



Kunal Jha

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 Computer Science Engineering(CS)

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Q. 1

Complete the sentence by filling in the appropriate words from the options provided. At a time when most charities seem to think of ____ increasing their capital, Warren Buffet's stipulation that what he gifts must be spent within ten years comes as a ____ announcement.

(A) perennially, contradictory

(B) merely, bleak

(C) eternally, involuntary

(D) constantly, landmark

Correct Option

Solution :

(d)

Though constantly, perennially and eternally are synonyms yet constantly fits the blank best as it simply means continuously, whereas perennially and eternally mean everlasting and are too strong for the given context. A landmark announcement is an important announcement.

QUESTION ANALYTICS


Q. 2
[Solution Video](#)
[Have any Doubt ?](#)


Choose an option, which can be substituted for the given phrase.
 A thing no longer in use

(A) Redundant

(B) Obsolete

Correct Option

Solution :

(b)

Obsolete means out of date; unfashionable or outmoded. Redundant means being in excess. Obnoxious means very rude or unpleasant.

(C) Sick

(D) Obnoxious

QUESTION ANALYTICS


Q. 3
[Solution Video](#)
[Have any Doubt ?](#)


Choose the correct alternative that will continue the same pattern and replace the question mark in the given series.
 3, 15, ?, 63, 99, 143

(A) 27

(B) 35

Correct Option

Solution :

(b)

The terms of the given series are $(2^2 - 1)$, $(4^2 - 1)$, ..., $(8^2 - 1)$, $(10^2 - 1)$, $(12^2 - 1)$.
 So, missing term = $(6^2 - 1) = (3^6 - 1) = 35$.

(C) 45

(D) 56

QUESTION ANALYTICS


Q. 4
[Solution Video](#)
[Have any Doubt ?](#)


If the sum of n positive integers $k_1, k_2, k_3, \dots, k_n$ is an even number, then number of odd integers involved in the expression is:

(A) odd

B even

Correct Option

Solution :

(b)
When odd numbers are added even number of times the resultant is always an even number.
For example:
 $3 + 5 = 8 \rightarrow$ even
 $3 + 5 + 9 = 17 \rightarrow$ odd
 $3 + 5 + 9 + 13 = 30 \rightarrow$ even etc.
Again, even + even = even
and odd + even = odd,
So, the sum of odd numbers cannot be odd in order for the resultant sum to be an even number.

C $(n - 1)$

D none of these

QUESTION ANALYTICS



Q. 5

Solution Video

Have any Doubt ?



In a cricket match, five batsmen A, B, C, D and E scored an average of 36 runs. D scored 5 more than E, E scored 8 fewer than A; B scored as many as D and E combined; and B and C scored 107 between them. The runs scored by E are _____

20

Correct Option

Solution :

20
Total runs scored = $(36 \times 5) = 180$
Let the runs scored by E be x .
Then, runs scored by D = $x + 5$; runs scored by A = $x + 8$;
Runs scored by B = $x + x + 5 = 2x + 5$;
Runs scored by C = $(107 - B) = 107 - (2x + 5) = 102 - 2x$.
So, total runs = $(x + 8) + (2x + 5) + (102 - 2x) + (x + 5) + x = 3x + 120$.
Therefore $3x + 120 = 180 \Rightarrow 3x = 60 \Rightarrow x = 20$.

QUESTION ANALYTICS



Q. 6

Solution Video

Have any Doubt ?



Pipe A can fill a tank in 12 hours and pipe B can fill it in 15 hours, separately. A third pipe C can empty it in 20 hours. Initially pipe A was opened, after one hour pipe B was opened and then after 1 hour when pipe B was opened pipe C was also opened. In how many total hours the tank will be full?

A $9\frac{2}{3}$ hours

Correct Option

Solution :

(a)
Efficiency of pipe A = 8.33%
Efficiency of pipe B = 6.67%
Efficiency of pipe C = 5%
When tap C was opened, pipe A had filled 16.66% capacity
When tap C was opened, pipe B had filled 6.67% capacity
Therefore rest capacity of the tank to be filled
 $= 100 - 23.34 = 76.66\%$
Now, the net efficiency of A, B and C = 10%
Hence, pipes A, B and C will take = $\frac{76.66}{10} = 7.66 = 7\frac{2}{3}$ hours
 \therefore Total time = 2 hours + $7\frac{2}{3}$ hours = $9\frac{2}{3}$ hours

B $6\frac{2}{3}$ hours

C 10 hours

D none of these

QUESTION ANALYTICS



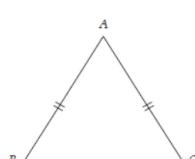
Q. 7

Solution Video

Have any Doubt ?



ABC is an isosceles triangle in which $AB = AC$ and $\angle A = 2(\angle B)$. $AB = 4$ cm. What is the ratio of inradius to the circumradius?



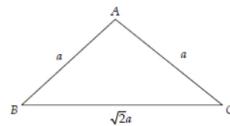
A $\frac{1}{2}$

B $\frac{(\sqrt{2}-1)}{1}$

Correct Option

Solution :

(b) $\angle B = \angle C$ and $\angle A = 2(\angle B)$
 $\therefore \angle A = 90^\circ$ and $\angle B = \angle C = 45^\circ$
In a right angled triangle,



$$\text{Inradius} = \frac{P + B - H}{2} = \frac{(a+a)-a\sqrt{2}}{2} = \frac{a(2-\sqrt{2})}{2}$$

and Circumradius = $\frac{H}{2} = \frac{a\sqrt{2}}{2}$

$$\begin{aligned}\therefore \frac{\text{Inradius}}{\text{Circumradius}} &= \frac{\frac{a(2-\sqrt{2})}{2}}{\frac{(a\sqrt{2})}{2}} \\ &= \frac{2-\sqrt{2}}{\sqrt{2}} = \frac{\sqrt{2}(\sqrt{2}-1)}{\sqrt{2}} \\ &= \frac{(\sqrt{2}-1)}{1}\end{aligned}$$

C $\frac{1}{(2\sqrt{2}-1)}$

D none of these

QUESTION ANALYTICS



Q. 8

Solution Video

Have any Doubt ?



The number of five digit numbers having atleast one of their digits repeated is :

A 900

B 1000

C 62784

Correct Option

Solution :

(c)
Total number of 5 digit numbers = $9 \times 10^4 = 90000$
Number of digit numbers without any repetition
 $= 9 \times 9 \times 8 \times 7 \times 6 = 27216$
 \therefore Required number of 5 digit numbers in which atleast one of the digit repeats
 $= 90000 - 27216 = 62784$

D none of these

QUESTION ANALYTICS



Q. 9

Solution Video

Have any Doubt ?



If 6 objects are distributed at random among 6 persons, the probability that atleast one of them will not get anything is :

A $6(6!)$

B $\frac{5^6}{6!}$

C $\frac{6^6 - 6!}{6^6}$

Correct Option

Solution :

(c)
6 objects can be distributed among 6 persons in 6^6 ways.

∴ Total number of ways = 6^6

The number of ways of distribution in which each one gets only one thing is $6!$. So, the number of distribution in which atleast one of them does not get anything $= 6^6 - 6!$

$$\text{Hence, required probability} = \frac{6^6 - 6!}{6^6}$$

D none of these

QUESTION ANALYTICS +

Q. 10

Solution Video

Have any Doubt ?



When a person aged 39 is added to a group of n people, the average age increases by 2. When a person aged 15 is added instead, the average age decreases by 1. The value of n is _____

7

Correct Option

Solution :

7

The initial average must have been between 39 and 15. When a person aged 39 is added to the group, the average increases and when a person aged 15 is added, the average decreases. Let's look at the second case first. When the person aged 15 is added to the group, the average becomes (initial average - 1). If instead, the person aged 39 were added to the group, there would be $39 - 15 = 24$ extra which would make the average = (initial average + 2). This difference of 24 creates a difference of 3 in the average. This means there must have been $24/3 = 8$ people (after adding the extra person). The value of n must be $8 - 1 = 7$.

QUESTION ANALYTICS +

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Q. 11

Solution Video

Have any Doubt ?

Let L be a regular language. If minimal DFA corresponding to L and L' contains 3 final states and 4 final states respectively, then the number of states in the minimal DFA corresponding to L is equal to _____. A 3 B 4 C 6 D 7

Correct Option

Solution:

(d)

We know that the sum of the final states in L and L' add up to the number of states in the minimal DFA. So in this case, 3 + 4 equals 7 and hence minimal DFA for L will have 7 states respectively.

QUESTION ANALYTICS



Q. 12

FAQ

Have any Doubt ?



Consider the following C program:

```
int main ()
{
    int x = 20;
    static int y = x;
    if (x == y)
        printf("Equal");
    else
        printf("Not Equal");
    return 0;
}
```

What will be the output for above C program?

 A Equal B Not Equal C Runtime error D Compile time error

Correct Option

Solution:

(d)

In C, static variable gets allocated during compile time while auto variable gets allocated during run time. Thus whenever variable y (in above case) gets allocated, it requires x which does not exist till now. Hence, compile time error occurs.

QUESTION ANALYTICS



Q. 13

FAQ

Solution Video

Have any Doubt ?

A grammar G is said to be in 3-Chomsky Normal Form (3CNF) if and only if all the productions of G are of the form $W \rightarrow XYZ$ or $W \rightarrow a$. Let X be a grammar and w be a string belonging to $L(G)$ such that $w \in \Sigma^{81}$. Then the minimum height of the parse tree corresponding to the string w , is equal to _____. A 4 B 5

Correct Option

Solution:

(b)

$$\text{Minimum height} = \log_3(|w|) + 1$$

Putting $|w|$ as 81, we get 5 as the height of the parse tree.
Hence 5 is the answer. C 6 D 9

Q. 14

Solution Video

Have any Doubt ?



The designer of a cache system need to reduces the number of cache misses that occur in a certain group of programs. Which of the following statements is/are true?

1. If compulsory misses are most common then the designers should consider increasing the cache line size to take better advantage of locality.
2. If capacity misses are most common then the designer should consider increasing the total cache size so it can contain more lines.
3. If conflict misses are most common then the designers should increasing the cache's associativity, in order to provide more flexibility when collision occurs.

 A 3 only B 1 and 2 only C 2 only D 1, 2 and 3

Correct Option

Solution :

(d)

To reduce the number of cache misses:

1. If compulsory misses are common, then increase cache line size will take better advantage of locality i.e. more number of entries will be present in cache at a time.
2. If conflict misses are common then increasing cache associativity will provide more flexibility.
3. If capacity misses are common then increasing total cache size so that maximum entries can be contained in it.

Q. 15

Solution Video

Have any Doubt ?



Consider two sorted arrays A and B having distinct elements, but there may be many elements common in both A and B . What is the best case time complexity for the intersection of two array A and B ?

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

Correct Option

Solution :

(b)

Since both arrays are sorted, so applying merge procedure will take $(n + n - 1) = O(n)$ time. C $O(n \log n)$ D $O(n^2)$

Q. 16

Have any Doubt ?



How many relations on a set with 3 elements are neither reflexive nor irreflexive _____.

 A 384

Correct Option

Solution :

(a)

The key to making a relation dissatisfy both reflexivity and irreflexivity is to pick all those relations which contain some, but not all self loops. The others may or may not be there.

So our counting problem can be broken down into 2 tasks.

First take care of self loops = $2^3 - 2$ (excluding 2 cases, one wherein all self loops are taken, and the other in which no self loop is taken)

Now take care of the rest = $2^{3^2 - 3} = 2^6$

Multiplying the two, we get $6 \times 2^6 = 384$

Option (a) as the answer.

 B 64 C 243 D None of these

Q. 17

Have any Doubt ?



Which of the following scheduling algorithms may cause starvation?

- S₁: Short remaining time first (SRTF).
- S₂: Longest remaining time first (LRTF).
- S₃: Pre-emptive algorithms.
- S₄: First in first out.

A S₁ and S₂

B S₁ and S₃

C S₁, S₂ and S₃

Correct Option

Solution :

(c)

(c)

Pre-emptive algorithm may cause starvation because one process may be preferred over other one. SRTF is kind of priority scheduling whose priority are decided on the basis of their burst time. So it also may lead to starvation. LRTF can also cause starvation.

D S₁, S₂, S₃ and S₄

 QUESTION ANALYTICS



Q. 18

 Solution Video

 Have any Doubt ?



Consider the expressions given below for the function f(A, B):

- I. $(\bar{A} + \bar{B})(\bar{A} + B)$
- II. $AB + A\bar{B}$
- III. $\bar{A}\bar{B} + A\bar{B}$

For the above functions to be true, it should be self dual functions. Which of the above functions are true?

A I only

B I and II only

C II and III only

D I, II and III

Correct Option

Solution :

(d)

Function is self dual if its dual is same as the original function.

- $(\bar{A} + \bar{B})(\bar{A} + B) = \bar{A}\bar{B} + A\bar{B}$
Dual of $(\bar{A} + \bar{B})(\bar{A} + B) = \bar{A}\bar{B} + A\bar{B}$
Both are same hence self dual.
- Both II and III are self dual just follow the above procedure as in I to prove self dual.
Hence, I, II and III are self dual, which is option (d).

 QUESTION ANALYTICS



Q. 19

 Have any Doubt ?



To allow the sender to detect a collision in CSMA/CD

A frames must include a checksum.

B frames must be encrypted and authenticated.

C frames need to be longer than maximum propagation time in the network.

D frames need to be longer than twice the maximum propagation time in the network.

Correct Option

Solution :

(d)

In CSMA/CD to detect a collision condition will be T.T. ≥ 2 T.P. i.e. frame size should be greater than twice the maximum propagation time between two stations.

 QUESTION ANALYTICS



Q. 20

 FAQ

 Have any Doubt ?



Consider the following code:

```
#include <stdio.h>
int main()
{
    int i = 10;
    switch (i)
    {
        i = i + 10;
```

```
Case 10 : printf("\n i is 10");
Case 15 : printf("i is 15");
break;
Case 20 : printf("i is 20");
break;
default : printf("no choice");
break;
}
return 0;
}
```

What of the output of above code?

A Compiler error

B i is 20

C i is 10 i is 15

Correct Option

Solution :

(c)

After the switch statement, the control directly transfers to the matching case, without executing any statement between them.

D i is 10 i is 15 i is 20

QUESTION ANALYTICS



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


A coin is biased such that a head is twice as likely to occur as a tail. If a coin is tossed 3 times, the probability of getting exactly 2 tails is

A

$$\frac{2}{9}$$

[Correct Option](#)
Solution :

(a)

 Let the probability of getting a tail = k

 the probability of getting a head = $2k$

$$k + 2k = 1$$

$$k = \frac{1}{3}$$

Probability of getting exactly 2 tails in 3 tosses

$$= {}^3C_2 \left(\frac{1}{3}\right)^2 \times \left(\frac{2}{3}\right) = 3 \times \frac{1}{9} \times \frac{2}{3} = \frac{2}{9}$$

B

$$\frac{2}{27}$$

C

$$\frac{1}{3}$$

D

$$\frac{3}{8}$$

[QUESTION ANALYTICS](#)

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


In how many ways can we fill the given binary operation table so that the binary operation * is commutative.

*	a	b	c
a	-	-	-
b	c	-	a
c	a	-	-

A

3!

B

729

C

9

D

27

[Correct Option](#)
Solution :

(d)

Each diagonal position can be filled in 3 ways (a, b, c) and there are 3 diagonal places so the diagonal can be filled in 3^3 ways. Now in order to ensure symmetry, $(a * b)$ must be equal to $(b * a)$, so $(a * b) = c^*$.

Similarly $(a * c) = (c * a) = a$ and $(c * b) = (b * c) = a$.

So totally we have 3^3 ways = 27 such tables of the given type, which ensure commutativity. Hence option (d) is the answer.

[QUESTION ANALYTICS](#)

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


Consider the following modified 2 phase locking protocol: Before a transaction T writes a data object A, T has to obtain an exclusive lock on A. Before a transaction T reads a data object A, T has to obtain a shared lock on A. If exclusive locks are held until the end of transaction and shared locks can be released at unlocking phase even before commit time then which of the following properties are guaranteed?

A

Conflict serializability

B

Recoverability

C Avoids cascading rollbacks

Correct Option

D All of the above

Solution :

(d)

The given locking protocol follows the properties of strict 2PL which is conflict serializable, recoverable and avoid cascading rollbacks.

QUESTION ANALYTICS

+

Q. 24

Q

Out of all the simple, undirected graphs possible with 3 vertices, a graph G is chosen at random. The expected number of components in G is equal to (answer must contain exactly 3 decimal places) _____.

A 0.987

Correct Option

B 1.625

Solution :

(b)

Let X denote the number of components in G which has 3 vertices.

Clearly $1 \leq X \leq 3$

X	1	2	3
$P(X)$	$\frac{(^3C_2 + ^3C_3)}{2^3}$	$\frac{^3C_1}{2^3}$	$\frac{^3C_0}{2^3}$

$$\begin{aligned} E(X^a) &= \sum_{i=1}^3 x_i p(x_i) \\ &= 1 \cdot P(X=1) + 2 \cdot P(X=2) + 3P(X=3) \\ &= 1 \cdot \left[\frac{^3C_2 + ^3C_3}{2^3} \right] + 2 \cdot \frac{^3C_1}{2^3} + 3 \cdot \frac{^3C_0}{2^3} \\ &= \frac{4+6+3}{8} = \frac{13}{8} = 1.625 \end{aligned}$$

C 0.8

D 1.15

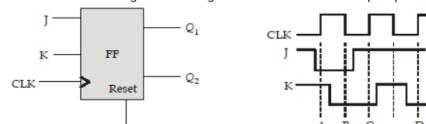
QUESTION ANALYTICS

+

Q. 25

Q

Consider the circuit diagram showing the connection of a JK-flip-flop and the timing diagram given below. What are the respective values of Q1 at A, B, C and D?



A A = 0, B = 0, C = 0, D = 0

Correct Option

B A = 0, B = 0, C = 1, D = 1

Solution :

(b)

Correct output Q_1 will be option (b).

C A = 1, B = 1, C = 0, D = 1

D A = 0, B = 1, C = 1, D = 1

QUESTION ANALYTICS

+

Q. 26

Q

Let the clock cycles required for various operations be as follows:

Memory reference	3 clock cycles
ALU reference	1 clock cycle
Register reference	0 clock cycle

Consider the following code running on a 16 bit hypothetical CPU.

Instruction	Meaning	Size in bytes
$I_1 : \text{MOV } r_0 @ 3000$	$r_0 \leftarrow M[[3000]]$	8
$I_2 : \text{MOV } r_1 3(r_0)$	$r_1 \leftarrow M[3 + r_0]$	6
$I_3 : \text{Add } r_1, r_0, r_1$	$r_1 \leftarrow r_1 + M[r_0]$	4

$I_1 : \text{MUL } r_0 \oplus 2000$	$r_0 \leftarrow r_0 \times M[[2000]]$	8
$I_2 : \text{MOV } 3(r_1), r_0$	$M[3 + [r_1]] \leftarrow r_2$	6
$I_3 : \text{Halt}$	Machine halts	2

The total number of clock cycles required to execute the program is _____.

76

Correct Option

Solution :

Instruction	Size in word	Cycles
I_1	4	18
I_2	3	13
I_3	2	10
I_4	4	19
I_5	3	13
I_6	1	3

76 cycles

QUESTION ANALYTICS

+

Q. 27

Have any Doubt ?

Consider the flow specification having the maximum packet size 800 bytes, token bucket rate of 8×10^6 bytes/sec. Token bucket size is 4 MB and the maximum transmission rate 16×10^6 B/sec. The time for which burst be send at maximum speed will be _____ (in sec). (Upto 2 decimal places)

0.50 [0.48 - 0.52]

Correct Option

Solution :

0.50 [0.48 - 0.52]

$$t = \frac{C}{M-\rho}$$

Where

- C : Capacity of token bucket
- ρ : Token generation rate
- M : Maximum data rate of token bucket
- t = Time for which token bucket can send the data with maximum data rate.

So,

$$t = \frac{4 \times 10^6 \text{ bytes}}{16 \times 10^6 \text{ bytes/sec} - 8 \times 10^6 \text{ bytes/sec}}$$

$$t = \frac{4}{8} = 0.50 \text{ sec}$$

QUESTION ANALYTICS

+

Q. 28

Have any Doubt ?

If $A = \begin{bmatrix} 1 & 0 \\ -1 & 7 \end{bmatrix}$ and $A^2 = 8A + KI_2$, then K is equal to _____.

-7

Correct Option

Solution :

-7

Given $A = \begin{bmatrix} 1 & 0 \\ -1 & 7 \end{bmatrix}$ then by Cayley Hamilton Theorem,

$$|A - \lambda I| = 0$$

$$\begin{vmatrix} 1 - \lambda & 0 \\ -1 & 7 - \lambda \end{vmatrix} = 0 \Rightarrow (1 - \lambda)(7 - \lambda) - 0 = 0$$

$$\Rightarrow 7 - \lambda - 7\lambda + \lambda^2 = 0$$

∴ Characteristic equation is $\lambda^2 - 8\lambda + 7 = 0$

Every matrix satisfies its characteristic equation

$$\Rightarrow A^2 = 8A - 7I_2$$

$$K = -7$$

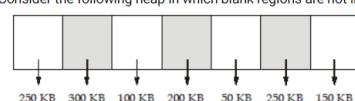
QUESTION ANALYTICS

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Q. 29

Have any Doubt ?

Consider the following heap in which blank regions are not in use and shaded regions are in use.

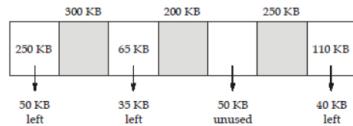


The sequence of requests for block of size 200 KB, 65 KB and 110 KB are satisfied using best fit policy. Then the internal fragmentation present after requests as _____ (in KB) (Assume fixed partition scheme).

125

Correct Option

Solution :
125



So, internal fragmentation is $[50 + 35 + 40]$ KB = 125 KB

QUESTION ANALYTICS



Q. 30

? FAQ

Have any Doubt ?



Let the number of edge disjoint Hamiltonian Cycles in K_7 be equal to X, and the number of labelled Hamiltonian cycles in K_7 be equal to Y. Then the value of $Y + 20X$ will be equal to _____.

420

Correct Option

Solution :
420

No of edge disjoint Hamiltonian cycles in K_n is equal to floor of $\frac{(n-1)!}{2}$.

Putting $n = 7$, we get $X = 3$

No of labelled Hamiltonian cycles in $K_n = \frac{(n-1)!}{2}$

Putting $n = 7$, we get $Y = 360$
Therefore $Y + 20X = 360 + 20(3) = 420$

QUESTION ANALYTICS



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


Consider the following elements are inserted into an empty AVL tree in the given order:

50, 40, 30, 20, 10, 5, 7

 The number of rotations applied to construct an AVL tree with the given elements are _____.
 (Assume LR, RL, LL and RR as a single rotation)

4 Correct Option

Solution :
4

So there are total 4 relations (3LL + 1LR).

[QUESTION ANALYTICS](#)

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


Which of the following statements is/are true?

 S₁ : In relational algebra σ (selection) operation is NOT commutative.
 S₂ : In relational algebra Π (projection) operation is commutative.
 The number of the above correct statements are _____.

0 Correct Option

Solution :
0

Both the statements are incorrect.

The select operation is commutative i.e. $\sigma_{C_2}(\sigma_{C_1}(R)) \Leftrightarrow \sigma_{C_1}(\sigma_{C_2}(R))$. Ultimately only those tuples will be selected which satisfy both C_1 and C_2 . Hence order does not matter.

But Π (projection) operation is not commutative.

$\Pi_{a_1}(\Pi_{a_2}(R)) = \Pi_{a_1}(R)$ if and only if a_1 is substring (or subset) of a_2 , otherwise operation would be incorrect.

[QUESTION ANALYTICS](#)

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

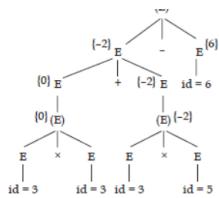

Consider the following SDT:

- | | |
|----------------------------|-----------------------------------------------------|
| $E \rightarrow E + E$ | {E.val = E ₁ .val + E ₂ .val} |
| $E \rightarrow E \times E$ | {E.val = E ₁ .val - E ₂ .val} |
| $E \rightarrow E - E$ | {E.val = E ₁ .val × E ₂ .val} |
| $E \rightarrow (E)$ | {E.val = E ₁ .val} |
| $E \rightarrow id$ | {E.val = id.lex} |

 The value of the attribute computed at root when the expression $[3 \times 3] + [3 \times 5] - 6 + 7$ is evaluated using the above SDT are _____.

-5 Correct Option

Solution :
-5



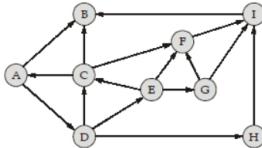
QUESTION ANALYTICS

Q. 34

? FAQ ► Solution Video

Have any Doubt ?

Consider the following graph:



If DFS algorithm applied starting from vertex 'A' which uses stack data structure then the height of stack is needed in worst case for DFS traversal is _____.

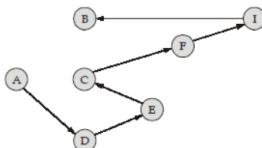
7

Correct Option

Solution :

7

Maximum height of stack needed, when depth of the graph is maximum, so,



Which is 7, so maximum height of stack is 7.

QUESTION ANALYTICS

Q. 35

Have any Doubt ?

A 3-array tree is a tree in which every internal node has exactly 3 children. The number of leaf nodes in such a tree with 16 internal nodes will be _____.

33

Correct Option

Solution :

33

$n \rightarrow$ number of internal nodes :

$$\text{Let } n = 1 \quad \begin{array}{c} \bullet \\ | \\ \bullet \quad \bullet \end{array} \quad \Rightarrow 3 \quad \Rightarrow 2(1-1) + 3$$

$$\text{Let } n = 2 \quad \begin{array}{c} \bullet \\ | \\ \bullet \quad \bullet \quad \bullet \end{array} \quad \Rightarrow 5 \quad \Rightarrow 2(2-1) + 3$$

$$\text{Let } n = 3 \quad \begin{array}{c} \bullet \\ | \\ \bullet \quad \bullet \quad \bullet \\ | \\ \bullet \quad \bullet \quad \bullet \end{array} \quad \Rightarrow 7 \quad \Rightarrow 2(3-1) + 3$$

$$\text{Number of internal nodes} = 2(n-1) + 3 = 2(16-1) + 3 = 33$$

QUESTION ANALYTICS

Q. 36

► Solution Video

Have any Doubt ?

Consider the following C-function:
int Rec (int n)

```

    {
        int i, j, k, p, q = 0;
        for (i = n; i > 1; i = i/2) {
            p = 0;
            for (j = 1; j < n; j++) {
                p = p+1;
                for (k = 1; k < p; k = k * 3)
                    q++;
            }
        } return q
    }

```

Then time complexity of Rec in term of Θ notation is

A $\Theta(n)$

B $\Theta(n^2)$

C $\Theta(n \log n)$

Correct Option

Solution :

- (c)
1st loop will execute $(\log n)$ times
(i) For which 2nd for loop executes n times
(ii) For which 3rd for loop executes $\log n$ items.
So, time complexity is $\log n[n + \log n] = \Theta(n \log n)$

D $\Theta(n \log \log n)$

QUESTION ANALYTICS



Q. 37

? FAQ

Have any Doubt ?



Consider the following statements:

S_1 : In IPv4 header total length field denote the size of payload (excluding header of IP) comes from TCP layer.

S_2 : In IPv6 header payload length indicate the size of pay load (header of IP+ data from TCP layer).

Which of the following is true?

A Only S_1

B Only S_2

C Both S_1 and S_2

D Neither S_1 nor S_2

Correct Option

Solution :

- (d)
In IPv4: Total length indicate size of header + data from TCP layer. Since header size is variable. In IPv6: Payload length indicate size of data comes from TCP layer. Since so, both statements are false.

QUESTION ANALYTICS



Q. 38

? FAQ

Have any Doubt ?



$S(x)$: x is a symmetric relation;

$AS(x)$: x is an asymmetric relation;

and $ATS(x)$: x is an antisymmetric relation.

Taking the domain to be the set of all relations on the set {1, 2, 3}, what will be the output of the following formulae?

- I. $\exists x(S(x) \wedge AS(x) \wedge ATS(x))$
II. $\exists x(\neg S(x) \wedge \neg AS(x) \wedge \neg ATS(x))$

A True, True

Correct Option

Solution :

- (a)
Let's see why I is true.

- Empty relation i.e. \emptyset satisfies all 3 properties – symmetry, asymmetry and antisymmetry. Therefore I is true.
- Take the relation as $\{(1, 2), (2, 1), (3, 2)\}$. This is neither symmetric, nor asymmetric, nor antisymmetric. Hence II is also true.

B True, False

C False, True

D False, False

QUESTION ANALYTICS



Q. 39

Have any Doubt ?



Consider program for P_1 and P_2 :

$P_1()$ <pre>{ wait(m); x++; wait(n); y++; signal(n); }</pre>	$P_2()$ <pre>{ wait(n); y++; wait(m); x++; signal(m); }</pre>
--------------------------------------------------------------------------------------------------------------	--------------------------------------------------------------------------------------------------------------

Signal (m); | Signal (n);

Here, m and n are binary semaphore variables whose values are initially initialized to 1. x and y are shared resources whose values are initialized to 0. Which of the following holds by above processes?

A Deadlock and no mutual exclusion

Correct Option

Solution :

(a) P_1 first executes wait (m) i.e. $m = 0$; P_2 executes wait (n) then $n = 0$; now the process which will perform wait () an any of the two semaphore will block. Here P_1 and P_2 both again executes wait () goes to the block condition. Hence deadlock occurs. No mutual exclusion occurs.

B Deadlock and race condition

C No deadlocks and no race condition

D Race condition and no deadlock

 QUESTION ANALYTICS



Q. 40

Solution Video

Have any Doubt ?



Consider following 2 queries with relation schema:

Student (ID, name, DEPT)

Courses (CID, ID, Grade, DEPT)

Q_1 : Select *

From Student S

Where not exists (select *

from Course C

Where C.ID = S.ID and C.Grade > 4.0)

Q_2 :

$\Pi_{ID}(\text{Student}) - \Pi_{ID}(\sigma_{\text{Grade} > 4.0}(\text{Course})) \bowtie \text{Student}$.

Which of the following query results "all students who never got a grade above 4.0"?

A Only Q_1

B Only Q_2

C Both Q_1 and Q_2

Correct Option

Solution :

(c)

Both query results students who never got a grade above 4.0 but 1st query also give those students who never enrolled any course.

D None of them

 QUESTION ANALYTICS



Item 31-40 of 65 « previous 1 2 3 4 5 6 7 next »



Kunal Jha

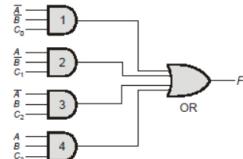
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Q. 41
[▶ Solution Video](#)
[Have any Doubt ?](#)


Consider the circuit shown below. Each of the control inputs, C_0 through C_3 , must be tied to a constant, either '0' or '1'.



What are the values of C_0 through C_3 that would cause F to be the exclusive OR of A and B ?

- A (1, 0, 0, 1)
- B (0, 1, 1, 1)
- C (0, 1, 1, 0)
- D (1, 1, 1, 1)

[QUESTION ANALYTICS](#)

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


An organization is granted the block 172.89.0.0/16. The administrator wants to create 1024 subnets using 10 bits. The first and last addresses of any host in subnet 1024 respectively are

- A 172.89.255.0/26 and 172.89.255.255/26
- B 172.89.255.1/26 and 172.89.255.245/26
- C 172.89.0.1/26 and 164.76.255.255/26
- D 172.89.0.1/26 and 172.89.255.245/26

Correct Option

Solution :

(d)
 Number of subnets = 1024
 Bits required for subnet = 10
 Subnet mask = 255.255.255.192 [i.e. take bits from host portion]
 Number of hosts = $2^8 - 2$

Ranges are:

172.89.0.0/26 to 172.89.0.63/26 ----- 1st subnet
 172.89.0.64/26 to 172.89.0.127/26 ----- 2nd subnet
 :
 172.89.255.192/26 to 172.89.255.255/26----- 16th subnet
 So first host address will be 172.89.0.1/26 and last host address will be 172.89.255.245/26.

[QUESTION ANALYTICS](#)

Q. 43
[▶ Solution Video](#)
[Have any Doubt ?](#)


Consider the following languages:

- I. $\{a^xb^yc^z \mid z^2 = x^2 + y^2\}$
- II. $\{a^xb^yc^z \mid z = x + y\}$
- III. $\{a^xb^yc^z \mid z = x - y\}$

Which of the above are context free?

- A II only
- B III only
- C II and III only

Correct Option

Solution :

(c)
 Obviously I can't be CFL.
 II is a well known CFL; as we can push the a's and b's and then pop each symbol for every 'c'

seen. Hence II is a CFL.

III is also context free. Push all the a's and then pop all the a's for each 1 and c seen. Therefore III is also context free.

Therefore option (c) is the answer.

- D All of the above

QUESTION ANALYTICS

Q. 44

Solution Video

Have any Doubt?



Consider the recurrence function:

$$T(n) = \begin{cases} \sqrt{n} T(\sqrt{n}) + n & n > 2 \\ 2 & n \leq 2 \end{cases}$$

Then $T(n)$ in terms of Θ notation is

- A $\Theta(n \log n)$

- B $\Theta(\sqrt{n} \log n)$

- C $\Theta(\sqrt{n})$

- D $\Theta(n \log \log n)$

Correct Option

Solution :
(d)

$$\begin{aligned} T(n) &= \sqrt{n} T(\sqrt{n}) + n \\ &= n^{1/2} T(n^{1/2}) + n \\ &= n^{1/2} [n^{1/4} T(n^{1/4}) + n^{1/2}] + n \\ &= n^{3/4} T(n^{1/4}) + n + n \\ &= n^{3/4} [n^{1/8} T(n^{1/8}) + n^{1/4}] + n + n \\ &= n^{7/8} T(n^{1/8}) + n + n + n \\ &\vdots \\ &= n^{2^k - 1/2^k} T(n^{1/2^k}) + k \cdot n \\ n^{1/2^k} &= 2 \\ \log n &= 2^k \times \log 2 \\ \log n &= 2^k \\ k &= [\log \log n] \\ &= 2 \cdot \left[n^{1/2} \cdot n^{1/2^2} \cdot n^{1/2^3} \dots n^{1/2^{\lfloor \log \log n \rfloor}} \right] + n(\log \log n) \\ &= 2 \cdot \left(\frac{1}{2} \left(\frac{1}{2} \right)^{\lfloor \log \log n \rfloor} \right) + n \log \log n \\ &= 2 \frac{n}{2} + n \log \log n = \Theta(n \log \log n) \end{aligned}$$

QUESTION ANALYTICS

Q. 45

Have any Doubt?



An implementation of a stack S, using two queues Q1 and Q2 is given below.

Delete the element from stack S and store it in x:

```
void pop(S, x) {
    if (isEmpty(Q(Q1))) {
        printf("S is empty");
        return;
    }
    while (1) {
        x = dequeue(Q1);
        if (isEmpty(Q(Q1)))
            break;
        enqueue(Q2, x);
    }
    while (! isEmpty(Q(Q2)))
        enqueue(Q1, dequeue(Q2));
}
```

Insert the element x into stack S

```
void push(S, x){
    enqueue(Q1, x);
}
```

How many enqueue and dequeue operations are required to perform a pop operation if Q1 contains n elements initially?

- A $3n + 1, 2n - 1$

- B $2n - 1, 2n$

- C $2n - 2, 2n - 1$

Correct Option

Solution :
(c)

Q1 initially contains n elements, during pop operation following event occurs:

1. dequeue $n - 1$ elements from Q1 and add them to Q2.
i.e. $n - 1$ dequeue and $n - 1$ enqueue.
2. dequeue n^{th} elements i.e. 1 dequeue.
3. Again shift all $n - 1$ elements from Q2 to Q1 i.e. $n - 1$ dequeue and $n - 1$ enqueue.

Hence, total $2n - 2$ enqueue and $2n - 1$ dequeue operations.

D $2n - 2, 3n - 3$

QUESTION ANALYTICS

Q. 46

Solution Video

Have any Doubt?



Consider A(P, Q, R, S, T, V, W) and the following FD's:

$W \rightarrow VS$

$T \rightarrow S$

$WS \rightarrow RT$

$QS \rightarrow P$

Which of the following is minimal cover of the given FD's?

A $\{W \rightarrow V, T \rightarrow S, W \rightarrow R, WS \rightarrow T, QS \rightarrow P\}$

B $\{W \rightarrow V, W \rightarrow S, T \rightarrow S, W \rightarrow R, QS \rightarrow P\}$

C $\{W \rightarrow V, T \rightarrow S, W \rightarrow R, WS \rightarrow R, QS \rightarrow P\}$

D $\{W \rightarrow V, T \rightarrow S, W \rightarrow R, W \rightarrow T, QS \rightarrow P\}$

Correct Option

Solution :

(d) Checking $QS \rightarrow P$, $Q^* = Q$, $S^* = S$, Hence $QS \rightarrow P$ is essential.

Checking $WS \rightarrow R$, $WS \rightarrow T$

$W^* \rightarrow WVSRT$, Hence it can be decomposed to $W \rightarrow R$, $W \rightarrow T$

So, the dependencies remained are

$W \rightarrow V$, $W \rightarrow S$, $T \rightarrow S$, $W \rightarrow R$, $W \rightarrow T$, $QS \rightarrow P$

Now, $[W \rightarrow T, T \rightarrow S]$ by transitive rule $W \rightarrow S$ can be obtained.

Hence minimal cover is: $W \rightarrow V$, $T \rightarrow S$, $W \rightarrow R$, $W \rightarrow T$, $QS \rightarrow P$.

QUESTION ANALYTICS

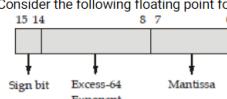
Q. 47

Solution Video

Have any Doubt?



Consider the following floating point format:



The decimal number 0.413×2^{13} has the _____ normalized representation. Assume, the mantissa has an implicit 1 preceding the binary point and only 0's are padded in while shifting a field

A 0A20

B 4BA6

Correct Option

Solution :

(b)

The decimal number is 0.413×2^{13}

Binary representation of 0.413 is 0.01101001101110

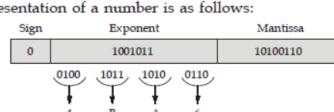
∴ Number is $(0.01101001101110) \times 2^{13}$

After normalization we have $(1.101001101110) \times 2^{11}$

Then the biased exponent = $11 + 64 = 75$

Representing biased exponent 75 in binary $(75)_{10} = (1001011)_2$

Floating point representation of a number is as follows:



C 4DD0

D 4AE8

QUESTION ANALYTICS

Q. 48

Have any Doubt?



Consider the following three address code table:

Operand-1	Operand-2	Operation	Result
a	b	+	t_1
c		-	t_2
t_2	d	+	t_2
t_1	t_2	\times	t_1
t_1	e	+	t_1
t_1		Move	S

Which of the following expression represents the above three address code (quadruple notation)?

A $S = [(a + b - c) \times -(c + d)] + e$

B $S = [(a + b) \times (-c + d)] + e$

Correct Option

Solution :

(b)

The code is as follows,

$$\begin{aligned} t_1 &= a + b \\ t_2 &= -c \\ t_2 &= t_2 + d = [-c + d] \\ t_1 &= t_1 \times t_2 = [a + b] \times [-c + d] \\ t_1 &= t_1 + e = ([a + b] \times [-c + d]) + e \\ S &= t_1 \\ S &= [(a + b) \times (-c + d)] + e \end{aligned}$$

C $S = [(a + b \times -c) + d] + e$

D $S = a + b + e + [(a + b) - c] + d$

QUESTION ANALYTICS



Q. 49

? FAQ

Have any Doubt ?



If the function $f(x) = 2x^3 - 9ax^2 + 12a^2x + 1$, where $a > 0$ attains its maximum and minimum at p and q respectively such that $p^2 = q$, then a is equals to

A $\frac{1}{2}$

B 3

C 1

D 2

Correct Option

Solution :

(d)

$$\begin{aligned} \text{For maximum and minimum, evaluate } f'(x) &= 0 \\ \Rightarrow 6x^2 - 18ax + 12a^2 &= 0 \\ \Rightarrow x &= a, 2a \\ \text{for maxima} & f''(x) < 0 \\ \text{for minima} & f''(x) > 0 \\ & f''(x) = 12x - 18a \\ \Rightarrow f''(a) &= -6a < 0 \\ f''(2a) &= 24a - 18a = 6a > 0 \\ \therefore a &\text{ is the point of maxima} = p \\ 2a &\text{ is the point of minima} = q \\ \Rightarrow a^2 &= 2a \\ \Rightarrow a^2 - 2a &= 0 \\ \Rightarrow a &= 0, 2 \quad [\text{but } a > 0 \text{ since given in question}] \\ \therefore \text{so option (d) is correct.} \end{aligned}$$

QUESTION ANALYTICS



Q. 50

Have any Doubt ?



What will be the output of the following C program?

```
#include <stdio.h>
int main ()
{
    char c = 'A';
    int x = 5, y = 10, res1, res2;
    res1 = c++ || x++ || -y;
    res2 = ++x && --c && ++y;
    printf ("%d %d %d %c", res1, res2, x + y, c);
    return 0;
}
```

A 1 0 17 B

B 1 1 17 A

Correct Option

Solution :

QUESTION

(b)
|| operator, evaluation takes place from left to right and stops evaluating next component when it gets true value.
So far res1, C++ returns true value so further components it does not evaluate.
&& operator, evaluation takes place from left to right, it evaluates all of its components until it's getting true value, whenever it gets false value, next components doesn't evaluate and stops.
So for res2, it evaluates all components and returns true.

C 1 0 16 B

D 1 1 16 B

 QUESTION ANALYTICS

+

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Q. 51
[▶ Solution Video](#)
[Have any Doubt ?](#)


Consider the language over $\{x, y, z\}$ given by, $L = \{x^a y^b z^c \mid a, b, c \geq 0; (a + b + c) \bmod 512 = 0\}$. Then which of the following is true?

A L is regular

Correct Option

Solution :

(a) L is regular. L is the intersection of two languages L_1 and L_2 , where L_1 is $x^a y^b z^*$ and L_2 is set of all strings whose length is divisible by 512. Clearly, regular languages are closed under intersection, which means L will be regular.
Hence (a) is the answer.

B L is CFL but not regular

C L is CSL but not a CFL

D None of these


Q. 52
[▶ Solution Video](#)
[Have any Doubt ?](#)


Consider the unpipelined machine with 10 ns clock cycles. It uses four cycles for ALU operations and branches, whereas five cycles for memory operations. Assume that the relative frequencies of these operations are 40%, 20%, 40% respectively. Suppose that due to clock skew and setup, pipelining the machine adds 1 ns overhead to the clock. How much speed up in the instruction execution rate will we gain from a pipeline?

A 5 times

B 8 times

C 4 times

Correct Option

Solution :

(c)

Operation	Frequency	Clock cycles
ALU	40%	4
Branch	20%	4
Memory	40%	5

$$\begin{aligned} \text{Total clock cycle} &= 0.40 \times 4 + 0.20 \times 4 + 0.40 \times 5 \\ &= 1.6 + 0.8 + 2 = 4.4 \text{ clock cycle} \end{aligned}$$

Under non pipeline time = $4.4 \times (10) = 44$

Under pipeline time = $10 + \text{overhead} = 10 + 1 = 11$

$$\text{So, speedup} = \frac{44}{11} = 4 \text{ times}$$

D 4.5 times


Q. 53
[Have any Doubt ?](#)


Which of the following statements is true?

A The size of TCP receiver window never change throughout the duration of connection.

B Suppose host A is sending a large file to host B over a TCP connection. The number of unacknowledged bytes that host A send cannot exceeds the size of advertised receiver buffer.

Correct Option

Solution :

(b)

- Receiver window is used to give the sender an idea of how much free buffer space is available at receiver. So, as the receiver buffer changes receiver window also changes.
- TCP does not allow the host to send more data than receiver buffer requirement which restricts the data overflow.
- When a strict routing has been specified by the source but can't be followed by the intermediate routers, such events will be reported by ICMP.
- Secret key encryption algorithms are often referred to as symmetric encryption algorithms as the same key can be used in bidirectional communication between sender and receiver.

C When a strict routing has been specified by the source but can't be followed by the intermediate routers, such events will not be reported by ICMP.

D Symmetric encryption algorithm is same as public key encryption algorithm.

QUESTION ANALYTICS



Q. 54

? FAQ

Have any Doubt ?



In a club election the number of contestants is one more than the number of maximum candidates for which a voter can vote. If the total number of ways in which a voter can vote be 62, then the number of candidates is _____.

6

Correct Option

Solution :

6

Let the number of contestants be n . Then the maximum number of candidates which can be voted will be equal to $n - 1$ as per the question. It's also clear that the voter has to caste at least one vote.

Given, total number of total number of ways in which a voter can vote = 62.

$$\text{or, } (^nC_1 + ^nC_2 + \dots + ^nC_{n-1}) = 62$$

$$\text{or, } 2^n - 2 = 62$$

$$\text{or, } 2^n = 64$$

$$\text{Therefore } n = 6$$

Hence there are total 6 candidates.

So 6 is the correct answer.

QUESTION ANALYTICS



Q. 55

▶ Solution Video

Have any Doubt ?



Let $L_1 = \{a^k \mid k = 5n; 1 \leq k \leq 100\}$; and $L_2 = \{a^k \mid k = 7n; 1 \leq k \leq 100\}$. Then the number of strings in $L_1 \cup L_2$ is equal to _____.

32

Correct Option

Solution :

32

The question is nothing but finding the number of integers from 1 to 100 which are either divisible by 5 or 7.

$$\text{Hence } n(\text{div by 5 or 7}) = n(\text{div by 5}) + n(\text{div by 7}) - n(\text{div by 5 and 7})$$

$$= \left\lfloor \frac{100}{5} \right\rfloor + \left\lfloor \frac{100}{7} \right\rfloor - \left\lfloor \frac{100}{\text{LCM}(5, 7)} \right\rfloor \\ = 20 + 14 - 2 = 32$$

Hence 32 is the answer.

QUESTION ANALYTICS



Q. 56

Have any Doubt ?



Consider a 40 Kbps satellite link has a propagation delay of 504 ms. The transmitter employs the "go back n ARQ" scheme with n set to 15. Assuming that each frame is 105 bytes long, the maximum data rate possible is _____ (in kbps). (Upto 2 decimal places)

12.24 [12.23 - 12.25]

Correct Option

Solution :

12.24 [12.23 - 12.25]

$$Tx = 105 \times 8 \text{ bits}/40 \text{ Kbps} = 21 \text{ ms}$$

$$Tp = 504 \text{ ms}$$

$$a = \frac{Tp}{Tx} = \frac{504}{21} = 24$$

$$\text{Efficiency of GBN} = \frac{W}{(1+2a)}$$

where, W = Window size

$$= \frac{15}{(1+48)} = \frac{15}{49}$$

BW utilization or throughput or maximum data rate = Efficiency \times BW

$$= \frac{15}{49} \times 40 \text{ kbps} = 12.24 \text{ Kbps}$$

QUESTION ANALYTICS



Q. 57

Have any Doubt ?



Consider a 2-level paging system with TLB support. The page table has divided into 2K pages each of size 8K words. If the physical address space has 32 M words which is

divided into 8K frame. TLB access time is 20 ns and main memory access time is 200 ns. The CPU finds 135 page reference in the TLB out of total reference of 180. Then the effective memory access time is _____ ns.

320

Correct Option

Solution :

320

$$\text{TLB hit ratio } (x) = \frac{135}{180} = 0.75$$

$$\begin{aligned}\text{Effective memory access time: } & x(C + M) + (1 - x)(C + 3M) \\ & = 0.75(20 + 200) + (1 - 0.75)(20 + 3(200)) \\ & = 165 + 155 = 320 \text{ ns}\end{aligned}$$

QUESTION ANALYTICS



Q. 58

? FAQ

▶ Solution Video

⌚ Have any Doubt ?



Consider an undirected simple graph having n vertices numbered 1, 2, 3, 4, 5, ..., n . Where each vertex connected to all other vertices and weight of edge 'e' assigned by $f(e)$:
 $f(e) = \{\max(x, y) | \forall x, \exists y\}$

If $n = 5$, then the number of different MSTs possible are _____.

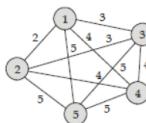
24

Correct Option

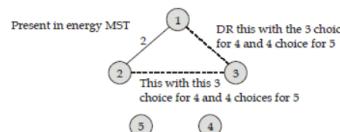
Solution :

24

Graph with edge weight looks like:



MST:



For every weight '4' edge we have 3 choices and for every weight '5' edge, we have 4 choices.

Therefore 3C_1 (for 4) $\times {}^4C_1$ (for 5) = $3 \times 4 = 12$

Number of edges with weight '3' = 2

So, total MST = $2 \times 12 = 24$

QUESTION ANALYTICS



Q. 59

? FAQ

⌚ Have any Doubt ?



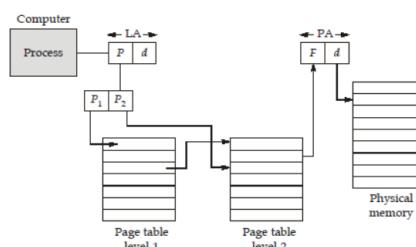
A computer uses 30 bit physical address, 38 bit virtual address and uses 2-level paging. The page table base register stores the base address of the first level. Each page table occupied exact one page. Each entry of first level store base address of second level table and each entry of second level table store a page table entry which is of size 32 bits. The size of page in KB in computer is _____.

16

Correct Option

Solution :

16



Let page size is x byte

$$\begin{aligned}\text{So, Page table size of 2^{nd} level} &= \text{Number of page table entry} \times \text{size of each entry} \\ &= \frac{2^{38}}{x} \times 4 \text{ byte}\end{aligned}$$

$$\begin{aligned}\text{Page table size of 1^{st} level} &= \text{Number of page table entry} \times \text{size of each entry} \\ &= \frac{2^{40}}{x^2} \times 4 \text{ byte}\end{aligned}$$

Since, last level entry must store in a page.

$$\begin{aligned}\text{So, } \frac{2^{42}}{x^2} &= x \\ 2^{42} &= x^3 \\ x &= 14 \\ x &= 16 \text{ KB}\end{aligned}$$

QUESTION ANALYTICS





$f(x)$ and $g(x)$ are two differential functions on $[0, 2]$ such that $f''(x) = g''(x) = 0$, $f'(1) = 4$, $g'(1) = 2$, $f(2) = 9$, $g(2) = 3$ then $f(x) - g(x)$ at $x = \frac{3}{2}$ is _____.

5

Correct Option

Solution :

$$\begin{aligned}
 & f''(x) - g''(x) = 0 \\
 \text{Integrating, } & f'(x) - g'(x) = C \\
 \Rightarrow & f'(1) - g'(1) = C \Rightarrow 4 - 2 = C \Rightarrow C = 2 \\
 \therefore & f'(x) - g'(x) = 2 \\
 \text{Integrating, } & f(x) - g(x) = 2x + C_1 \\
 & f(2) - g(2) = 4 + C_1 \\
 & 9 - 3 = 4 + C_1 \\
 & C_1 = 2 \\
 \therefore & f(x) - g(x) = 2x + 2 \\
 \text{At} & x = \frac{3}{2}; f(x) - g(x) = 3 + 2 = 5
 \end{aligned}$$

QUESTION ANALYTICS





Kunal Jha

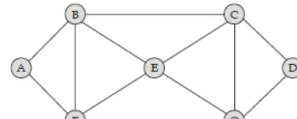
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[INCORRECT\(0\)](#)
[SKIPPED\(65\)](#)
Q. 61
[FAQ](#)
[Have any Doubt ?](#)


Consider the following graph:


 The minimum size of queue required when performing BFS on above graph is _____.
 (Take size of queue as by maximum number of elements at any time).

4
[Correct Option](#)
Solution :

4

Minimum queue size required when performing BFS on above graph is equals to maximum number of elements that can be in a queue simultaneously.

Maximum number of elements will be there when we start BFS from vertex E.

- Step 1: [E]
- Step 2: [B | C | F | G] Adjacent of E, queue size = 4
- Step 3: [C | F | B | A] Adjacent of B, queue size = 4
- Step 4: [F | G | A | D] Adjacent of C, queue size = 4
- Step 5: [G | A | D] queue size = 3
- Step 6: [A | D] queue size = 2
- Step 7: [D] queue size = 1
- Step 8: Empty

Hence, queue size must be atleast 4.

QUESTION ANALYTICS


Q. 62
[Solution Video](#)
[Have any Doubt ?](#)

 Consider the following relational schema R(ABCDEFG) with FD set {AB → C, BC → A, AC → B, B → D, D → E}. The minimum number of relations required to decompose R into BCNF which satisfy both lossless join and dependency preserving decomposition is _____.
4
[Correct Option](#)
Solution :

4

 Given relation in 1NF
 for 2NF $R_1(ABCDFG)$ $R_2(BDE)$
 $AB \rightarrow C$ $B \rightarrow D$
 $BC \rightarrow A$ $D \rightarrow E$
 $AC \rightarrow B$
 for 3NF $R_1(ABCFG)$ $R_2(BD)$ $R_3(DE)$
 $AB \rightarrow C$ $B \rightarrow D$ $D \rightarrow E$
 $BC \rightarrow A$
 $AC \rightarrow B$

 FOR BCNF $R_1(ABC)$ $R_2(ABFG)$ $R_3(DE)$
 (Lossless join) $AB \rightarrow C$ $B \rightarrow D$ $D \rightarrow E$
 (Dependency Preserving) $BC \rightarrow A$
 $AC \rightarrow B$

QUESTION ANALYTICS


Q. 63
[Solution Video](#)
[Have any Doubt ?](#)


Consider the statements:

- The Excess-3 code is said to be self complementary because decimal 9's complement of a number can be obtained by 1's complement of that Excess-3 number.
- The Excess-3 code is said to be self complementary because 2's complement of the Excess-3 number is same as that number.
- The Excess-3 code of 539 is (100001111000)₂.

 The number of correct statements are _____.
1
[Correct Option](#)
Solution :

1

- Statement I is correct and defines the self complementary process of an Excess-3 code.
- Statement II is incorrect.
- Statement III is wrong because Excess-3 code used BCD to represent each digit. Correct representation will be as given.

$$\begin{array}{r}
 & 5 & 3 & 9 \\
 & \downarrow & \downarrow & \downarrow \\
 +3 & +3 & +3 \\
 \hline
 8 & 6 & 12 \\
 \text{BCD} \rightarrow (1000 \ 0110 \ 1100)
 \end{array}$$

QUESTION ANALYTICS

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Q. 64

Have any Doubt?

?

Consider the following SDT:

$$\begin{aligned}
 G &\rightarrow A - T \quad \{G.x = A.x - T.x\} \\
 A &\rightarrow Ea \quad \{A.x = E.x \times 2\} \\
 E &\rightarrow Eb \quad \{E_1.x = 1+E_2.x\} \\
 E &\rightarrow e \quad \{E.x = -1\} \\
 T &\rightarrow Eb \quad \{T.x = E.x - 2\}
 \end{aligned}$$

If above SDT uses L-attributed definition then what is the value of an attribute x at root after evaluation for an input string "ba-bb" _____.

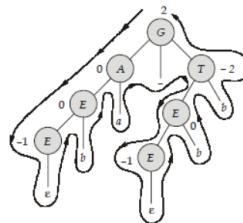
2

Correct Option

Solution :

2

Input: ba-bb



In above dependency graph, 2 is the value at G after the evaluation.

QUESTION ANALYTICS

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Q. 65

FAQ Solution Video Have any Doubt?

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During a program execution, out of 1000 memory references there are 250 and 120 misses in L_1 (Level-1) and L_2 (Level-2) caches respectively. Hit times for L_1 and L_2 cache are 24 and 40 cycles respectively. If there are 2.5 memory references per instruction (Assume L2 to memory miss penalty is 250 cycles). The average stall cycles per instruction is _____.

100

Correct Option

Solution :

100

Average Number of stalls per instruction = (Number of misses per instruction in L_1 \times Hit time in L_1) + (Number of misses per instruction in L_2 \times Miss penalty of L_2)

2.5 memory references per instruction $\Rightarrow \frac{1000}{2.5}$ instructions for 1000 references = 400 instructions.

\therefore Average number of stalls per instruction

$$= \left(\frac{250}{400} \times 40 \right) + \left(\frac{120}{400} \times 250 \right) = 25 + 75 = 100 \text{ cycles}$$

QUESTION ANALYTICS

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