



Kunal Jha

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Q. 1

Solution Video

Have any Doubt ?



Complete the sentence by filling in the appropriate words from the options provided.

I have never ____ such a problem and therefore confess I have no_____ to it.

(A) left alone, inhibitions

(B) chickened at, solution

(C) dreaded, panacea

(D) come across, ready-made answer

Correct Option

Solution :

(d)

I have never come across such a problem and therefore confess I have no ready-made answer to it. The logic is that since this person has never encountered such a problem earlier he has no ready-made answer to it.

QUESTION ANALYTICS



Q. 2

Solution Video

Have any Doubt ?

Choose an option, which can be substituted for the given phrase.
Something that cannot be imitated.

(A) Inimitable

Correct Option

Solution :

(a)

Inimitable means incapable of being duplicated. The word duplicitous means dishonest behavior that is intended to trick someone. Something that is impossible to explain is called inexplicable and something that is impossible to avoid or prevent is termed as inevitable.

(B) Inevitable

(C) Duplicity

(D) Inexplicable

QUESTION ANALYTICS



Q. 3

Solution Video

Have any Doubt ?



There are 16 executives including two brothers, A and B. In how many ways can they be arranged around a circular table if the two brothers can not be seated together?

(A) (14!)13

Correct Option

Solution :

(a)

Total number of ways of arranging 16 people around a circular table = $15!$ waysNumber of ways in which two brothers are together = $14! \times 2$

∴ Number of ways in which two brothers are never together

$$= 15! - 14! \times 2$$

$$= 14! (15 - 2) = 14! \times 13$$

(B) ${}^{14}P_3$ (C) $\frac{14!}{3!}$

(D) none of these

QUESTION ANALYTICS



Q. 4

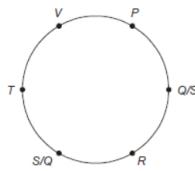
[▶ Solution Video](#)[Have any Doubt ?](#)

Six girls are sitting in a circle facing the centre of the circle. They are P, Q, R, S, T and V. R is sitting between Q and S. P is on the immediate left of V. R is 4th to the right of P. Which of the following statement is not true?

A R is sitting opposite to V**B** T is just next to the right of V**C** R is second to the left of T

Correct Option

Solution :
(c)

**D** P is second to the right of R

QUESTION ANALYTICS



Q. 5

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

An n sided polygon has ' n ' diagonals, then the value of n is_____

5

Correct Option

Solution :
5
For an ' n ' sided polygon, no. of diagonals = ${}^nC_2 - n$
Here, ${}^nC_2 - n = n$
 $\Rightarrow {}^nC_2 = 2n$
 $\Rightarrow \frac{n(n-1)}{2} = 2n$
 $\Rightarrow n = 5$

QUESTION ANALYTICS



Q. 6

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

"Some men are definitely intelligent, others are definitely not intelligent, but of intermediate men, we should say, 'intelligent'? Yes, I think so or no, I shouldn't be inclined to call them intelligent."
Which of the following reflects the intention of the writer well?

A To call men intelligent who are not strikingly so, is using the concept with undue imprecision.

Correct Option

Solution :
(a)
The writer clearly states in the last part of his statement, that he should or should not be inclined to call him intelligent. The only option, which reflects that intention, is the first option and thus is the answer.
Option (b) is wrong because we cannot generalise all empirical concepts to be vague on basis of this and it is irrelevant also. Option (c) and (d) are also vague.

B Every empirical concept has a degree of vagueness**C** Calling someone intelligent or not depends upon one's whim**D** There is no need to be as indecisive as the writer of the above

QUESTION ANALYTICS



Q. 7

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

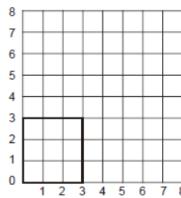
Nine small squares of size 1×1 are chosen at random on a chessboard. What is the probability that they form a big square of size 3×3 ?

A $\frac{9}{64C_9}$ **B** $\frac{36}{64C_9}$

Correct Option

Solution :
(b)
We can choose 9 squares out of 64 squares in ${}^{64}C_9$ ways.
Hence, exhaustive number of cases = ${}^{64}C_9$

From the figure it is clear that given square of size 3×3



can be formed by using four consecutive horizontal and 4 consecutive vertical lines, which can be done in

$${}^6C_1 \times {}^6C_1 = 36 \text{ ways}$$

Basically you can make 6 squares of size 3×3 in vertical direction and 6 squares of the size 3×3 in horizontal direction. Hence total $6 \times 6 = 36$ squares can be chosen.

$$\therefore \text{The required probability} = \frac{36}{64C_9}$$

C $\frac{6}{64C_9}$

D none of these

QUESTION ANALYTICS

+

Q. 8

Solution Video

Have any Doubt?

Q

The total number of men, women and children working in a factory is 18. They earn ₹ 4000 in a day. If the sum of the wages of all men, all women and all children is in the ratio of 18 : 10 : 12 and if the wages of an individual man, woman and child is in the ratio 6 : 5 : 3, then how much a woman earns in a day?

A ₹ 400

B ₹ 250

Correct Option

Solution :

(b)

Ratio of number of men, women and children

$$= \frac{18}{6} : \frac{10}{5} : \frac{12}{3} = 3x : 2x : 4x$$

$$\therefore (3x + 2x + 4x) = 18$$

$$\therefore x = 2$$

Therefore, number of women = 4

$$\text{Share of all women} = \frac{10}{40} \times 4000 = ₹ 1000 \quad (\because 18 + 10 + 12 = 40)$$

$$\therefore \text{share of each woman} = \frac{1000}{4} = ₹ 250$$

C ₹ 150

D ₹ 120

QUESTION ANALYTICS

+

Q. 9

Solution Video

Have any Doubt?

Q

If $x^a \times x^b \times x^c = 1$, then $a^2 + b^2 + c^2$ is equal to :

A 9

B abc

C $a + b + c$

D $3abc$

Correct Option

Solution :

(d)

$$x^a \times x^b \times x^c = 1$$

$$\Rightarrow x^{a+b+c} = 1 = x^0$$

$$\Rightarrow a + b + c = 0$$

Now since $a^3 + b^3 + c^3 - 3abc$

$$= (a + b + c)(a^2 + b^2 + c^2 - ab - bc - ac)$$

$$\Rightarrow a^3 + b^3 + c^3 - 3abc = 0$$

$$\therefore a^3 + b^3 + c^3 = 3abc$$

Hence, (d) is the right choice.

Q. 10

Solution Video

Have any Doubt ?



A, B, C, D and E play a game of cards. A says to B, "If you give me three cards, you will have as many as E has and if I give you three cards, you will have as many as D has." A and B together have 10 cards more than what C and E together have. If B has two cards more than what C has and the total number of cards be 133, the number of cards that B has is _____

25

Correct Option

Solution :

25

Clearly, we have :

$$\begin{aligned}B - 3 &= E && \dots(i) \\B + 3 &= D && \dots(ii) \\A + B &= D + E + 10 && \dots(iii) \\B &= C + 2 && \dots(iv) \\A + B + C + D + E &= 133 && \dots(v) \\ \text{From (i) and (ii), we have : } 2B &= D + E && \dots(vi) \\ \text{From (iii) and (vi), we have : } A &= B + 10 && \dots(vii) \\ \text{Using (iv), (vi) and (vii) in (v), we get:} \\ (B + 10) + B + (B - 2) + 2B &= 133, 5B = 125 \Rightarrow B = 25.\end{aligned}$$



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Q. 11
[▶ Solution Video](#)
[Have any Doubt ?](#)


Which of the following is true?

- I. If a Mealy Machine is converted into a Moore Machine, then the number of states don't change.
- II. If a Moore Machine is converted into a Mealy Machine, then the number of states don't change.

 A Only I

 B Only II

Correct Option

Solution :

(b)

Only II is true. If an N state Mealy Machine having M outputs is converted into a Moore machine, then the resulting machine can have upto MN states, so we can have $(MN - N)$ additional states after the conversion. So I is false. II is true as there's no change in the number of states after conversion. So correct choice is (b).

 C Both I and II

 D None of these


Q. 12
[Have any Doubt ?](#)

 Assume we have n number of unsorted list is given. Each list containing m integers such that $n > m$. What will be the time to sort in a single list?

 A $O(m^2)$
 B $O(m \times n \log(m \times n))$
 C $O(m \times n \log m)$

Correct Option

Solution :

(d)

Each list contains m elements which will take $O(m \log m)$ time.

- Now we have n sorted list each of which contains m -elements.
- Now to sort them there will be $\log n$ level and each $(m \times n)$ moves at each level. It will take $O(m \times n \log n)$.
- T.C = $m \times n \log n + \log n \times m \times n = O(m \times n \log n)$.


Q. 13
[▶ Solution Video](#)
[Have any Doubt ?](#)

 Consider the following statements regarding a language L over an arbitrary alphabet.

- I. If a string w belongs to L , then w belongs to L^k where $k > 1$.
- II. If a string w belongs to L^k , then w does not belong to L where $k > 1$.

Which of the above statements are true?

 A I only

 B II only

 C Both I and II

Correct Option

Solution :

(d)

None of the above statements are true.

Take a finite language, say $L = \{0, 1\}$ over the binary alphabet. Now 0 belongs to L , but doesn't belong to L^2 [00, 01, 10, 11]. So I is false.

What about II? It so happens that II is also false. Let's $L = \{0, 1, \in\}$. Clearly 0 now belongs to L^2 , which also belongs to L as well. So II is false as well.

Hence (d) is the correct answer.

Q. 14

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

Consider the addition of the two numbers 10001110 and 10000000 in an 8-bit ALU. Which of the following best summarizes the result and the status of the Z(zero), S(sign), C(carry) and O(overflow) flags? Assume that the numbers are represented in 2's Complement format and that S = 1 if the result is negative.

A Sum = 10001110, Z = 0, C = 1, O = 0, S = 1**B** Sum = 00001110, Z = 0, C = 0, O = 1, S = 0**C** Sum = 100001110, Z = 0, C = 0, O = 1, S = 0**D** Sum = 100001110, Z = 0, C = 1, O = 1, S = 0

Correct Option

Solution :

(d)

$$\begin{array}{r}
 10001110 \\
 10000000 \\
 \hline
 \text{Sum} = 100001110 \\
 \hline
 \end{array}$$

Z = 0, C = 1, O = 1, S = 0

Q. 15

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

Consider the following code:

```

main ()
{
    int s = 0;
    for (int b = 1, b ≤ n, b * = 2)
    {
        for (int i = 0, i < b; i++)
        {
            for (int j = 0, j < n; j+ = 2)
            {
                s = s + j;
            }
            for (int j = 1, j < n; j * = 2)
            {
                s = s * j;
            }
        }
    }
}

```

What is the time complexity of above code?

A $O(n(\log n)^2)$ **B** $O(n^2 \log n)$ **C** $O(n^2)$

Correct Option

Solution :

(c)

The first and second successive inner most loop have $O(n)$ and $O(\log n)$ complexity, thus the overall complexity of the inner most for loop is $O(n)$. The outer and middle loops have complexity $O(\log n)$ and $O(n)$. So the overall complexity of the given code is $O(n^2)$.

D $O(n \log(\log n))$

Q. 16

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

Consider the sentence "Eggs and oats are rich in protein".

- I. $\forall x(\text{Egg } (x) \vee \text{Oats } (x) \Rightarrow \text{Protein rich } (x))$
- II. $\forall x(\text{Egg } (x) \wedge \text{Oats } (x) \Rightarrow \text{Protein rich } (x))$
- III. $[\forall x(\text{Egg } (x) \Rightarrow \text{Protein rich } (x)) \wedge (\text{Oats } (x) \Rightarrow \text{Protein rich } (x))]$

Which of the following is correct translation of the above sentence?

A I only**B** I and III only

Correct Option

Solution :

(b)

I and III are correct. I says "if x is an oat or an egg, then x is rich in protein". And III says, all eggs are rich in protein, and oats are rich in protein.

But II says " x is both an egg and oat at the same time, then it's protein rich, which simply

doesn't make any sense".
So I and III are correct.

C I and II only

D All I, II and III

QUESTION ANALYTICS +

Q. 17

Solution Video

Have any Doubt ?



Which of the following is correct about deadlock condition?

A If there is more than one instance for some resource type and resource allocation graph has cycle then there will be no deadlock.

B If there is no cycle in resource allocation graph then there is no deadlock.

Correct Option

Solution :

(b)

If there is no cycle there is no deadlock.

If there is cycle in single instance resource type then there will be deadlock.

C If there is only one instance per resource type and resource allocation graph has cycle then there may or may not be deadlock.

D Both (b) and (c)

QUESTION ANALYTICS +

Q. 18

Solution Video

Have any Doubt ?



The Boolean theorem $AB + \bar{A}C + BC = AB + \bar{A}C$ corresponds to

A $AB + \bar{A}C + BC = (A + B) \cdot (\bar{A} + C) \cdot (B + C)$

B $AB + \bar{A}C + BC = AB + BC$

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

Correct Option

Solution :

(c)

Option (a) is incorrect because it is not self dual function.

$$AB + \bar{A}C + BC = AB + \bar{A}C$$

Changing the binary operators, $(A + B)(\bar{A} + C)(B + C) = (A + B)(\bar{A} + C)$

D $(A + B) \cdot (\bar{A} + C) \cdot (B + C) = AB + \bar{A}C$

QUESTION ANALYTICS +

Q. 19

Solution Video

Have any Doubt ?



For authentication digital signature is used, then sender encrypts its signature using

A Sender's private key

Correct Option

Solution :

(a)

Sender's private key is used for encryption and its public key used for the authentication purpose.

B Sender's public key

C Receiver's public key

D Receiver's private key

QUESTION ANALYTICS +

Q. 20

Have any Doubt ?



Consider a complete Binary Tree 'T' with key of root node be 'P'. It is given that the left and right subtree of 'P' satisfies min-heap property. What is the time taken to convert the given tree 'T' to a max heap?

A $O(\log n)$

Correct Option

B $O(n)$

Solution :

(b)

Since the left and right subtrees are satisfying min heap property and we want the final output to be a max-heap.
Hence, the answer would remain unaffected.
To create a max-heap time required is $O(n)$.

C $O(n \log n)$

D $O(n^2)$

 QUESTION ANALYTICS

+

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Q. 21
[Have any Doubt?](#)


Two students Anil and Ashima appeared in an examination. The probability that Anil will qualify the examination 0.05 and that Ashima will qualify the examination is 0.10. The probability that both will qualify the examination is 0.02. Then the probability of only one of them will qualify the examination is _____.

 A. 0.08

 B. 0.15

 C. 0.19

 D. 0.11

[Correct Option](#)
Solution:

(d)

Probability of only one of them qualify

$$\begin{aligned}
 &= P(E \cap F') + P(E' \cap F) \\
 &= P(E) - P(E \cap F) + P(F) - P(E \cap F) \\
 &= 0.05 - 0.02 + 0.10 - 0.02 = 0.11
 \end{aligned}$$

 QUESTION ANALYTICS

Q. 22
[Solution Video](#)
[Have any Doubt?](#)


Consider the following statements:

 I. If A is a finite set with n elements and R is a relation on A, then there exist 's' and 't' such that $R^s = R^t$ and $0 \leq s < t \leq 2^n$.

 II. If A is an infinite set and R is a relation on A, then there exist integer 's' and 't' such that $R^s = R^t$ and $0 \leq s < t$.

Which of the above statements are true?

 A. I only

[Correct Option](#)
Solution :

(a)

II is clearly false. Consider the following counter example, take R on set of natural numbers such that $x R y$ iff $y = x + 1$. Now R^2 will be such that $x R^2 y$ iff $y = x + 2$. Similarly $R^3 : x R^3 y$ iff $y = x + 3$ and so on.

So there are no s and t such that $R^s = R^t$. Hence II is false.

Now if we see I, I is true. Why? There are totally 2^{n^2} distinct relations possible on an n element

set. But we have $(2^{n^2} + 1)$ powers of relation, i.e. $R^0, R^1, R^2, R^3, \dots, R^{\binom{n^2}{2}}$. Hence by pigeonhole principle, there must be s and t such that $R^s = R^t$.
Hence I is true.

 B. II only

 C. Both I and II

 D. None of these

 QUESTION ANALYTICS

Q. 23
[Solution Video](#)
[Have any Doubt?](#)


Suppose a transaction P is executing and another transaction Q begins. Which of the following is true?

 A. In a wait-die system, if Q needs a resource held by P, then Q waits.

 B. In wound-wait system, if P needs a resource held by Q, then Q yields and waits.

 C. In a wait-die system, if P needs a resource held by Q, then P waits.

[Correct Option](#)
Solution :

(c)

P is older transaction, in a wait die system, if P needs a resource held by Q, then P waits.

 D. In a wound-wait system, if Q needs a resource held by P, then Q dies.

Q. 24

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

The number of ways to distribute atmost 8 identical chocolates to 3 children such that each child gets at least one chocolate, is equal to _____.

A 8³**B** 56

Correct Option

Solution :

(b)

This problem can be reduced to finding the number of integral solutions to this equation,

$X_1 + X_2 + X_3 \leq 8$, where each X_i is at least 1, for i ranging from 1 to 3. So,

Let's give everyone one chocolate first, to satisfy the 'at least 1' constraint.

$X_1 + X_2 + X_3 = 5$, each X_i being at least 0.

Now in order to solve this, we use the box method, by introducing another variable X_4 to make both sides equal and satisfy atmost property.

$X_1 + X_2 + X_3 + X_4 = 5$

Now the number of solutions to this equation is given by $n - 1 + r C_r$, where $n = 4$ and $r = 5$.

Putting these values, we get ${}^5 C_4 = 56$.

C 45**D** 21

Q. 25

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

Consider the following statements regarding registers and latches:

1. Registers are made of edge-triggered FFS, whereas latches are made from level-triggered FFS.
2. Registers are temporary storage devices whereas latches are not.
3. A latch employs cross-coupled feedback connections.
4. A register stores a binary word whereas a latch does not.

Which of the statements given above are correct?

A 1 and 2**B** 1 and 3

Correct Option

Solution :

(b)

C 2 and 3**D** 3 and 4

Q. 26

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

Consider execution of a program on a 5 stage pipeline. Let P be the probability of an instruction being a branch. The value of P such that speed up is atleast 4 is _____ (Upto 2 decimal places) (Assume each stage takes 1 cycle to perform it's task and branch is predicted on fourth stage of the pipeline).

A 0.083 (0.08 - 0.09)

Correct Option

Solution :

0.083 (0.08 - 0.09)

$$\text{Speed up} = \frac{\text{Pipeline depth}}{(1 + \text{Branch frequency} \times \text{Branch penalty})} \geq 4$$

$$\frac{5}{1 + P \times 3} \geq 4$$

$$4 + 12P \leq 5$$

$$12P \leq 1$$

$$P \leq \frac{1}{12} = 0.0833$$

Q. 27

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

Consider two node A and B round trip delay between these is 80 ms and bottle neck bandwidth of link between A and B is 512 Kbps, the optimal window size (in packets) if the packet size is 64 bytes and channel is full duplex _____.

Solution :

640

While calculating window size for full duplex

In 1 sec $512 \times 10^3 \times 8$ bits are transmit

$$\text{In 1 RTT} = 80 \times 10^3 \times 512 \times 8$$

$$= 80 \times 512 \times 8 \text{ bits}$$

$$\text{Number of packets} = \frac{80 \times 512 \times 8}{64 \times 8} = 640$$

QUESTION ANALYTICS

**Q. 28**

If $A = \begin{bmatrix} a & 2 & -3 \\ b & c & 5 \\ d & e & f \end{bmatrix}$ is skew symmetric matrix. Then $a + b + c + d + e + f = \underline{\hspace{2cm}}$

-4

Solution :

-4

Given $A = \begin{bmatrix} a & 2 & -3 \\ b & c & 5 \\ d & e & f \end{bmatrix}$ is skew - symmetric

$$\Rightarrow A = -A^T \Rightarrow \begin{bmatrix} a & 2 & -3 \\ b & c & 5 \\ d & e & f \end{bmatrix} = -\begin{bmatrix} a & b & d \\ 2 & c & e \\ -3 & 5 & f \end{bmatrix}$$

$$\Rightarrow \begin{aligned} a &= -a \Rightarrow 2a = 0 \Rightarrow a = 0 \\ b &= -2 \\ d &= 3 \\ c &= -c \Rightarrow 2c = 0 \Rightarrow c = 0 \\ e &= -5 \\ f &= -f \Rightarrow 2f = 0 \Rightarrow f = 0 \\ \Rightarrow a + b + c + d + e + f &= -4 \end{aligned}$$

QUESTION ANALYTICS

**Q. 29**

Consider a virtual memory with page size of 2 KB virtual address is 32 bit and physical address is 32 bit. For each page it also stores additional 3 bits for protection what is the size of page table (MB) if single level page table is used $\underline{\hspace{2cm}}$.

6

Solution :

6

$$\text{Number of pages} = \frac{2^{32}}{2^{11}} = 2^{21}$$

Page table entry size = $(21 + 3) = 24 = 3$ bytePage table size = $2^{21} \times 3 = 6$ MB

QUESTION ANALYTICS

**Q. 30**

Consider the cycle graph C_{2020} . Our task is to colour all the vertices of the graph such that no two adjacent vertices have the same colour. Then the maximum number of vertices which can be assigned the same colour, is equal to $\underline{\hspace{2cm}}$.

1010

Solution :

1010

Maximum number of vertices which are assigned the same colour is actually equal to the size of the maximal independent set of the graph G . So let's find the cardinality of this set.

It can be shown that the maximal independent set of C_n equals floor of $\frac{n}{2}$.

Therefore, putting n as 2020, we get $\frac{2020}{2}$ which is equal to 1010. Hence 1010 vertices will receive the same colour.

Therefore 1010 is the answer.

QUESTION ANALYTICS





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Q. 31
[Have any Doubt ?](#)


Consider a two-dimensional array with elements stored in the form of lower triangular matrix. The elements must be crossed to read $A[4, 2]$ from the array $A[-6, \dots, +8, -6, \dots, +8]$ whose base address 1000 is _____. (Assume elements are stored in row major order at each byte location).

1063
[Correct Option](#)
Solution :

1063

The given lower triangular matrix can be represented as

$$\begin{matrix} -6 & -5 & -4 & \dots & +8 \\ -6 & a_{11} & & & \\ -5 & a_{21} & a_{22} & & \\ -4 & a_{31} & a_{32} & a_{33} & \\ \vdots & \vdots & \vdots & \ddots & \\ +8 & a_{61} & a_{62} & \dots & a_{66} \end{matrix}$$

Let (i, j) be the element to be accessed.

We must cross upto $(i - 1)^{\text{th}}$ row.

Number of elements upto $(i - 1)^{\text{th}}$ row or 10^{th} row

$$\begin{aligned} &= 1 + 2 + 3 + \dots + [(i - 1) - (-6)] + 1][l_{bj}] \rightarrow \text{lower bound of } i \\ &= 1 + 2 + 3 + \dots + (3 - (-6) + 1) \\ &= 1 + 2 + 3 + \dots + (10) \\ &= \frac{10 \times 11}{2} = 55 \end{aligned}$$

In i^{th} row we must cross $(j - l_{bj})$ elements. $[l_{bj}] \rightarrow \text{lower bound of } j$

$$= 2 - (-6) = 8$$

∴ In total = 55 + 8 = 63 elements need to be crossed.

Resulted address = Base address + Number of element crossed

$$1000 + 63 = 1063$$

1111
[QUESTION ANALYTICS](#)

Q. 32
[Solution Video](#)
[Have any Doubt ?](#)


Consider the following schedule:

$S : w_1(x), w_1(y), r_2(x), w_2(y), r_3(x), w_3(y)$

The number of schedule which are conflict equivalent is _____.

8
[Correct Option](#)
Solution :

8

$S : w_1(x), w_1(y), r_2(x), w_2(y), r_3(x), w_3(y)$

$$r_2(x) \left\{ \begin{array}{l} w_1(x), r_2(x), w_1(y), w_2(x), w_3(y) \\ w_1(x), w_1(y), r_2(x), w_2(y), w_3(y) \end{array} \right.$$

In each sequence above $r_3(x)$ can place in 4 positions which are conflict equivalent.

1111
[QUESTION ANALYTICS](#)

Q. 33
[Have any Doubt ?](#)


Consider the following context free grammar:

$E \rightarrow E + E$

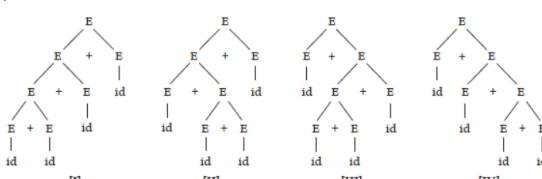
$E \rightarrow (E * E)$

$E \rightarrow id$

E is the starting symbol, the number of parse tree possible to derive the string "id + id + id + id" is _____.

4
[Correct Option](#)
Solution :

4



QUESTION ANALYTICS



Q. 34

▶ Solution Video

Have any Doubt?



Let P_1, P_2, P_3, P_4 be five matrices of dimensions $5 \times 6, 6 \times 7, 7 \times 1, 1 \times 10$. The optimum number multiplication required for computing the product $P_1 P_2 P_3 P_4$ is _____.

122

Correct Option

Solution :

122

 $(P_1(P_2 \times P_3))P_4$

Number of multiplications = 122, which is minimum compared to other options

 $P_2 \times P_3$ = Number of multiplications = 42 $P_1 \times (P_2 \times P_3)$ = Number of multiplications = 30 $(P_1(P_2 \times P_3))_{5 \times 1} (P_4)_{1 \times 10}$ = Number of multiplications = 50

= 122 multiplications

QUESTION ANALYTICS



Q. 35

Have any Doubt?



The maximum number of edges in an undirected graph (simple) with 52 vertices and 3 components are _____.

1225

Correct Option

Solution :

1225

We get maximum number of edges, when we have complete graph.

So maximum vertex complete graph possible with 50 vertices as one component and 2 vertices are distinct components.

$$\text{So edges will be } = \frac{(n-K)(n-K+1)}{2} = \frac{50 \times 49}{2} = 1225$$

QUESTION ANALYTICS



Q. 36

▶ Solution Video

Have any Doubt?



Consider unsorted doubly linked list data structure containing n items. For decrease key operation a pointer is provided to the record on which operation is performed. An algorithm performs the following operations on the list in this order (\sqrt{n}) insert, $O(n \log n)$ decrease key, $O(n)$ find operations. What is the time complexity of all these operations put together?

A $O(n)$ B $O(n^2)$

Correct Option

Solution :

(b)

Unsorted double linked list:

Find	Insert	Decrease key	Overall
$O(n^2)$	$O(\sqrt{n})$	$O(n \log n)$	$O(n^2)$

C $O(n^2 \log n)$ D $O(\sqrt{n})$

QUESTION ANALYTICS



Q. 37

▶ Solution Video

Have any Doubt?



Consider a class C block address 210.47.28.39/26 then what is the last host of the 2nd last subnet, where the addresses are returned in lexicographic order?

A 210.47.28.192/26

B 210.47.28.190/26

Correct Option

Solution :

(b)

Address 210.47.28.39

210.47.28.00100111

[26 bits]
 10 2nd last subnet
 21.47.28.10000001 – 1st host
 210.47.28.10111110 – Last host
 ⇒ 210.47.28.190

C 210.47.28.193/26

D 210.47.28.191/26

QUESTION ANALYTICS



Q. 38

Solution Video

Have any Doubt ?



The number of partial functions possible from an m element set to an n element set such that exactly 2 elements are not mapped to any element in the co-domain, is equal to

A $n^m - 2$

B ${}^m C_2 \cdot n^{m-2}$

Correct Option

Solution :

(b)

First we have to select 2 elements which don't have any image. This can be done in ${}^m C_2$ ways.
Now we leave these elements without any image, which can be done in 1 way. But the phrase 'exactly' used in question implies that the other elements must not be left out unlike these two chosen elements. Hence each of them will have n choices, and there are $m - 2$ elements, so this task can be done in n^{m-2} ways.

So finally putting everything in one place, we get ${}^m C_2 \times n^{m-2}$ partial functions satisfying the criterion mentioned in the question.

So (b) is the answer.

C ${}^n C_2 \cdot m^n - 2$

D None of these

QUESTION ANALYTICS



Q. 39

Solution Video

Have any Doubt ?



Assume two processes P_i ($i = 0$ or $i = 1$) share the following code:

```

flag[ ] and turn is shared by both process and initially flag[0] and flag[1] is false
while (true)
{
  flag [i] = true;
  while (flag [j])
  {
    if (turn == j)
    {
      flag [i] = false;
      while (turn == j);
      flag [i] = true;
    }
  }
  critical section
  turn = j;
  flag [i] = false;
  <Remainder section>
}

```

If current process is P_i , and $turn = i$ then other process is assumed as P_j , where $j = 1 - i$ which of the following is correct about the above scenario?

A Mutual exclusion is satisfied but not progress.

B Both mutual exclusion and progress is satisfied but not bounded waiting.

C Mutual exclusion is not satisfied.

D All mutual exclusion, progress and bounded waiting is satisfied.

Correct Option

Solution :

(d)

Mutual exclusion is ensured with the turn variable, if both processes are ready then their flags are true only one can succeed to enter the critical section depends on turn value.
Progress and bounded waiting are also satisfied by the given code.

QUESTION ANALYTICS



Consider the following relational schema $\text{Adj}(x, y)$ which is used to state edges of its directed graph:
Which of the following results vertices set which forms loop atleast two vertices?

A $\Pi_x(\text{Adj} \bowtie_{y=y_1 \wedge x=x_1} \rho_{x_1, y_1}(\text{Adj}))$

B $\Pi_x(\text{Adj} \bowtie_{y=x_1 \wedge y_1=x} \rho_{x_1, y_1}(\text{Adj}))$

Correct Option

Solution :
(b)

$\Pi_x(\text{Adj} \bowtie_{y=x_1 \wedge y_1=x} \rho_{x_1, y_1}(\text{Adj}))$

will return the vertices set which forms loop with atleast two vertices.

C $\Pi_x(\text{Adj} \bowtie_{y=x_1 \wedge y_1 \neq x} \rho_{x_1, y_1}(\text{Adj}))$

D None of these

QUESTION ANALYTICS

+



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OVERALL ANALYSIS

COMPARISON REPORT

SOLUTION REPORT

ALL(65)

CORRECT(0)

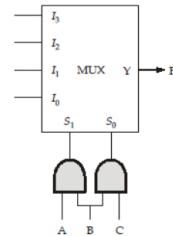
INCORRECT(0)

SKIPPED(65)

Q. 41

Solution Video

Have any Doubt ?

The following circuit is used to implement the Boolean function $F(A,B,C) = \Sigma(3,6)$. Determine the inputs of the MUX.

A 0110

Correct Option

Solution :

(a) Boolean function $F(A, B, C) = \Sigma(3, 6)$

Means input 3 and 6 then it outputs 1 otherwise 0

When input is 3, ABC = 011 then $S_1 S_0 = 01$ When input is 6, ABC = 110 then $S_1 S_0 = 10$ Value of $S_1 S_0$ is 01 and 10 so input line I_2 and I_1 will get selected. So I_2 and I_1 should be 1.

So (a) is correct answer.

B 1010

C 0011

D 1110

QUESTION ANALYTICS



Q. 42

Solution Video

Have any Doubt ?



Consider the following statement:

I. If maximum sequence number is k, then maximum sender's window size in GBN and selective repeat are $\frac{k+1}{2}$ and $\frac{k}{2}$ respectively.

II. A time exceeded message by ICMP can be generated when not all the fragments that make up a message arrives at a destination with in a certain limit.

III. No ICMP error message will be generated for a fragmented datagram that is not the first fragment.

Which of the above statement(s) is/are not correct?

A I and II only

B I and III only

C I only

Correct Option

Solution :

(c)

- If maximum sequence number is 'k' maximum senders windows size for GBN is k and for selective repeat is $\frac{(k+1)}{2}$.

- Time exceeded message can be generated in two cases:

- When time to live field becomes zero, after decrementing, the router discards the datagram. However, when the datagram is discarded, a time-exceeded message must be sent by the router to the original source.
- A time exceeded message is also generated when not all fragments that make up a message arrive at the destination host within a certain time limit.

Statement II and III is true.

D II and III only

QUESTION ANALYTICS



Q. 43

Solution Video

Have any Doubt ?

Let $L_1 = \{a^{3n} \mid n \geq 0\}$, $L_2 = \{a^{5n} \mid n \geq 0\}$

Then the number of states in the minimal DFA corresponding to $L_1 \cdot L_2$ is equal to _____.

A 4

B 6

C 8

D 9

Correct Option

Solution :

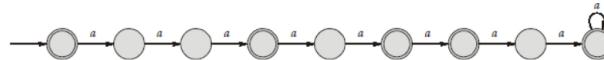
(d)

$$\begin{aligned}L_1 \cdot L_2 &= \{a^{3m} \cdot a^{5n} \mid m, n \geq 0\} \\&= \{a^{3m+5n} \mid m, n \geq 0\}\end{aligned}$$

Regular expression for $L_1 \cdot L_2$ is as below:

$$\begin{aligned}L_1 \cdot L_2 &= \epsilon + a^3 + a^5 + a^6 + a^8 + a^9 + a^{10} + \dots \\&= \epsilon + a^3 + a^5 + a^6 + a^8 (\epsilon + a + a^2 + a^3 + \dots) \\&= \epsilon + a^3 + a^5 + a^6 + a^8 \cdot a^*\end{aligned}$$

Here's the DFA for the same



Therefore we need 9 states to accept the required language.

So 9 is the answer.

QUESTION ANALYTICS



Q. 44

Solution Video

Have any Doubt ?



You are given a set of n nuts and another set of n bolts such that they form n distinct pairs of matching nuts and bolts, i.e., each of the bolts go into one nut only. The matching operation conducted in an effective manner would take number of comparisons that is:

(Note the only allowed operation is trying to fit a bolt into a nut and thereby concluding whether they are of equal size, or find out which is greater in size)

A $O(n)$

B $O(n^2)$

Correct Option

Solution :

(b)

Pick any nut and test with all the bolts. Segregate the set of bolts into two-sets, one that contains bolts, which are greater in size than the chosen nut and the other that has bolts which are smaller than the nut. Also, find the matching bolts for the nut. Take this bolt and test will all the nuts and perform a similar segregation. Thus, we have succeed in dividing the problem into smaller sub problems, each of which will be solved recursively using the same procedure. Therefore the recurrence relation for number of comparison:

$$T(n) = T(n - q - 1) + T(q) + \Theta(n)$$

This is the same recurrence as that of quick-sort which is $O(n^2)$ in worst case.

C $O(n \log n)$

D $O(\log n)$

QUESTION ANALYTICS



Q. 45

Have any Doubt ?



Consider the following C program execute on a singly linked list numbered from 1 to n containing atleast 2 nodes:

```
atleast 2 nodes:
struct Listnode
{
    int data;
    struct Listnode *next;
};

void fun (struct Listnode *head)
{
    if (head == NULL || head -> next ==NULL) return;
    struct Listnode *tmp = head -> next;
    head -> next = tmp -> next;
    free (tmp);
    fun (head -> next);
}
```

Which of the following represents the output of above function 'fun' ?

A It reverses the every 2 adjacent nodes linked list

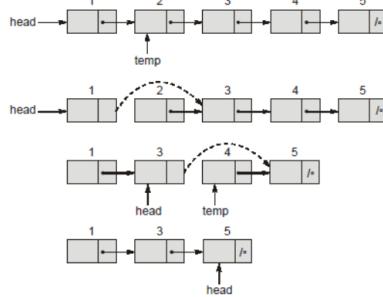
B Every odd number nodes of given linked list will be deleted

C Every even number nodes of given linked list will be deleted

Correct Option

Solution :

(c)



The above program deletes every even number node in the linked list (In particular second, fourth, sixth... soon nodes will be deleted)

- D** It reverses the linked list and delete alternate nodes

QUESTION ANALYTICS

Q. 46

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

Consider the following Employee table:

E_No	Job	Salary	Dept_no
2	Writer	35000	20
8	Engineer	32000	35
10	System Analyst	27000	30
15	Software Engineer	40000	20
25	Quality Assurer	25000	35
27	Anaylist	21000	10

Which of the following gives the list of departments having average salary greater than 30000?

- A** Select Dept_no, AVG(Salary) From Employee HAVING Salary > 30000

- B** Select Dept_no, AVG(Salary) From Employee GROUP BY Dept_no HAVING AVG(Salary) > 30000

Correct Option

Solution :

(b)
Select Dept_no, AVG(Salary) From Employee GROUP BY Dept_no HAVING AVG(Salary) > 30000 gives the list of desired department.

- C** Select Dept_no, AVG(Salary) From Employee ORDER BY Dept_no HAVING AVG(Salary) > 30000

- D** None of these

QUESTION ANALYTICS

Q. 47

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

Consider 4-way set associative cache of 64 KB organized into a 16 word blocks. Word size is 32 bit. To which cache set in octal the following main memory addressed data is mapped (0xFCB8630)

- A** 760

- B** 030

Correct Option

Solution :
(b)

$$\begin{aligned}
 \text{CM size} &= 64 \text{ KB} \\
 \text{Block size} &= 16 \text{ W} \\
 &= 16 \times 32 \text{ bit} = 16 \times 4\text{E} = 2^6\text{B} \\
 \text{Number of lines (N)} &= \frac{64 \text{ K}}{2^6} = \frac{2^{16}}{2^6} = 2^{10} \\
 \text{Number of sets (S)} &= \frac{N}{\text{P-way}} = \frac{2^{10}}{4} = 2^8 \\
 &\text{28 bit} \\
 &\boxed{\begin{array}{|c|c|c|} \hline \text{Tag} & \text{SO} & \text{WO} \\ \hline \end{array}}
 \end{aligned}$$

14 bit $\log_2 2^8 = 8$ bit $\log_2 2^6 = 6$ bit
 $(FCB8630)_H$
 ↓
 11111100101110 00011000 110000
 Tag SO WO

SO: 00011000
0 3 0

- C** 580

- D** 060

Q. 48

Have any Doubt ?



Consider the following grammar:

$$\begin{aligned} st \rightarrow & \text{ if expr then st} \\ & | \text{ if expr then st else st} \\ & | \text{ other} \end{aligned}$$

Consider the following statements for above grammar:

- I. The grammar is ambiguous.
 - II. The grammar is left recursive.
 - III. The grammar will cause shift reduce conflict.
- Which of the above statement(s) is/are true?

 A I and II only B II and III only C I and III only

Correct Option

Solution :

(c)

The grammar

$$\begin{aligned} st \rightarrow & \text{ if expr then st} \\ & | \text{ if expr then st else st} \\ & | \text{ other} \end{aligned}$$

When we construct parsing table it will cause shift reduce conflict because at else we will not be able to decide whether shift or reduce and also the given grammar is ambiguous.

 D I only

Q. 49

Have any Doubt ?



Events A, B, C are mutually exclusive events such that $P(A) = \frac{3n+1}{3}$, $P(B) = \frac{1-n}{4}$ and $P(C) = \frac{1-2n}{2}$, the set of possible values of n are in the interval

 A $\left[\frac{1}{3}, \frac{1}{2} \right]$

Correct Option

Solution :

(a)

$$P(A) = \frac{3n+1}{3}, P(B) = \frac{1-n}{4}, P(C) = \frac{1-2n}{2}$$

These are mutually exclusive

$$0 \leq \frac{3n+1}{3} \leq 1, 0 \leq \frac{1-n}{4} \leq 1 \text{ and } 0 \leq \frac{1-2n}{2} \leq 1$$

$$-1 \leq 3n \leq 2, -3 \leq n \leq 1 \text{ and } -1 \leq 2n \leq 1$$

$$\frac{-1}{3} \leq n \leq \frac{2}{3}, -3 \leq n \leq 1 \text{ and } \frac{-1}{2} \leq n \leq \frac{1}{2}$$

$$\text{Also, } 0 \leq \frac{1+3n}{3} + \frac{1-n}{4} + \frac{1-2n}{2} \leq 1$$

$$0 \leq 13 - 3n \leq 12$$

$$\frac{1}{3} \leq n \leq \frac{13}{3}$$

$$\max\left\{\frac{-1}{3}, -3, \frac{-1}{2}, \frac{1}{3}\right\} \leq n \leq \min\left\{\frac{2}{3}, 1, \frac{1}{2}, \frac{13}{3}\right\}$$

$$n \in \left[\frac{1}{3}, \frac{1}{2} \right]$$

 B $\left[\frac{1}{3}, \frac{2}{3} \right]$ C $\left[\frac{1}{3}, \frac{13}{3} \right]$ D $[0, 1]$

Q. 50

Have any Doubt ?



Suppose that queue operations are implemented using stack operation. `Enqueue(x)` and `Dequeue()` are queue operations whereas `Pop()` and `Push(x)` are stack operations. Consider the following code:

```
Enqueue(S1, x)
```

```

    {
        Push ( $S_1$ ,  $x$ );
    }
    Dequeue ( $S_1$ ,  $S_2$ )
    {
        if(! Is empty stack  $S_2$ )
            return Pop ( $S_2$ );
        else
        {
            while (! Is empty stack  $S_1$ )
                 $B1$ ;
            return  $B2$  ;
        }
    }
}

```

Fill the missing statement $B1$ and $B2$ to perform Dequeue operation correctly (here S_1 and S_2 are two stacks)

A Push (S_2 , Pop (S_1)); and Pop S_2

Correct Option

Solution :

(a)
If S_2 stack is empty and S_1 stack is not empty then we have to pop the element from stack S_1 and push that element into stack S_2 and return the stack S_2 which contain newly inserted element.

B Push (S_1 , Pop (S_2)); and Pop S_1

C Push (S_1 , Pop (S_2)); and Pop S_2

D Push (S_2 , Pop (S_1)); and Pop S_1

 QUESTION ANALYTICS





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OVERALL ANALYSIS COMPARISON REPORT **SOLUTION REPORT**

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

Q. 51

Solution Video Have any Doubt ?

Consider the language $L = \{a^{3n+5} \mid n \geq 0\}$.
 What is the minimum pumping length for L?

A 5

B 6

Correct Option

C 8

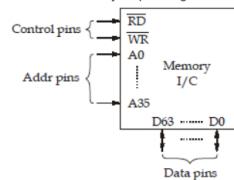
D 13

QUESTION ANALYTICS

Q. 52

Solution Video Have any Doubt ?

Consider the memory chip configuration:



What is the memory capacity in bytes and how many memory cells are interfaced to 64 bit CPU to access the data word from the memory respectively?

A 64 GB and 1

B 512 GB and 8

C 512 GB and 1

Correct Option

D 64 GB and 8

QUESTION ANALYTICS

Q. 53

Solution Video Have any Doubt ?

Consider the following statements with respect to TCP sliding window:

- S_1 : Silly window syndrome is a problem caused by heavy congestion in the network.
 - S_2 : Nagle's algorithm is used when silly window syndrome problem is created by the sender.
 - S_3 : Clark's solution is used when silly window syndrome problem is created by receiver.
 - S_4 : When the advertised window by the receiver is 0, the sender can not send any type of segment.
- Which of the above statement are correct?

A Only S_1 and S_2

B Only S_1 , S_3 and S_4

C Only S_1 , S_2 and S_4

D Only S_2 and S_3

Correct Option

Solution :

- (d)
- Silly window syndrome is a problem caused by poorly implementing TCP flow control.
- Nagle's solution requires that the sender sends the first segment even if it's a small one, then it wait until an ack is received or a MSS is accumulated.
- Clark's solution closes the window until another segment of MSS can be received or the buffer is half empty.
- When the advertised window by the receiver is 0, sender may not normally send segment with two exceptions. First, urgent data may be send. Second, sender may send a 1 B segment to force the receiver to renounce the next byte accepted and the window size.

QUESTION ANALYTICS

Q. 54

[▶ Solution Video](#)

[Have any Doubt ?](#)



If a graph of order 11 can be properly colored with minimum of 5 colors, then its independence number is at least equal to _____.

3

Correct Option

Solution :

3

$$\text{Independence number} \geq \left\lceil \frac{n}{k_G} \right\rceil \geq \left\lceil \frac{11}{5} \right\rceil$$

Independence number ≥ 3

QUESTION ANALYTICS

Q. 55

[▶ Solution Video](#)

[Have any Doubt ?](#)



The probability that out of all 2 state DFAs with designated initial state over the alphabet {a, b} a randomly placed DFA's is such that the language accepted by it is non empty is equal to _____.
(Upto 3 decimal places)

0.6875 [0.6872 - 0.6878]

Correct Option

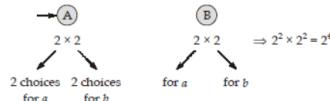
Solution :

0.6875 [0.6872 - 0.6878]

Number of DFAs such that language generated is non empty = (Total number of DFAs) - (Number of DFAs which generate empty language)

(i) **Total number of DFAs:**

First we'll see the number of ways of assigning the arcs.



Now we need to find number of ways in which we can assign final states.



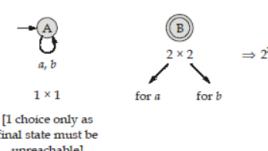
So final answer for total DFAs = $2^4 \times 2^2 = 2^6 = 64$

(ii) **Number of DFAs generating empty language:**

Case I: No final state



Case II: Final state not reachable from source



Adding the two cases, we get $(16 + 4) = 20$

So required number of DFAs = $(64 - 20) = 44$

And the required probability = $\left(\frac{44}{64} \right) = 0.6875$

QUESTION ANALYTICS

Q. 56

[▶ Solution Video](#)

[Have any Doubt ?](#)



The length of cable for standard ethernet is 2500m. What would be length of cable for fast gigabit ethernet i.e. 1000baseT in order to maintain same size is _____.

25

Correct Option

Solution :

25

$$\frac{2500}{100} = L$$

Q. 57

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

Consider the system with the 2-level paging with TLB support.

1. The page table has divided into 2 K pages each of size 4 K words. If the physical address space has 64 M words which is divided into 16 K frame.
2. The TLB access time is 20 ns and the main memory access time is 100 ns.
3. The TLB contains frequently referred page numbers and corresponding physical page numbers.

The CPU finds 135 page references in the TLB out of the total references of 180. Then what is the effective memory access time using TLB?

170

Correct Option

Solution :

170

The CPU finds 135 page references in the TLB, out of the total 180 references.

$$\therefore \text{Hit ratio } (x) = \frac{135}{180} = \frac{3}{4} = 0.75$$

The system uses 2 level paging with TLB support.

So, Effective Memory Access Time (EMAT)

$$\begin{aligned} &= x(c + m) + (1 - x)(c + 3m) \\ &= 0.75(20 \text{ ns} + 100 \text{ ns}) + 0.25(20 \text{ ns} + 300 \text{ ns}) \\ [\text{TLB access time } (c) = 20 \text{ ns}, \text{ MM access time } (m) = 100 \text{ ns}] \\ &= 90 \text{ ns} + 80 \text{ ns} = 170 \text{ ns} \end{aligned}$$

Q. 58

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

A binary search tree was constructed by inserting following elements into an initially empty binary tree.

50, 27, 16, 88, 34, 65, 52, 77, 93, 4, 12, 29, 44, 92

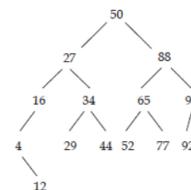
Preorder and postorder traversals of the resultant binary search tree were stored in arrays A and B respectively. How many elements have different location in both the arrays? [Assume arrays A and B start from the same index]

11

Correct Option

Solution :

11



Array A: Preorder:

0	1	2	3	4	5	6	7	8	9	10	11	12	13
50	27	16	4	12	34	29	44	88	65	52	77	93	92

Array B: Postorder:

0	1	2	3	4	5	6	7	8	9	10	11	12	13
12	4	16	29	44	34	27	52	77	65	92	93	88	50

The elements 12, 4, 29, 44, 27, 52, 77, 92, 93, 88 and 50 have different location in A and B.

Q. 59

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

Consider the following page table. Assume each page size is 4 K bytes. [Assume virtual and physical address spaces have same size]

Virtual Page #	Frame #	Valid bit	Reference bit	Dirty bit
0	3	v	0	1
1	-	i	0	0
2	0	v	1	1
3	-	i	0	0
4	9	v	1	0
5	-	i	0	0
6	-	i	0	0
7	12	v	0	0
:	:	:	:	:

[v → valid, i → invalid]

The number of following virtual address (represented in hexadecimal) that will not generate page fault is _____.

- I. 0x1234
- II. 0x2345
- III. 0x3456

1

Correct Option

Solution :

1

Assume 0x2345 is virtual address from option (b)

4K bytes page size $\Rightarrow 2^{12} \Rightarrow$ 12 bits for offset
 Virtual page # = 2 is valid page, no page fault. [Since page# = 2, offset = 345]
 Remaining options (a) and (c) will generate page fault.

 QUESTION ANALYTICS



Q. 60

Have any Doubt ?



If $\frac{dy}{dx} = y + 3$ and $y(0) = 2$, then $y(\ln 2)$ equal to _____.

 7

Correct Option

Solution:
7

$$\begin{aligned} \text{Given} \quad & \frac{dy}{dx} = y + 3 \\ \Rightarrow \quad & \frac{dy}{y+3} = dx \\ \Rightarrow \quad & \ln|y+3| = x + C \\ \because \quad & y(0) = 2 \\ & \ln|2+3| = 0 + C \\ \text{Given} \quad & C = \ln 5 \\ \Rightarrow \quad & \ln|y+3| = x + \ln 5 \\ \Rightarrow \quad & \ln\left|\frac{y+3}{5}\right| = x \\ \Rightarrow \quad & \ln\left|\frac{y+3}{5}\right| = \ln 2 \\ \Rightarrow \quad & y+3 = 10 \\ \Rightarrow \quad & y = 7 \end{aligned}$$

 QUESTION ANALYTICS



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 Computer Science Engineering(CS)

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OVERALL ANALYSIS COMPARISON REPORT **SOLUTION REPORT**

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

Q. 61

Have any Doubt ?



Suppose that six keys are inserted into an unbalanced binary search tree in the following order:

- Finding any key in the resulting tree requires examining 1, 2, or 3 nodes.
 - The resulting tree has equal numbers of internal and leaf nodes.
 - The key 7 can now be inserted without adding another level to the tree.
- Out of the above, the number of correct statements is/are _____.

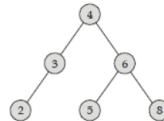
2

Correct Option

Solution :

2

The resulting tree appears below:



- Finding 4 now takes one comparison (with the root), finding 3 and 6 take two comparisons, and finding the other nodes takes three comparisons. Hence statement I is correct.
- There are three leaf nodes and three interior nodes. Hence statement II is correct
- If 7 is inserted, it will go onto a new level, as the left child of 8. Hence statements III is incorrect.

QUESTION ANALYTICS



Q. 62

Solution Video

Have any Doubt ?



Consider the following relational schema:

Student (Sid: integer, Sname: string, address: string)
 Course (Cid: integers, Cname: string, branch: string)
 Enrols (Sid: integers, Cid: integer, employee: integer)

Consider the following queries:

- $\rho(R_1, \pi_{\text{sid}}(\pi_{\text{cid}}(\pi_{\text{branch}} = 'CS' (\text{Course})) \bowtie \text{Enrols}))$
 $\rho(R_2, \pi_{\text{sid}}(\pi_{\text{cid}}(\pi_{\text{branch}} = 'IT' (\text{Course})) \bowtie \text{Enrols}))$
 $R_1 \cap R_2$
- $\{T | \exists T_1 \in \text{enrols} (\exists x \in \text{courses} (x.\text{branch} = 'CS' \wedge x.\text{cid} = T_1.\text{cid}) \wedge \exists T_2 \in \text{Enrols} (\exists y \in \text{courses} (y.\text{branch} = 'IT' \wedge y.\text{cid} = T_2.\text{cid}) \wedge T_2.\text{sid} = T_1.\text{sid}) \wedge T.\text{sid} = T_1.\text{sid})\}$
- Select Sid
 From courses P, Enrols C
 where P.branch = 'CS' AND P.cid = C.cid AND EXISTS (Select Sid
 From courses P2, Enrol C2
 where P2.branch = 'IT' AND C2.sid = C.sid
 AND P2.cid = C2.cid)

The number of the above queries are equivalent to this query in English i.e., "Find the Sid of students who are enrolled in some courses of 'CS' branch and some courses of 'IT' branch" is _____.

3

Correct Option

Solution :

3

- $\rho(R_1, \pi_{\text{sid}}(\pi_{\text{cid}}(\pi_{\text{branch}} = 'CS' (\text{Course})) \bowtie \text{Enrols}))$
 $\rho(R_2, \pi_{\text{sid}}(\pi_{\text{cid}}(\pi_{\text{branch}} = 'IT' (\text{Course})) \bowtie \text{Enrols}))$
 $R_1 \cap R_2$

Find the Sid who enrolled atleast one course of CS branch then find the Sid who enrolled atleast one course of IT branch. Then take inter-section both Sid.

- $\{T | \exists T_1 \in \text{enrols} (\exists x \in \text{courses} (x.\text{branch} = 'CS' \wedge x.\text{cid} = T_1.\text{cid}) \wedge \exists T_2 \in \text{Enrols} (\exists y \in \text{courses} (y.\text{branch} = 'IT' \wedge y.\text{cid} = T_2.\text{cid}) \wedge T_2.\text{sid} = T_1.\text{sid}) \wedge T.\text{sid} = T_1.\text{sid})\}$

Find the Sid who enrolled atleast one course of CS branch then find the Sid who enrolled atleast one course of IT branch with same Sid. Then return Sid.

- Select Sid
 From courses P, Enrols C
 where P.branch = 'CS' AND P.cid = C.cid AND EXISTS (Select Sid
 From courses P2, Enrol C2
 where P2.branch = 'IT' AND C2.sid = C.sid
 AND P2.cid = C2.cid)

Find the Sid who enrolled atleast one course of CS branch then find the same Sid enrolled for atleast one course of IT branch and return it.

Hence all the three queries are correct.

QUESTION ANALYTICS



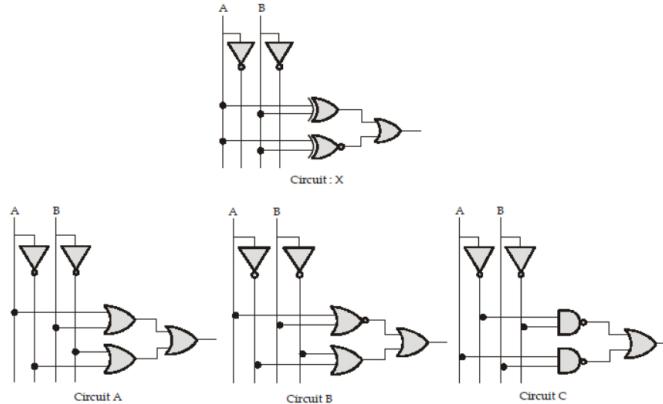
Q. 63

Solution Video

Have any Doubt ?



Consider the below logic Circuit X and Circuit A, Circuit B and Circuit C.



From the above Circuit A, B and C the number of circuits provide similar output as Circuit X is _____.

● 1

Correct Option

Solution :

1

Only circuit A is similar to Circuit X.

QUESTION ANALYTICS

+

Q. 64

Have any Doubt ?

QUESTION

Consider the following grammar:

$$\begin{aligned} S &\rightarrow (L) \mid a \\ L &\rightarrow L, \ S \mid S \end{aligned}$$

The maximum size of stack during $LL(1)$ parsing the input string $w = (a, a)$ is _____.

● 4

Correct Option

Solution :

4

Since given grammar is left recursive, so first convert into non-left recursive.

$$S \rightarrow (L) \mid a$$

$$L \rightarrow SL'$$

$$L' \rightarrow , SL' \mid \epsilon$$

$$\text{First}(S) = \{(, a\} \quad \text{Follow}(S) = \{, , \}, \$\}$$

$$\text{First}(L) = \{(, a\} \quad \text{Follow}(L) = \{\}\}$$

$$\text{First}(L') = \{, \text{ follow}(L')\}$$

$$= \{, , \}\}$$

	()	a	,	\$
S	$S \rightarrow (L)$		$S \rightarrow a$		
L	$S \rightarrow SL'$		$L \rightarrow SL'$		
L'		$L' \rightarrow \epsilon$		$L' \rightarrow SL'$	

$LL(1)$ Table

Stack	Input	Output
$\$S$	$(a, a)\$$	
$\$)L($	$(a, a)\$$	$S \rightarrow (L)$
$\$)L'$	$a, a)\$$	
$\$)L'S$	$a, a)\$$	$S \rightarrow SL'$
$\$)L'a$	$a, a)\$$	$S \rightarrow a$
$\$)L'$	$a)\$$	
$\$)L'S,$	$a)\$$	$L' \rightarrow , SL'$
$\$)L'S$	$a)\$$	
$\$)L'a$	$a)\$$	$S \rightarrow a$
$\$)L'$	$)\$$	
$\$)$	$)\$$	$S \rightarrow \epsilon$
$\$$	$\$$	

Maximum size of stack is 4.

QUESTION ANALYTICS

+

Q. 65

Have any Doubt ?

QUESTION

A CPU has a cache with block size 64 bytes. The main memory has k blocks, each block being c bytes wide. Consecutive c -byte chunks are mapped on consecutive blocks with warp-around. All the k blocks can be accessed in parallel, but two accesses to the same block must be serialized. A cache block access may involve multiple iterations of parallel block accesses depending on the amount of data obtained by accessing all the k -blocks in parallel. Each iteration requires decoding the block numbers to be accessed in parallel and this takes $k/2$ ns. The latency of one block access is 80 ns. If $c = 2$ and $k = 24$, then latency of retrieving a cache block starting at address zero from main memory is _____ (in ns).

● 184

Correct Option

Solution :

184

Cache block size = 64 bytes
Main memory has K banks or $k = 24$
Each bank is 2 byte long because $c = 2$
Total time for one parallel access

$$\begin{aligned} T &= \frac{K}{2} + \text{Latency} = \frac{24}{2} + 80 \\ &= 12 + 80 = 92 \text{ ns} \\ \text{Total latency time} &= CT = 2 \times 92 = 184 \text{ ns} \end{aligned}$$

 QUESTION ANALYTICS

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