $\{00, 11\}$  may or may not belongs to some  $L(M)$ . So it is not trivial. Therefore by Rice's theorem  $L_2$  is undecidable. B Only  $L_2$  C Both  $L_1$  and  $L_2$  D None of these

QUESTION ANALYTICS



Q. 28

[FAQ](#)
[Solution Video](#)
[Have any Doubt ?](#)

A min heap having 1024 distinct elements with keys ranging from 0 to 1023 is stored in an array of 1024 indices. The element with key value 512 can be stored in some level of the heap. The maximum difference possible at maximum level and minimum level in which key 512 can be present is \_\_\_\_\_?

 9

Correct Option

**Solution :**

9

Let's assume root level is level 1 then 512 element could be present 11 level (in case of maximum). 512 element could be present at 2nd level (in case of minimum). Hence 9 is the answer.

QUESTION ANALYTICS



Q. 29

[FAQ](#)
[Solution Video](#)
[Have any Doubt ?](#)

Consider the following function:

```
int DoSomething()
{
    int i, r;
    r = 0;
    for (i = 0; i < 5; i++)
    {
        if ((i % 3) == 1)
            r = r + i;
        else
            r = r + 1;
    }
    return r;
}
```

What value is returned as a result of the call `DoSomething()`?

 8

Correct Option

Solution :

8  
i will go from 0 to 4. r increases by i when  $i \bmod 3$  is 1, else r increases by 1.  
So, final value of r will be 8.

QUESTION ANALYTICS



Q. 30

Have any Doubt ?



Consider the following CFG:

$S \rightarrow aB \mid bA \mid D \mid E$   
 $A \rightarrow a \mid aS \mid bAA \mid c$   
 $B \rightarrow b \mid bS \mid aBB \mid c$   
 $D \rightarrow dD \mid Dd \mid d$   
 $E \rightarrow EE \mid EdE$

Which of the following statements are true for the above grammar?

A  $S \Rightarrow aB \Rightarrow aaBB \Rightarrow aabSB \Rightarrow aabbAB \Rightarrow aabbccB \Rightarrow aabbcc$  is the left-most derivation for string aabbcc.

Correct Option

B  $S \Rightarrow aB \Rightarrow aaBB \Rightarrow aaBc \Rightarrow aabSc \Rightarrow aabbAc \Rightarrow aabbcc$  is the right-most derivation for string aabbcc.

Correct Option

C The grammar is ambiguous.

Correct Option

D The string ab has more than one parse trees.

YOUR ANSWER - NA

CORRECT ANSWER - a,b,c

STATUS - SKIPPED

Solution :

(a, b, c)

Yes, the grammar is ambiguous because there are two different leftmost derivations of the string dd: (1)  $S \Rightarrow D \Rightarrow dD \Rightarrow dd$  and (2)  $S \Rightarrow D \Rightarrow Dd \Rightarrow dd$ .

QUESTION ANALYTICS



Item 21-30 of 65 « previous 1 2 3 4 5 6 7 next »



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**Q. 31**


The Karnaugh map shown above represents a switching function  $f(a, b, c, d)$ .

	ab	00	01	11	10
cd	00	0	4	12	8
00	1	0	0	0	1
01	1	5	13	9	X
11	3	7	15	11	
10	0	0	0	0	
2	2	6	14	10	
10	1	0	1	X	

The summation of the number of prime implicants and essential prime implicants of this function is \_\_\_\_\_?

 6

Correct Option

**Solution :**

6

Prime Implicants are:

Cells(0, 2, 8, 10) this is also an EPI because it covers minterm 2 uniquely.  
 Cells(0, 1, 8, 9) this is also an EPI because it covers minterm 1 uniquely.  
 Cells (10, 14) this is also an EPI because it covers minterm 14 uniquely.  
 So, three PI, 3 EPI. So, answer 6.

**QUESTION ANALYTICS**

**Q. 32**


Let  $A$  and  $B$  are events.

$P(A) = 0.35$ ,  $P(B) = 0.25$  and  $P(A \cap B) = 0.1$

What is  $P(A^c \cap B)$ ?

 A. 0.1

 B. 0.15

Correct Option

**Solution :**

(b)

$$\begin{aligned} P((A^c) \cap B) &= P((S - A) \cap B) \\ &= P((S \cap B) - (A \cap B)) \\ &= P(B) - P(A \cap B) \\ &= 0.25 - 0.1 = 0.15 \end{aligned}$$

 C. 0.25

 D. 0.20


**QUESTION ANALYTICS**

**Q. 33**
[FAQ](#)


$X(R_i)$  represents an index addressing mode.

The Effective address of operand is given by  $EA = X + [R_i]X$  denotes signed integer and mentioned in the instruction itself. If the contents of the register  $R_i$  is always equal to zero then Index addressing mode will implement.

 A. Immediate addressing mode

 B. Absolute addressing mode

Correct Option

**Solution :**

(b)

 As the  $R_i$  value is zero.

 So effective address of the operand =  $X$ 

Logically we are specifying the address of the operand directly.

 C. Indirect addressing mode

 D. Register addressing mode


**QUESTION ANALYTICS**


Q. 34

FAQ Have any Doubt ?

Let  $N^*$  denote the non-zero natural numbers. Define a binary relation  $R$  on  $N^*$  by  $(m, n) R (s, t)$  if  $(m - n) \equiv (s - t) \pmod{5}$ . The binary relation  $R$  is

A Reflexive, not symmetric, transitive

B Reflexive, symmetric, transitive

Correct Option

Solution :

(b)

Reflexive because  $(m - n) \equiv (m - n) \pmod{5}$ .

Symmetric because  $(m - n) \equiv (s - t) \pmod{5}$  so  $(s - t) \equiv (m - n) \pmod{5}$ .

Transitive because  $(m - n) \equiv (s - t) \pmod{5}$  and  $(s - t) \equiv (u - v) \pmod{5}$  then  $(m - n) \equiv (u - v) \pmod{5}$ .

C Reflexive, symmetric, not transitive

D Reflexive, not symmetric, not transitive

QUESTION ANALYTICS

+

Q. 35

FAQ Have any Doubt ?

Consider the following program:

```
sum = 0;
for (i = 1; i < 31; ++i)
    for (j = 1; j < 31; ++j)
        for (k = 1; k < 31; ++k)
            if ((i + j + k)%3 == 0)
                sum+=1;
printf("%d", sum);
```

The output is \_\_\_\_\_.

A 900

B 3000

C 90

D 9000

Correct Option

Solution :

(d)

Value of sum is incremented for  $i + j + k = 3, 6, 9$  etc.

i.e. for  $i = 1, j = 1, k$  can be  $1, 4, 7 \dots$  (10 times)

Also for  $i = 1, j = 2, k = 3, 6, 9 \dots$  (10 times)

So, for  $i = 1$  there will be  $30 \times 10 = 300$  such combination for each  $i$ .

And total  $(i = 1 \text{ to } 30) = 300 \times 30 = 9000$ .

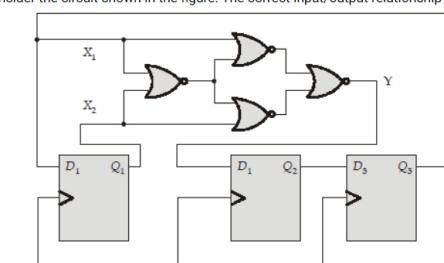
QUESTION ANALYTICS

+

Q. 36

Solution Video FAQ Have any Doubt ?

Consider the circuit shown in the figure. The correct input/output relationship between  $Y$  and  $(X_1, X_2)$  is



A  $Y = X_1 + X_2$

B  $Y = X_1 \cdot X_2$

C  $Y = X_1 \oplus X_2$

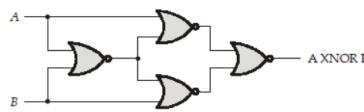
D  $Y = \overline{X_1 \oplus X_2}$

Correct Option

Solution :

(d)

Here 4 NOR gate combination make ANXOR gate.



XNOR is complement of XOR

i.e. 
$$Y = \overline{X_1 \oplus X_2}$$

So option (d) is correct one.

#### QUESTION ANALYTICS

Q. 37

FAQ Solution Video Have any Doubt ?

Which of the following options is/are true?

A Self dual function is a subset of neutral functions.

Correct Option

B  $F(x, y, z) = \Sigma(0, 1, 2, 4)$  is self-dual.

Correct Option

C Number of neutral functions < number of self-dual functions.

D A function becomes self-dual if the number of minterms is equal to number of maxterms.

YOUR ANSWER - NA

CORRECT ANSWER - ab

STATUS - SKIPPED

Solution :

(a, b)

Option (a) and (b) are true.

Option (c) is contradictory to (a) option.

Option (d) is false because a function to be self dual, should have minterms = maxterms and the terms should be mutually exclusive.

#### QUESTION ANALYTICS

Q. 38

FAQ Solution Video Have any Doubt ?

$G(x)$  :  $x$  is a gold ornament.

$S(x)$  :  $x$  is a silver ornament.

$P(x)$  :  $x$  is precious.

Which one of the following is the appropriate logical formula to represent the statement "Gold and silver ornaments are precious".

A  $\forall x (G(x) \wedge S(x) \Rightarrow P(x))$

B  $\forall x (G(x) \vee S(x) \Rightarrow P(x))$

Correct Option

Solution :

(b)

The statement is saying that every gold, every silver is precious.

So, answer is option (b). For every  $x$ , if  $x$  is gold or silver then  $x$  is precious.

C  $\exists x (G(x) \wedge S(x) \Rightarrow P(x))$

D  $\exists x (G(x) \vee S(x) \Rightarrow P(x))$

#### QUESTION ANALYTICS

Q. 39

FAQ Solution Video Have any Doubt ?

Consider the following strings  $x$  and  $y$ .

$x = "csemadeeasy2021"$

$y = "gateexam2021"$

The length of longest common subsequences are possible from  $x$  and  $y$  is \_\_\_\_\_.

8

Correct Option

Solution :

8

Substring has to be consecutive letters but subsequence need not have to be consecutive letters but must be in same order as it appears in the string.

To find the longest common subsequence take the common letters one by one from left to right.

$x = csemadeeasy2021$

$y = gateexam2021$

LCS  $(x, y) = aeea2021$

Only "aeaa2021" is longest common subsequence whose length is 8.

Q. 40

Solution Video

Have any Doubt ?



Let two systems of linear equations be defined as follows:

$$\begin{array}{ll} x + y = 1 & x + y = 3 \\ P : 3x + 3y = 3 & \text{and } Q : 2x + 3y = 4. \text{ Then,} \\ 5x + 5y = 5 & 5x + 5y = 12 \end{array}$$

A *P* and *Q* are inconsistent.

B *P* and *Q* are consistent.

C *P* is consistent but *Q* is inconsistent.

Correct Option

Solution :

(c)

*P* has infinite solutions and *Q* has no solutions.

D None of the above



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	ab	00	01	11	10
cd	00	0	4	12	8
00	1	0	0	0	1
01	1	5	13	9	X
11	3	7	15	11	0
10	2	6	14	10	0
	1	0	1	X	

The summation of the number of prime implicants and essential prime implicants of this function is \_\_\_\_\_?

 6

Correct Option

**Solution :**

6

Prime Implicants are:

Cells(0, 2, 8, 10) this is also an EPI because it covers minterm 2 uniquely.  
 Cells(0, 1, 8, 9) this is also an EPI because it covers minterm 1 uniquely.  
 Cells (10, 14) this is also an EPI because it covers minterm 14 uniquely.  
 So, three PI, 3 EPI. So, answer 6.

QUESTION ANALYTICS

**Q. 32**


Let  $A$  and  $B$  are events.

$P(A) = 0.35$ ,  $P(B) = 0.25$  and  $P(A \cap B) = 0.1$

What is  $P(A^c \cap B)$ ?

 A. 0.1

 B. 0.15

Correct Option

**Solution :**

(b)

$$\begin{aligned} P((A^c) \cap B) &= P((S - A) \cap B) \\ &= P((S \cap B) - (A \cap B)) \\ &= P(B) - P(A \cap B) \\ &= 0.25 - 0.1 = 0.15 \end{aligned}$$

 C. 0.25

 D. 0.20


QUESTION ANALYTICS

**Q. 33**


$X(R_i)$  represents an index addressing mode.

The Effective address of operand is given by  $EA = X + [R_i]X$  denotes signed integer and mentioned in the instruction itself. If the contents of the register  $R_i$  is always equal to zero then Index addressing mode will implement.

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 B. Absolute addressing mode

Correct Option

**Solution :**

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 As the  $R_i$  value is zero.

 So effective address of the operand =  $X$ 

Logically we are specifying the address of the operand directly.

 C. Indirect addressing mode

 D. Register addressing mode


QUESTION ANALYTICS


Q. 34

FAQ Have any Doubt ?

Let  $N^*$  denote the non-zero natural numbers. Define a binary relation  $R$  on  $N^*$  by  $(m, n) R (s, t)$  if  $(m - n) \equiv (s - t) \pmod{5}$ . The binary relation  $R$  is

A Reflexive, not symmetric, transitive

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Correct Option

Solution :

(b)

Reflexive because  $(m - n) \equiv (m - n) \pmod{5}$ .

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Transitive because  $(m - n) \equiv (s - t) \pmod{5}$  and  $(s - t) \equiv (u - v) \pmod{5}$  then  $(m - n) \equiv (u - v) \pmod{5}$ .

C Reflexive, symmetric, not transitive

D Reflexive, not symmetric, not transitive

QUESTION ANALYTICS

+

Q. 35

FAQ Have any Doubt ?

Consider the following program:

```
sum = 0;
for (i = 1; i < 31; ++i)
    for (j = 1; j < 31; ++j)
        for (k = 1; k < 31; ++k)
            if ((i + j + k)%3 == 0)
                sum+=1;
printf("%d", sum);
```

The output is \_\_\_\_\_.

A 900

B 3000

C 90

D 9000

Correct Option

Solution :

(d)

Value of sum is incremented for  $i + j + k = 3, 6, 9$  etc.

i.e. for  $i = 1, j = 1, k$  can be  $1, 4, 7 \dots$  (10 times)

Also for  $i = 1, j = 2, k = 3, 6, 9 \dots$  (10 times)

So, for  $i = 1$  there will be  $30 \times 10 = 300$  such combination for each  $i$ .

And total ( $i = 1$  to  $30$ ) =  $300 \times 30 = 9000$ .

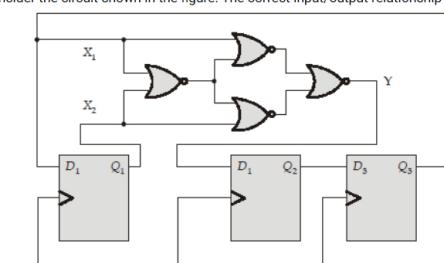
QUESTION ANALYTICS

+

Q. 36

Solution Video FAQ Have any Doubt ?

Consider the circuit shown in the figure. The correct input/output relationship between  $Y$  and  $(X_1, X_2)$  is



A  $Y = X_1 + X_2$

B  $Y = X_1 \cdot X_2$

C  $Y = X_1 \oplus X_2$

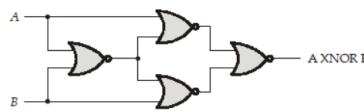
D  $Y = \overline{X_1} \oplus \overline{X_2}$

Correct Option

Solution :

(d)

Here 4 NOR gate combination make ANXOR gate.



XNOR is complement of XOR

i.e. 
$$Y = \overline{X_1 \oplus X_2}$$

So option (d) is correct one.

#### QUESTION ANALYTICS

Q. 37

FAQ Solution Video Have any Doubt ?

Which of the following options is/are true?

A Self dual function is a subset of neutral functions.

Correct Option

B  $F(x, y, z) = \Sigma(0, 1, 2, 4)$  is self-dual.

Correct Option

C Number of neutral functions < number of self-dual functions.

D A function becomes self-dual if the number of minterms is equal to number of maxterms.

YOUR ANSWER - NA

CORRECT ANSWER - ab

STATUS - SKIPPED

Solution :

(a, b)

Option (a) and (b) are true.

Option (c) is contradictory to (a) option.

Option (d) is false because a function to be self dual, should have minterms = maxterms and the terms should be mutually exclusive.

#### QUESTION ANALYTICS

Q. 38

FAQ Solution Video Have any Doubt ?

$G(x)$  :  $x$  is a gold ornament.

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Which one of the following is the appropriate logical formula to represent the statement "Gold and silver ornaments are precious".

A  $\forall x (G(x) \wedge S(x) \Rightarrow P(x))$

B  $\forall x (G(x) \vee S(x) \Rightarrow P(x))$

Correct Option

Solution :

(b)

The statement is saying that every gold, every silver is precious.

So, answer is option (b). For every  $x$ , if  $x$  is gold or silver then  $x$  is precious.

C  $\exists x (G(x) \wedge S(x) \Rightarrow P(x))$

D  $\exists x (G(x) \vee S(x) \Rightarrow P(x))$

#### QUESTION ANALYTICS

Q. 39

FAQ Solution Video Have any Doubt ?

Consider the following strings  $x$  and  $y$ .

$x = "csemadeeasy2021"$

$y = "gateexam2021"$

The length of longest common subsequences are possible from  $x$  and  $y$  is \_\_\_\_\_.

8

Correct Option

Solution :

8

Substring has to be consecutive letters but subsequence need not have to be consecutive letters but must be in same order as it appears in the string.

To find the longest common subsequence take the common letters one by one from left to right.

$x = csemadeeasy2021$

$y = gateexam2021$

LCS  $(x, y) = aeea2021$

Only "aeaa2021" is longest common subsequence whose length is 8.

Q. 40

Solution Video

Have any Doubt ?



Let two systems of linear equations be defined as follows:

$$\begin{array}{ll} x + y = 1 & x + y = 3 \\ P : 3x + 3y = 3 & \text{and } Q : 2x + 3y = 4. \text{ Then,} \\ 5x + 5y = 5 & 5x + 5y = 12 \end{array}$$

A *P* and *Q* are inconsistent.

B *P* and *Q* are consistent.

C *P* is consistent but *Q* is inconsistent.

Correct Option

Solution :

(c)

*P* has infinite solutions and *Q* has no solutions.

D None of the above



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**Q. 41**
[Have any Doubt ?](#)


Let  $M$  be the number different boolean functions of degree 4. The value of  $\log_2 M$  \_\_\_\_\_.

**16**
[Correct Option](#)
**Solution :**

16

Boolean function of the degree 4 means boolean function on 4 variables.

Total number of boolean functions with total  $2^n$  combination =  $2^{2^4}$ .

Given,  $n = 4$

Therefore, number of boolean functions =  $2^{2^4} = 2^{16}$

So,  $\log_2 M = \log_2 2^{16} = 16$

[QUESTION ANALYTICS](#)

**Q. 42**
[Have any Doubt ?](#)


Consider the following function/method:

```
int test(int a, int b)
{
    if (a < b) return 0;
    else return (1 + test (a - b, b));
}
```

What is returned by the call `test(15, 4)`?

**A** 1

**B** 2

**C** 3

[Correct Option](#)
**Solution :**

(c)

We get the answer by tracing through the series of recursive calls:

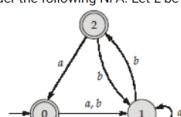
```
test(15, 4) : 15 > 4, so make a recursive call to test (15 - 4, 4)
test(11, 4) : 11 > 4, so make a recursive call to test(7, 4)
test(7, 4) : 7 > 4, so make a recursive call to test(3, 4)
test(3, 4) : 3 > 4, so we've hit the base case and return 0
test(7, 4) : return 1 + 0 = 1
test(11, 4) : return 1 + 1 = 2
test(15, 4) : return 1 + 2 = 3
```

**D** 4

[QUESTION ANALYTICS](#)

**Q. 43**
[FAQ](#)
[Have any Doubt ?](#)


Consider the following NFA. Let  $L$  be the language accepted by this NFA.



Which of the following statements are true for the above NFA?

**A** The minimal DFA for  $L$  will have 3 states.

[Correct Option](#)
**B** The grammar  $S \rightarrow aA?bA?\epsilon; A \rightarrow aA?bB; B \rightarrow aS?bA?\epsilon$  generates language  $L$ .

[Correct Option](#)
**C** The number of Myhill Nerode equivalence classes for  $L$  is 3.

[Correct Option](#)
**D** The grammar  $S \rightarrow aA?bA?\epsilon; A \rightarrow aA?baS?bbA?b$  generates language  $L$ .

[Correct Option](#)

YOUR ANSWER - NA

CORRECT ANSWER - a,b,c,d

STATUS - SKIPPED

**Solution :**

(a, b, c, d)  
The given NFA is DFA (Use the partition algorithm and within 2 steps it will converge and it will show it is minimal DFA).  
So option (a), (c) are true. Call the '0' state as 'S', '1' state as 'A' and '2' state as 'B' then it will generate the exactly same grammar as in option (b).  
Option (d) is same grammar as in option (b) after substituting variable B.

## QUESTION ANALYTICS +

Q. 44

FAQ Solution Video Have any Doubt ?

Consider 8 processes sharing the CPU in a round-robin fashion. Assuming that each process switch takes 0.125 seconds, what must be the quantum size 'q' such that the overhead resulting from process switching is minimized but at the same time each process is guaranteed to get its turn at the CPU at least every 64 seconds?

**A**  $q \leq 9$  seconds

Correct Option

**Solution :**

(a)

There are 8 processes.  
Consider  $P_1 || P_2 || P_3 || P_4 || P_5 || P_6 || P_7 || P_8 || P_1$   
Here Context switches are represented by  $||$ .  
If we see our scheduling pattern  $P_1$  get CPU again after 8 context switches and 7 time quanta.  
So  $8S + 7q \leq 64$  Seconds  
 $8 \times 0.125 + 7q \leq 64$   
Which means  $7q \leq 63$   
 $\Rightarrow q \leq 9$  seconds  
Hence option (a) is answer.

**B**  $q \geq 9$  seconds**C**  $q \leq 7$  seconds**D**  $q \geq 7$  seconds

## QUESTION ANALYTICS +

Q. 45

FAQ Solution Video Have any Doubt ?

Consider the following function:

```
int foo(int n)
{
    if (n < 5)
        { return n; }
    else if (n < 1000)
        { return foo(n - 3); }
    else {return foo(n/3); }
```

When asked what is the worst-case tight big-O runtime of this function  $\text{foo}()$ , Vivek says it is  $O(\log_2 n)$ . Nick says it is  $O(\log_3 n)$ . Who is right?

**A** Vivek is right (Vivek's answer:  $O(\log_2 n)$ )**B** Nisha is right (Nisha's answer:  $O(\log_3 n)$ )**C** Both are right.

Correct Option

**Solution :**

(c)

The function has time complexity of  $O(\log n)$ .  
And since  $O(\log_2 n) = O(\log_3 n)$ , hence, both  $\log_2 n$  and  $\log_3 n$  are tight worst case time complexities for the given function.

**D** Both are wrong.

## QUESTION ANALYTICS +

Q. 46

FAQ Solution Video Have any Doubt ?

Which of the following options are true?

**A** If  $\lim_{x \rightarrow a} \frac{f(x) - f(a)}{x - a}$  exists, then  $f$  is differentiable at  $a$ .

Correct Option

**B** If  $f$  is continuous at  $a$ , then  $f$  is differentiable at  $a$ .**C** If  $\lim_{x \rightarrow a} f(x)$  exists, then  $f$  is differentiable at  $a$ ,**D** If  $f$  is differentiable at  $a$ , then  $\lim_{x \rightarrow a} f(x) = f(a)$ .

Correct Option

**Solution :**

(a, d)

QUESTION ANALYTICS

+

**Q. 47**[? FAQ](#) [Have any Doubt ?](#)

Q

A company needs 600 addresses. Which of the following set of class C blocks can be used to form a supernet for this company?

- A 198.47.32.0, 198.47.33.0, 198.47.34.0
- B 198.47.32.0, 198.47.42.0, 198.47.52.0, 198.47.62.0
- C 198.47.31.0, 198.47.32.0, 198.47.33.0, 198.47.52.0
- D 198.47.32.0, 198.47.33.0, 198.47.34.0, 198.47.35.0

Correct Option

**Solution :**

(d)

For supernetting the block address should be contiguous  
 $198.47.32.0 \Rightarrow 192.47.00100000.00000000$   
 $192.47.33.0 \Rightarrow 192.47.00100001.00000000$   
 $192.47.34.0 \Rightarrow 192.47.00100010.00000000$   
 $192.47.35.0 \Rightarrow 192.47.00100011.00000000$

QUESTION ANALYTICS

+

**Q. 48**[? FAQ](#) [Have any Doubt ?](#)

Q

Let M be a  $n$  dimensional array declared as follows:

M : array [0 ...  $n - 1$ ] [0 ...  $n - 1$ ] [0 ...  $n - 1$ ] .... [0 ...  $n - 1$ ] of integers;

Assuming that each integer takes one memory location, the array is stored in row-major order and the first element of the array is stored at location 0. The address of the element  $A[i][i][i] \dots [i]$  is?

- A  $[(n^{n-1} - 1)/(n - 1)] * i$

- B  $[(n^n - 1)/(n - 1)] * i$

Correct Option

**Solution :**

(b)

When working with 2-D arrays (matrices), row-major vs. column-major are easy to describe. The row-major layout of a matrix puts the first row in contiguous memory, then the second row right after it, then the third and so on. Column-major layout puts the first column in contiguous memory, then the second, etc.

Higher dimensions are a bit more difficult to visualize. When we move to 3-D and beyond, it's best to leave the row/column notation of matrices behind. This is because this notation doesn't easily translate to 3 dimensions due to a common confusion between rows, columns and the Cartesian coordinate system.

So, let's not think of  $n$ -dimensional arrays in terms of rows/columns but in terms of dimensions. In row-major layout of multi-dimensional arrays, the last index is the fastest changing.

For 3-D arrays, this is equivalent in saying that in row-major order, first dimension of a 3-D array represents planes, second dimension represents rows, and third dimension represents columns. Similarly, this can be extended to  $n$ -D arrays.

So, we have the following for the given question:

In row major order,

Address of element  $A[i][i][i] \dots [i] = \text{Base address} + [(i) * n^{n-1} + (i) * n^{n-2} + \dots + i * n + i]$

$$\text{Address of element } A[i][i][i] \dots [i] = [1 + n + n * n + \dots + n^{n-1}]$$

$$= [(n^n - 1)/(n - 1)] * i$$

- C  $[(n^{n+1} - 1)/(n - 1)] * i$

- D None of these

QUESTION ANALYTICS

+

**Q. 49**[? FAQ](#) [Solution Video](#) [Have any Doubt ?](#)

Q

Consider the following relations:  $R_1(A B C)$  and  $R_2(A D E)$ .

$R_1$  has 1000 records and  $R_2$  has 2000 records. The attribute 'A' of  $R_2$  is not key as it is referencing attribute 'A' in  $R_1$ . Let X be minimum number of records in  $R_1 \bowtie R_2$  and Y be the maximum number of records in  $R_1 \bowtie R_2$ . The sum of  $(X + Y)$  is \_\_\_\_\_.

4000

Correct Option

**Solution :**

4000

Since 'A' in  $R_2$  is not key, hence all values of A may or may not be unique. Hence every entry under A in  $R_2$  will match with A in  $R_1$ .

Hence maximum is 2000. But A in  $R_2$  is foreign key referencing A in  $R_1$ .

∴ Sum is  $2000 + 2000 = 4000$

### QUESTION ANALYTICS

Q. 50

FAQ Solution Video Have any Doubt ?



Assume there are transactions:  $T_0, T_1, T_2, \dots, T_{n-1}$  is a schedule S. Every transaction writes value of  $x = x + 1$ , which is read by its successive transactions.  $T_0$  writes value of  $x$  that is read by  $T_1$ ,  $T_1$  writes a value of  $x$  that is read by  $T_2, \dots, T_{n-2}$  writes a value of  $x$  that is read by  $T_{n-1}$ . And before S is executed,  $x = 1$ . Now, if  $T_0$  fails, then in total how many transaction rollbacks are required to recover the schedule and what will be the final value of  $x$ ?

$T_0$	$T_1$	$T_2$	$T_3$	$T_4$	$T_5$	....
R(X)						
W(X)						
	R(X)					
	W(X)					
		R(X)				
		W(X)				
			....			

A  $n - 1, 1$

B  $n, 0$

C  $n - 1, 0$

D  $n, 1$

Correct Option

Solution :

(d)

Initially the value of  $x$  is 1.

Perform operation  $x = x + 1$  and value of  $x$  is 2. This value is read by transaction  $T_1$ , which is read by  $T_2$  and so on.

If transaction  $T_0$  fails, rollback the transactions  $T_1, T_2, T_3, T_4, \dots, T_{n-1}$ , because the transaction  $T_1$  reads uncommitted value  $x$  from  $T_0$ , so to get correct result,  $T_1, T_2, T_3, T_4, \dots, T_{n-1}$  have to be rolled back and to get the original value of  $x = 1$ , transaction  $T_0$  is also rolled back.

So finally all ' $n$ ' transactions are rolled back.

### QUESTION ANALYTICS

Item 41-50 of 65 « previous 1 2 3 4 5 6 7 next »



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Computer Science Engineering(CS)

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## FULL SYLLABUS TEST-5 (ADVANCE LEVEL) (GATE - 2021) - REPORTS

OVERALL ANALYSIS

COMPARISON REPORT

SOLUTION REPORT

ALL(65)

CORRECT(0)

INCORRECT(0)

SKIPPED(65)

Q. 51

Have any Doubt?



A 3

B 4

C 5

Correct Option

Solution :

(c)

Hash function =  $f(\text{key}) = \text{key mod } 7$ 

Insertion order = 37, 38, 72, 48, 98, 11, 56

Insert 37 : 37 mod 7 = 2

Insert 38 : 38 mod 7 = 3

Insert 72 : 72 mod 7 = 2, but already occupied, so after linear probing it would occupy index 4.

Insert 48 : 48 mod 7 = 6

Insert 98 : 98 mod 7 = 0

Insert 11 : 11 mod 7 = 4, but already occupied, after linear probing it would get into index 5.

So, option (c) is correct.

D 6

QUESTION ANALYTICS



Q. 52

FAQ

Solution Video

Have any Doubt?



Memory Protection is of no use in

A Multi-programmed systems

B Non multi-programmed systems

Correct Option

Solution :

(b)

1. Multi-programming as a way to allow multiple programs being resident in main memory and (apparently) running at the same time. One process should not be able to access the memory locations of other processes. Thus, protection is required in multi-programmed systems.

2. In case of non-multiprogrammed systems, i.e., uni-programmed systems, there is no issue of one process accessing other processes addresses, therefore, memory protection is not required.

3. Multitasking refers to multiple tasks running (apparently) simultaneously by sharing the CPU time. Each task should only be able to access only its memory addresses. Therefore, memory protection is required.

4. False statement.

C Non multitasking systems

D None of the above

QUESTION ANALYTICS



Q. 53

FAQ

Solution Video

Have any Doubt?

Consider four processes with a burst time of 10, 20, 30, 40 all process arrived at time 0. Each process spends first 10% of its execution time doing I/O, next 40% time doing CPU operations, next 20% time doing I/O and the last 30% time doing CPU operations. The system uses shortest remaining time first algorithm for scheduling. Calculate the completion time of  $P_3$  \_\_\_\_\_.

49

Correct Option

Solution :

49

	Arrival	Burst	10% IO	40% CPU	20% IO	30% CPU
$P_1$	0	10	1	4	2	3
$P_2$	0	20	2	8	4	6
$P_3$	0	30	3	12	6	9
$P_4$	0	40	4	16	8	12

Gantt Chart:

0 .... no process 1 ....  $P_1$  .... 5 ....  $P_2$  .... 7 ....  $P_1$  .... 10 ....  $P_2$  .... 16 ....  $P_3$  .... 20 ....  $P_2$  .... 26  
....  $P_3$  .... 34 ....  $P_4$  .... 40 ....  $P_3$  .... 49 ....  $P_4$  .... 59 .... no process .... 67 ....  $P_4$  .... 79

Q. 54

? FAQ Have any Doubt ?

We insert the following keys into an empty AVL tree in the following order:  
 15, 19, 13, 8, 6, 7, 11, 12, 10, 4  
 Which key will be the right child of the root after inserting all keys?

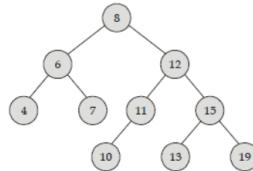
12

Correct Option

Solution :

12

The AVL tree will be as follows after insertion of all keys and after rotation:



Q. 55

? FAQ Have any Doubt ?

Consider the regular expression  $\underbrace{(x+y)(x+y)\dots(x+y)}_{n \text{ times}}$  on the alphabet  $\Sigma = \{x, y\}$ .

The minimum number of states in deterministic finite automaton that recognizes the language represented by this regular expression contains.

A *n* statesB *n* + 1 statesC *n* + 2 states

Correct Option

D  $2n$  states

YOUR ANSWER - NA

CORRECT ANSWER - c

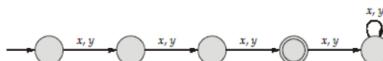
STATUS - SKIPPED

Solution :

(c)

Let regular expression for the above problem when  $n = 3$  is  $(x+y)(x+y)\dots 3 \text{ times}$   
 $= (x+y)(x+y)(x+y)$

The DFA



So, regular expression  $(x+y)^3$  has  $3 + 2 = 5$  states in DFA.

So, minimum number of states required for the given language is  $(n + 2)$  states.

Q. 56

? FAQ Have any Doubt ?

Consider the following 3 address intermediate code for C program fragment:

Intermediate code:

$\text{dot\_prod} = 0;$	$ $	$T_6 = T_4[T_5]$
$i = 0;$	$ $	$T_7 = T_3 * T_6$
$L_1: \text{if } (i >= 10) \text{ goto } L_2$	$ $	$T_8 = \text{dot\_prod} + T_7$
$T_1 = \text{addr } (a)$	$ $	$\text{dot\_prod} = T_8$
$T_2 = i * 4$	$ $	$T_9 = i + 1$
$T_3 = T_1[T_2]$	$ $	$i = T_9$
$T_4 = \text{addr } (b)$	$ $	$\text{goto } L_1$
$T_5 = i * 4$	$ $	$L_2:$

Where,  $a$ ,  $b$  are two integer arrays of size 10 and  $\text{dot\_prod}$ ,  $i$  are two integer variables.

i.e.  $\text{int } a[10], b[10], \text{dot\_prod}, i;$

Assume that  $a[i] = 1, \forall i, 0 \leq i \leq 9$  and  $b[i] = 2, \forall i, 0 \leq i \leq 9$ . And assume that integer size is 4 bytes and memory is byte addressable.

Then the value of the variable  $\text{dot\_prod}$  after the program fragment i.e. at  $L_2$  will be \_\_\_\_\_?

20

Correct Option

Solution :

20

The given intermediate code, when analyzed, does the following: It multiplies the corresponding entries of array  $a$ ,  $b$  and then sums them all and assigns to the variable  $\text{dot\_prod}$ . i.e.

```
for(i = 0; i < 10; i++)
    dot_prod += a[i] * b[i];
```

And the initial value of dot\_prod is 0.

Note that in the 3 address code, instruction  $a = b[i]$  means the following:  
 $a = b[i]$  ( $a$  is set to contents(content( $b$ ) + contents( $i$ )), where  $b$  is (usually the base address of an array i.e. the instruction  $x = y[i]$  sets  $x$  to the value in the location  $i$  memory units beyond location  $y$ ).

### QUESTION ANALYTICS

Q. 57

Have any Doubt?



Consider the given grammar:

$$\begin{aligned} E &\rightarrow E + T \mid E - T \mid T \\ T &\rightarrow T \times F \mid T \div F \mid F \\ F &\rightarrow G \uparrow F \mid G \\ G &\rightarrow id \end{aligned}$$

Evaluate the following expression in accordance with the given grammar (symbols have their usual meaning.  $\uparrow$  is the exponentiation operation. Example:  $2 \uparrow 3 = 8$ )  
 $3 \times 1 + 2 \uparrow 2 \uparrow 3 \times 1 + 3$  equals \_\_\_\_\_.

262

Correct Option

Solution :

262

Here exponent is having higher precedence and is right associative, then comes multiplication and divide which are left associative, then the least precedence goes to + and - which is also left associative so our calculation starts from.  
 $2 \uparrow (2 \uparrow 3)$  [right associative] = 256  
and then  $256 \times 1$ , then  $3 \times 1$   
Finally adding all 3 which is  $3 + 256 + 3 = 262$ .

### QUESTION ANALYTICS

Q. 58

Have any Doubt?



Let  $L$  be the language consisting of all strings of zero or more 0's followed by one or more 1's, followed by two or more 2's. For example, 001122, 122 and 0111122 are in  $L$ ; 012 (too few 2's) and 0112122 (a2 precedes a1) are not.  
Which of the following are true for  $L$ ?

A  $L$  is regular.

Correct Option

B The regular expression for  $L$  is  $0^*1^*2^*$

Correct Option

C The following grammar generates  $L$ . ( $\epsilon = \in$ )

Correct Option

$$\begin{aligned} S &\rightarrow A B C \\ A &\rightarrow 0 A \mid \epsilon \\ B &\rightarrow 1 B \mid 1 \\ C &\rightarrow 2 C \mid 22 \end{aligned}$$

D  $L$  is CFL.

Correct Option

YOUR ANSWER - NA

CORRECT ANSWER - a,b,c,d

STATUS - SKIPPED

Solution :

(a, b, c, d)  
All are correct.

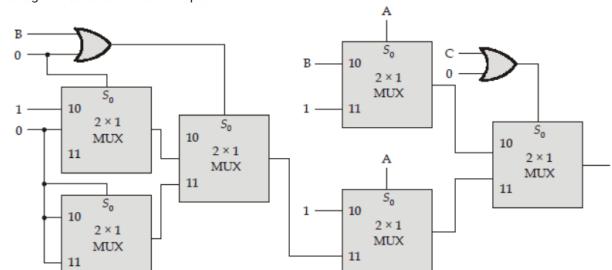
### QUESTION ANALYTICS

Q. 59

FAQ Solution Video Have any Doubt?



The logic circuit shown below implements:

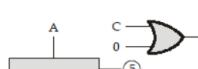
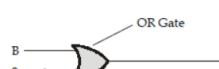


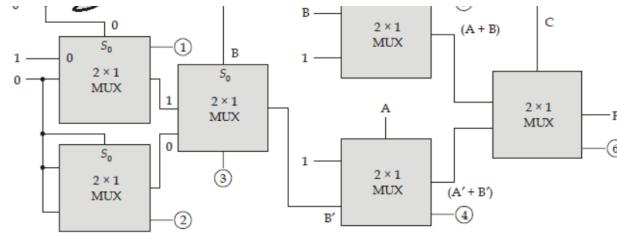
A  $(A \oplus C)(B \oplus C)$

Correct Option

B  $(C \oplus B) + (C \oplus A)$

Solution :  
(b)





1.  $0' \cdot 1 + 0 \cdot 0 = 1$
  2.  $0' \cdot 0 + 0 \cdot 0 = 0$
  3.  $B' \cdot 1 + 0 \cdot B = B'$
  4.  $A' \cdot 1 + AB'$   
 $(A + A')(A' + B') \Rightarrow A' + B'$
  5.  $A' \cdot B + A \Rightarrow (A + A')(A + B) = A + B$
  6.  $(A + B)C' + (A' + B')C$   
 $\rightarrow AC' + BC' + A'C + B'C$   
 $\rightarrow A'C + AC' + B'C + BC'$   
 $\rightarrow (A \oplus C) + (B \oplus C)$
- Option (b) is correct.

**C**  $(A \oplus B \oplus C)$

**D**  $(A \oplus B \oplus C)$

QUESTION ANALYTICS

+

Q. 60

Have any Doubt?

Q

Consider the following arguments. Which of them are valid?

- I. Everyone enrolled in the university has lived in a dormitory. Mia has never lived in a dormitory. Therefore, Mia is not enrolled in the university.
- II. A convertible car is fun to drive. Issac's car is not a convertible. Therefore, Issac's car is not fun to drive.
- III. Quincy likes all action movies. Quincy likes the movie eight men out. Therefore, eight men out is an action movie.
- IV. All lobstersmen set at least a dozen traps. Hamilton is a lobstersman. Therefore, Hamilton sets at least a dozen traps.

**A** Only I and III

**B** Only I and IV

Correct Option

Solution :

- (b)
- I. The argument is correct. It is an application of universal modus tollens.
  - II. The argument is not correct. It is an instance of the fallacy of denying the hypothesis.
  - III. This argument is not correct. It's a variant of the fallacy of affirming the conclusion. Indeed, it is quite possible that quincy likes also some movies that are not action movies.
  - IV. This argument is correct. It is an application of universal instantiation.

**C** I, III and IV only

**D** All are correct

QUESTION ANALYTICS

+



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## FULL SYLLABUS TEST-5 (ADVANCE LEVEL) (GATE - 2021) - REPORTS

OVERALL ANALYSIS    COMPARISON REPORT    **SOLUTION REPORT**

ALL(65)    CORRECT(0)    INCORRECT(0)    SKIPPED(65)

Q. 61

? FAQ    ▶ Solution Video    🤔 Have any Doubt ?



In a computer with a cache memory interposed between the processor and the primary memory, the cache is K-way set-associative (for some fixed K); i.e., each location in primary memory "maps to" (can be cached in) any of K locations in the set. Let there be P locations (blocks) in primary memory and C locations (lines) in the cache. On the average, how many different locations in primary memory map to a particular location in the cache if K = 2?

**A** 1

**B** P

**C**  $\frac{P}{C}$

**D**  $\frac{2P}{C}$

Correct Option

**Solution :**

(d)

Cache is K-way set associative. So, in one set, there are K lines.

There are C lines in the cache, so, there are  $\frac{C}{K}$  sets in the cache.

There are P blocks in main memory.

In set-associative cache, if there are n sets then a block number B of main memory will go to the set number  $B \bmod n$ .

So, to each set, there will be  $\frac{P}{\frac{C}{K}}$  blocks which will map to each set.

Inside a set, the block can go to any line.

So,  $\frac{P}{\frac{C}{K}}$  blocks map to a particular location in the cache.

Since K = 2, hence, answer is option (d).

QUESTION ANALYTICS



Q. 62

? FAQ    🤔 Have any Doubt ?



A certain company wants to have security for their computer systems. So they have given everyone a name and password. A length 10 word containing each of the characters: a, d, e, f, i, l, o, p, r, s is called as cword. A password will be cword which does not contain any of the subwords "fails", "failed", or "drop." Then the total number of passwords possible will be \_\_\_\_\_?

3622928

Correct Option

**Solution :**

3622928

There are 7! cwords that contain "drop", 6! that contain "fails" and 5! that contain "failed". There are 3! cwords containing both "drop" and "fails". No cword can contain both "fails" and "failed". The cwords containing both "drop" and "failed" come from taking the subword "failedrop" and the remaining letter "g" in any order, so there are 2! of them. So by inclusion exclusion, we have the number of cwords containing at least one of the three forbidden subwords is  $(7! + 6! + 5!) - (3! + 0 + 2!) = 5!(49) - 8$ . Among the 10! cwords, the remaining ones are passwords, so the number of passwords is  $10! - 5!(49) + 8 = 3622928$ .

QUESTION ANALYTICS



Q. 63

▶ Solution Video    🤔 Have any Doubt ?



Consider the following functions:

$$F_1(A, B, C) = \bar{A} + B\bar{C}$$

$$F_2(A, B) = \bar{A}B + A\bar{B}$$

Which of the above function(s) is/are functionally complete?

**A** Only  $F_1$

Correct Option

**Solution :**

(a)

$$F_1(A, B, C) = \bar{A} + B\bar{C} \Rightarrow \text{NOT, AND, OR gate}$$

$$F_1(A, A, A) = \bar{A} + A\bar{A} = \bar{A} \Rightarrow \text{NOT gate}$$

$$F_1(A, \bar{C}, C) = \bar{A} + \bar{C}C = \bar{A} + \bar{C} \Rightarrow \text{NAND gate}$$

NAND is functionally complete but XOR is not.

So, answer is option (a).

**B** Only  $F_2$

**C** Both  $F_1$  and  $F_2$

**D** Neither  $F_1$  nor  $F_2$

QUESTION ANALYTICS

Q. 64

FAQ

Solution Video

Have any Doubt?



Consider the following definitions and function given below:

The prime implicants for which each of its minterm is covered by some essential prime implicant are Redundant Prime Implicants (RPI). The prime implicants which are neither essential nor redundant prime implicants are called Selective Prime Implicants (SPI). Given  $F(A, B, C, D) = \sum_m(0, 1, 5, 7, 10, 14, 15)$ . Let the number of Essential Prime Implicant present is X, the number of Redundant Prime Implicants present is Y and the number of Selective Prime implicants present is Z. What is  $X + Y + Z$ ?

**6**

Correct Option

**Solution :**

6

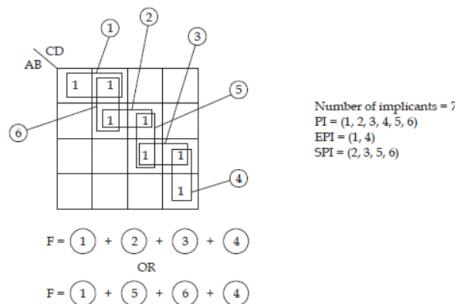
Number of Implicants = 7

Number of Prime Implicants (PI) = 6

Number of Essential Prime Implicants (EPI) = 2

Number of Redundant Prime Implicants (RPI) = 0

Number of Selective Prime Implicants (SPI) = 4



QUESTION ANALYTICS

Q. 65

FAQ

Solution Video

Have any Doubt?



Let  $E$  and  $F$  be the events that a family of  $n$  children has children of both sexes and has at most one boy, respectively. For which of the following value of  $n$ ,  $E$  and  $F$  are not independent?

**A** 2

Correct Option

**B** 3

Correct Option

**C** 4

Correct Option

**D** 6

Correct Option

YOUR ANSWER - NA

CORRECT ANSWER - a,c,d

STATUS - SKIPPED

**Solution :**

(a, c, d)

For,  $E = \{\text{of both sex}\}, F = \{\text{at most one boy}\}$

$n = 3$

$S = \{\text{bbb, bbg, bgb, gbb, bgg, gbg, ggb, ggg}\}$

$$E = \{\text{bbb, bbg, bgb, gbb, bgg, ggb}\} = P(E) = \frac{6}{8} = \frac{3}{4}$$

$$F = \{\text{ggg, gbg, ggb, bgg}\} = P(F) = \frac{4}{8} = \frac{1}{2}$$

$$P(E \cap F) = \{\text{gbg, ggb, bgg}\} = \frac{3}{8}$$

To be independent,

$$P(E \cap F) = P(E) \cdot P(F) = \frac{3}{4} \times \frac{1}{2} = \frac{3}{8}$$

Hence this is independent.

QUESTION ANALYTICS