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Course: GATE
Computer Science Engineering(CS)

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GATE MOCK TEST 1 GATE 2019 - REPORTS

OVERALL ANALYSIS
 COMPARISON REPORT
 SOLUTION REPORT

ALL(65)
 CORRECT(22)
 INCORRECT(22)
 SKIPPED(21)

Q. 1

The words that best fill the blanks in the below sentence are:
An expert committee has been.....to.....the transformation of the district into an international finance centre.

Solution Video
Have any Doubt ?

A
 constituted, convert

B
 appointed, oversee
 Your answer is **Correct**

Solution :
(b)

C
 converged, evaluate

D
 inducted, change


 QUESTION ANALYTICS



Q. 2

Select the pair which has the same relationship as the two words.
TRIAL : JURY :: ?

Solution Video
Have any Doubt ?

A
 dispute : arbiter
 Correct Option

Solution :
(a)

B
 poll : contestant

C
 championship : spectator
 Your answer is **Wrong**

D
 conference : speaker


 QUESTION ANALYTICS



Q. 3

Which of phrases given below should replace the phrase printed in bold type to make the sentence grammatically correct?
The crime **has growth rapidly** in Russia since the disintegration of the communist system.

Solution Video
Have any Doubt ?

A
 rapid crime has grown

B
 crime has grown rapidly
 Your answer is **Correct**

Solution :
(b)

C
 crimes grow rapidly

D
 crimes have been rapidly grown


 QUESTION ANALYTICS



Q. 4

If two typists can type two pages together in two minutes, how many typists will it take to type 18 pages in six minutes?

Solution Video
Have any Doubt ?

A
 3

B
 4

C
 6
 Your answer is **Correct**

Solution :
(c)

Since two typists can type two pages in two minutes, then one typist can type two pages in four minutes, which means that the rate of one typist is

$$= \frac{\text{job}}{\text{time}} = \frac{2}{4} = \frac{1}{2} \text{ page per minute.}$$

Now, (combined rate of x typists) \times (Time) = Job

$$(1 \times 6)$$

$$\left(\frac{1}{2} \times x\right) \times 6 = 18$$

$$\Rightarrow x = 6$$


D 12

 QUESTION ANALYTICS



Q. 5

If a sequence of consecutive integers of increasing value has a sum of 63 and the first term is 6, how many integers are there in the sequence?

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

7

Your answer is **Correct** 7

Solution :
7

$$S_n = \frac{n}{2} [2a + (n-1)d]$$

$$63 = \frac{n}{2} [12 + n - 1]$$

Solve for n we get $n = 7$

 QUESTION ANALYTICS



Q. 6

In how many ways can a person post 5 letters in 4 letter boxes?

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

A 2^3

B 4^2

C 4^3

D 4^5

Your answer is **Correct**

Solution :
(d)

Let the letter boxes be named as A, B, C and D.

Now, there are 4 places (A, B, C, D) that need to be filled.

Letter 1 can be posted in either A, B, C, or D i.e. 4 ways.

Similarly, letters 2,3 and 4 can be posted in either A, B, C, or D i.e. 4 ways each

So the total no of ways in which 5 letters can be posted in 4 boxes are


$$= 4 \times 4 \times 4 \times 4 \times 4 = 4^5$$

 QUESTION ANALYTICS



Q. 7

Chandan and Sonal purchased a laptop each at the same price. Both of them marked up the price of their laptops by the same amount. Sonal sold her laptop by offering successive discounts of \$200 and 20%, in that order; whereas Chandan sold his laptop by offering the same scheme of discount but in reverse order. If the profit made by Sonal was equal to the loss incurred by Chandan, then what was the amount of profit (in \$) made by Sonal?

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

A \$20

Correct Option

Solution :
(a)

Both had to reduce the marked price by \$200. The only difference lies in the fact that Sonal, since she reduced the amount by 200 first, did not have to give a discount on it. Whereas, Chandan gave a 20% off on \$200 too i.e. he reduced the price by an extra 20% of 200 = \$40 This additional reduction of \$40 led to a loss equal to Sonal's profit. So Sonal must have had \$20 profit and Chandan must have had \$20 loss.

B \$25

C \$30

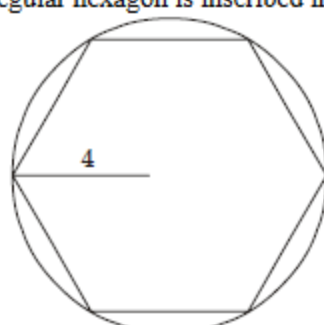
D \$35


 QUESTION ANALYTICS



Q. 8

If a regular hexagon is inscribed in a circle with a radius of 4, the area of the hexagon is



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

A $12\sqrt{3}$

B 8π

C $18\sqrt{3}$

D $24\sqrt{3}$

Correct Option

Solution :

(d)

A regular hexagon is essentially composed of 6 equilateral triangles.

The line joining the opposite vertices is the diameter of the circle in which the hexagon is inscribed.

So, the radius of the circle forms the side of the equilateral triangle

Area is $6 \times \left(\frac{\sqrt{3}}{4a^2} \right)$ where a = radius of the circle.


$$6 \times \frac{\sqrt{3}}{4} \times 4^2 = 24\sqrt{3}$$

 QUESTION ANALYTICS



Q. 9

Solution X , which is 50% alcohol, is combined with solution Y , which is 30% alcohol, to form 16 litres of a new solution that is 35% alcohol. How much of solution Y is used?

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

A 4 liters

B 6 liters

C 8 liters

D 12 liters

Correct Option

Solution :

(d)

We are given:

Y-----Mix-----X

30%-----35%-----50%

Therefore the proportion of Y:X is 3:1.

For every 4 litres of mixture we have 3 litres of Y and 1 litres of X .

In total we have 16 litres, which means that we have:

$$3 \times 4 = 12 \text{ litres of } Y \text{ and } 4 \text{ litres of } X.$$

 QUESTION ANALYTICS



Q. 10

The speed of a boat increases by 2 kmph after every one hour. If the distance travelled in the first one hour was 35 kms, what was the total distance (in km) travelled in 12 hours?

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

552

Correct Option

Solution :

552

Speed in first hour = Distance/time = 35 kmph

Speed in every subsequent hour is 2 kmph more so 37 kmph, 39 kmph and so on

Total distance travelled in 12 hrs will be the sum of distances travelled in each of these 12 hrs:

$$35 + 37 + 39 + 41 + \dots$$

$$\text{Sum} = \left(\frac{n}{2} \right) \times [2a + (n - 1) \times d]$$

$$\text{Sum} = \left(\frac{12}{2} \right) \times [2 \times 35 + (12 - 1) \times 2]$$

$$\text{Sum} = 6 \times [70 + 22] = 552 \text{ km}$$

 QUESTION ANALYTICS



Q. 11

Consider the following language over $\Sigma = \{0, 1\}$.

$$L_1 = \left\{ a^{\left\lfloor \frac{m}{n} \right\rfloor} \mid m, n \geq 1; n < m \right\}$$

$$L_2 = \left\{ a^{m^n} \mid m, n \geq 1; n < m \right\}$$

Which of the above languages are regular?

[Have any Doubt ?](#) 

A Both L_1 and L_2

Correct Option

Solution :

(a)

Both are regular. Let's take L_2 first.

Putting $n = 1$, we get

$$\left\{ a^{2^1}, a^{3^1}, a^{4^1}, a^{5^1}, \dots \right\} = aa^*$$

Since we're able to give a regular expression, hence L_2 is regular.

L_1 is also regular.

Putting $n = 2$ gives,

$$= \left\{ a^{\left\lfloor \frac{3}{2} \right\rfloor}, a^{\left\lfloor \frac{4}{2} \right\rfloor}, a^{\left\lfloor \frac{5}{2} \right\rfloor}, a^{\left\lfloor \frac{6}{2} \right\rfloor}, a^{\left\lfloor \frac{7}{2} \right\rfloor}, a^{\left\lfloor \frac{8}{2} \right\rfloor}, \dots \right\}$$

$$= \{a^1, a^2, a^3, a^4, \dots\}$$

$$= aa^* = a^+$$

Hence L_1 is also regular.

☐ Only L_2

☒ Only L_1

Your answer is Wrong

☐ Neither L_1 nor L_2

 QUESTION ANALYTICS



Q. 12

Consider a binary tree, where for every node $P - Q \leq 2$, where P represents number of nodes in left sub tree for node S and Q represents the number of nodes in right sub tree for node S for $h > 0$. The minimum number of nodes present in such a binary tree of height $h = 4$ will be

Have any Doubt ? 

☐ 6

☒ 8

Your answer is Wrong

☒ 9

Correct Option

Solution :

(c)

It can be seen that the minimum nodes possible in such a tree of height H will be,

$$N(h) = [2^{h-1} + 1]$$

Therefore putting $H = 4$, we get, $N(4) = 2^3 + 1 = 9$

Hence option (c) will be the answer.

☐ None of these

 QUESTION ANALYTICS



Q. 13

Let $L = \{w \mid w \in \{0, 1\}^*; w \text{ contains } 01 \text{ and } 011 \text{ as substring}\}$. The number of states in the minimal DFA corresponding to the complement of L is equal to

Have any Doubt ? 

☐ 3

☒ 4

Correct Option

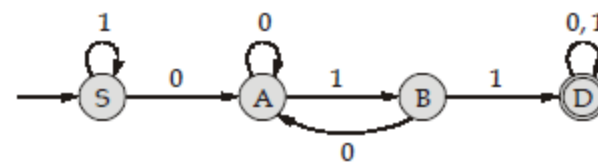
Solution :

(b)

If it contains '011' as a substring, then surely it will contain '01' as a substring.

Since the question asks for $\overline{L(M)}$, we know that in a DFA, $L(\overline{M})$ is same as $\overline{L(M)}$.

So let's find the minimal DFA for L(M).



So $L(M) \rightarrow 4$ states

$$\overline{L(M)} = L(\overline{M}) \rightarrow 4 \text{ states}$$

So option (b) will be the answer.

☐ 5

☐ None of these

 QUESTION ANALYTICS



Q. 14

Consider a n -way cache with ' x ' blocks of 64 words each. The main memory of the system is having 8 million words. Size of the tag field is 16 bits and additional memory required for tags is 1024 bytes. What will be the values of n and x respectively?

Have any Doubt ? 

☐ 128 and 1024

☐ 128 and 256

☐ 8 and 158

☒ 256 and 512

Correct Option

Solution :

(d)

$$1 \text{ million words} = 10^6 \text{ words} = 2^{20} \text{ words}$$

$$8 \text{ million words} = 2^3 \times 2^{20} = 2^{23} \text{ word} = 23 \text{ bits}$$

$$\text{Tag memory} = \text{Number of blocks} \times \text{Tag size}$$

$$1024 \times 8 = x \times 16$$

$$x = 512 = 2^9$$

x blocks of 64 words each, so 6 bits required to represent word offset.





$$\text{Length of set offset} = 23 - (16 + 6) = 1$$

$$\text{Number of sets} = 2^1 = 2$$

$$n = \frac{\text{Number of blocks}}{\text{Number of sets}}$$

$$= \frac{512}{2} = 256$$

QUESTION ANALYTICS

Q. 15

Assume $P_{a \times b}$, $Q_{b \times c}$, $R_{c \times d}$ are three matrices where $a > b > c > d$. Minimum number of multiplication required to perform (ABC)

Have any Doubt ?

A $abc + acd$

Your answer is Wrong

B $abd + bcd$

Correct Option

Solution :

(b)

$P_{a \times b} (Q_{b \times c} R_{c \times d})$ give minimum number of multiplication

$$P_{a \times b} (Q_{b \times c} R_{c \times d})$$

bcd multiplication

$$P_{a \times b} (QR)_{b \times d}$$

abd multiplication

Total $bcd + abd$ multiplication.

C $abc + bcd$

D $abd + acd$

QUESTION ANALYTICS

Q. 16

Give a relation R on the set A = {1, 2, 3, 4} in the form of matrix representation as,

$$M_R = \begin{bmatrix} 0 & 1 & 0 & 0 \\ 0 & 0 & 1 & 0 \\ 0 & 0 & 0 & 1 \\ 0 & 0 & 0 & 0 \end{bmatrix}$$

Then the cardinality of the smallest equivalence relation on A which contains R is equal to

Have any Doubt ?

A 12

Your answer is Wrong

B 8

C 13

D 16

Correct Option

Solution :

(d)

The smallest equivalence relation must satisfy reflexive, symmetric and transitive closure.

Let's deal with reflexivity and symmetry first.

$$\begin{bmatrix} 1 & 1 & 0 & 0 \\ 1 & 1 & 1 & 0 \\ 0 & 1 & 1 & 1 \\ 0 & 0 & 1 & 1 \end{bmatrix}$$

Now we only need to handle transitivity, so after making digraph, we will see that after taking transitive closure, every ordered pair will be in the relation. So the smallest equivalence relation containing R will be $A \times A$ itself.

Hence option (d) will be the answer.

QUESTION ANALYTICS

Q. 17

Consider the following statements:

S_1 : Disk is considered as the maximum size of virtual memory.

S_2 : Long term scheduler controls the degree of multiprogramming.

S_3 : Strict alternation guarantees mutual exclusion and progress.

Which of the above statements are correct?

Have any Doubt ?

A S_1 and S_2

Correct Option

Solution :

(a)

S_1 : Disk is the maximum memory size of virtual memory.

S_2 : Long term scheduler controls the degree of multiprogramming.

S_3 : Strict alternation guarantees mutual exclusion but not progress.

B

Only S_2

Your answer is Wrong

C

S_1 and S_3

D

S_2 and S_3

QUESTION ANALYTICS

+

Q. 18

A three variable boolean function is defined as, $f(A, B, C) = \Sigma m(1, 2, 5, 6)$. If $\overline{f(A, B, C)}$ denotes the compliment of the function $f(A, B, C)$, then the simplified expression of $\overline{f(A, B, C)}$ can be given as

Have any Doubt ?

A

$A \odot B$

B

$B \oplus C$

C

$B \odot C$

Your answer is Correct

Solution :
(c)
The K-map of the given function is as follows:

		BC	00	01	11	10
A	0	0	0	1	0	1
	1	0	0	1	0	1

The K-map of the function $\overline{f(A, B, C)}$ is as follows:

		BC	00	01	11	10
A	0	1	0	1	0	
	1	1	0	1	0	

$\therefore \overline{f(A, B, C)} = \overline{B}\overline{C} + BC = B \odot C$

D

$A \oplus B$

QUESTION ANALYTICS

+

Q. 19

Consider the following set of statements:
 S_1 : FF : FF : FF : FF : FF : FF is a broadcast MAC address.
 S_2 : E7 : 550 : 1F : DE : 73 : EE is a unicast MAC address.
Which of the above statements is false?

Have any Doubt ?

A

Only S_2

Correct Option

Solution :
(a)

- To find the type of the address, we look at the second hexadecimal digit from the left. If it is even, the address is unicast. If it is odd, the address is multicast.
- If all digits are F's, the address is broadcast.

Therefore, S_1 is true because all digits are F's.
 S_2 is false because 7 is binary is 0111 (odd).
It means E7 : 550 : 1F : DE : 73 : EE is a multicast MAC address.

QUESTION ANALYTICS

+

Q. 20

Consider a new sorting algorithm similar to the bubble sort algorithm, called RumbleSort. Given an array as input, RumbleSort attempts to sort the array and produces a sorted array as output. Here's the pseudocode for RumbleSort.
RumbleSort(L):
 let sorted = false
 while not sorted:
 sorted = true
 for $i = 0; i < \text{len}(L) - 2; i++$:
 if $L[i] > L[i + 2]$:
 sorted = false
 reverse the given list from $L[i]$ to $L[i + 2]$ (inclusive)

Consider running RumbleSort on the following inputs.
(i) [5 6 8 4 3]
(ii) [5 6 4 8 3]
(iii) [3 4 8 6 5]
(iv) [5 4 8 6 3]
For how many of the inputs, does RumbleSort produce the correct sorted array?

Have any Doubt ?

A

1

B 2

C 3

Correct Option

Solution :

(c)

RumbleSort algorithm fails to correctly sort the second input. Other inputs work fine.

D 4

 QUESTION ANALYTICS

+

Q. 21

If $\omega, \omega^2, 1$ are the cube roots of unity, then $A = \begin{bmatrix} 1 & \omega^n & \omega^{2n} \\ \omega^n & \omega^{2n} & 1 \\ \omega^{2n} & 1 & \omega^n \end{bmatrix}$ is

Have any Doubt ?

A Singular matrix

Correct Option

Solution :

(a)

$$|A| = \begin{vmatrix} 1 & \omega^n & \omega^{2n} \\ \omega^n & \omega^{2n} & 1 \\ \omega^{2n} & 1 & \omega^n \end{vmatrix} = 0$$

$\therefore A$ is singular matrix.

B Non-singular matrix

C Identity matrix

D Depends on n if A is singular or non-singular

Your answer is Wrong

 QUESTION ANALYTICS

+

Q. 22

Consider the graphs G_1 and G_2 , such that G_1 has 10 vertices and 7 edges. It is known that G_1 is isomorphic to \bar{G}_2 . Then the sum of the degrees of all vertices in G_2 is equal to

Have any Doubt ?

A 38

B 76

Correct Option

Solution :

(b)

Given, $V(G_1) = 10, e(G_1) = 7$

G_1 is isomorphic to $\bar{G}_2 \Rightarrow V(G_1) = V(\bar{G}_2) = 10$

Since $V(G_2) = V(\bar{G}_2)$, therefore $V(G_2) = 10$

Also $e(G_1) = e(\bar{G}_2) = 7$

Since we need to find the large sum of all vertices in G_2 , let's first find $e(G_2)$.

$$e(G_2) + e(\bar{G}_2) = \frac{n(n-1)}{2}$$

Putting $n = 10$ and $e(\bar{G}_2) = 7$;

$$\begin{aligned} e(G_2) &= \frac{10(10-1)}{2} - 7 \\ &= (45 - 7) = 38 \end{aligned}$$

Since $e(G_2) = 38$

$$\Rightarrow \sum_{v \in V(G_2)} d(v) = 2[e(G_2)] = 2[38] = 76$$

Hence the degree sum will be equal to 76.

C 24

D None of these

 QUESTION ANALYTICS

+

Q. 23

Consider the following statements:

S_1 : Unspanned strategy is suitable for variable length records.

S_2 : Secondary index may or may not be dense.

S_3 : Primary index may or may not be sparse.

Which of the above statements are correct?

FAQ | Have any Doubt ?

A S_1 and S_2 only

B Only S_2

C

Only S_3 only

Your answer is Wrong

D

S_2 and S_3 only

Correct Option

Solution :
(d)
 S_1 : Spanned strategy is suitable for variable length records.
 S_2 : Secondary index over key is dense and secondary index over non key is sparse.
 S_3 : Primary index may or may not be sparse.
 So only S_3 is correct.

QUESTION ANALYTICS

+

Q. 24

Let Q denote the set of rational numbers and $S = \{x \mid x \in \mathbb{N}; x \geq 10\}$. Consider the following POSETs.

I. $(Q \cap [0, 1], \leq)$

II. (S, \leq)

Which of the above POSETs are well ordered?

Have any Doubt ?

A

Both I and II

Your answer is Wrong

B

I only

C

II only

Correct Option

Solution :
(c)
 Let's see why I is not well ordered.
 For a Tiset to be well ordered, firstly it is necessary that every non empty subset of S must have a least element. This means, if there exists a subset of S which doesn't have a least element, then S is not well ordered.
 So $(0, 1)$ is a subset of $[0, 1]$; since $(0, 1)$ doesn't have a least element, it implies I is not well ordered.
 II is actually the set of natural numbers starting from 10. Clearly it will be well ordered, as every subset of S will have least element and it will obviously be discrete. Hence II is well ordered.

D

None of these

QUESTION ANALYTICS

+

Q. 25

2's complement representation of the number $(-89)_{10}$

Have any Doubt ?

A

7

B

5

Your answer is Correct

Solution :
(b)
 Binary representation of $(89)_{10} = (01011001)$
 $(-89)_{10} = 2$'s compliment of (01011001)
 So, 2 's complement of $(01011001) = (10100110) + (1) = 10100111$
 Sum of bits = 5

C

4

D

3

QUESTION ANALYTICS

+

Q. 26

Consider the followings statements for the pipelined CPU.

A. 2 consecutive instructions and 1 instruction uses the result of previous instructions.

B. Conditional jump instruction.

C. 2 consecutive instruction required ALU at the same time.

The number of above statements that causes hazards are _____.

Have any Doubt ?

3

Your answer is Correct3

Solution :
3
 $A \rightarrow$ Data hazard
 $B \rightarrow$ Control hazard
 $C \rightarrow$ Structural hazard
 A, B and C all three statements causes hazards.

QUESTION ANALYTICS

+

Q. 27

The total number of packet needs to send if 15 packets are sent from source to destination and assume stop and wait protocol is used and every 5th transferred packet being lost is _____.

Have any Doubt ?

18

Your answer is Correct18

Solution :

18

Packets: 1 2 3 4 5 5 6 7 8 9 10

11 12 13 13 14 15

Lost

Total number of packet sent = 15 + 3 = 18

QUESTION ANALYTICS

+

Q. 28

An integer is chosen at random from the first 200 positive integers. The probability that the integer is divisible by 6 or by 8 _____. (Upto 2 decimal places)

Have any Doubt ?

0.25 (0.20 - 0.30)

0.27

Your answer is Correct

Solution :

0.25 (0.20 - 0.30)

The number of integers between 1 to 200.

Which are divisible by 6 are $33 = \left\lfloor \frac{200}{6} \right\rfloor = 33$

Which are divisible by 8 are $25 = \left\lfloor \frac{200}{8} \right\rfloor = 25$

Which are divisible by 6 and 8 are $8 = \left\lfloor \frac{200}{\text{LCM}(6, 8)} \right\rfloor = 8$

The number of integers between 1 to 200 which are divisible by 6 or 8 or both
= $33 + 25 - 8 = 50$

\therefore Required probability = $\frac{n(E)}{n(S)} = \frac{50}{200} = 0.25$

QUESTION ANALYTICS

+

Q. 29

Consider the following set of processes with arrival time and burst time.

Process	Arrival Time	Burst Time
P_0	2	5
P_1	3	3
P_2	0	7
P_3	8	4

(All time in milliseconds)

CPU used Round Robin scheduling with time quantum of 2 msec. What is the average waiting time of all processes _____ (msec). (Upto 2 decimal places)

FAQ Have any Doubt ?

8.75 (8.74 - 8.76)

8.75

Your answer is Correct

Solution :

8.75 (8.74 - 8.76)

P_2	P_0	P_2	P_1	P_0	P_2	P_3	P_1	P_0	P_2	P_3	
0	2	4	6	8	10	12	14	15	16	17	19

Gantt chart

Process	Waiting Time
P_0	9
P_1	9
P_2	10
P_3	7

Average waiting time = $\frac{9+9+10+7}{4} = \frac{34}{4} = 8.75$ msec

QUESTION ANALYTICS

+

Q. 30

Consider the following as Z is the set of integers.

- I. $\{2x \mid x \in Z\}$
- II. $\left\{ \frac{p}{q} \mid p \in Z; q \in (Z - \{0\}) \right\}$

III. The power set of Z.
The number of countable sets are _____.

Have any Doubt ?

2

Correct Option

Solution :

2

We know that the set of natural numbers is countably infinite. Now let's see the choices one by one.

I. Set of even integers \rightarrow countably infinite.
Therefore I belongs to [N].

II. Set of rational numbers \rightarrow countably infinite II also is a number of $[N]$.
 III. $p(Z) \rightarrow$ uncountably infinite; hence III doesn't.
 Hence correct choice is I and II are correct.

QUESTION ANALYTICS



Q. 31

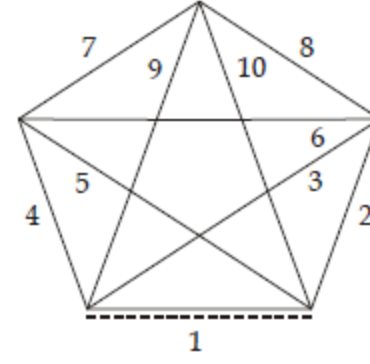
Let G be a complete undirected graph on 5 vertices, 10 edges, with weights being 1, 2, 3, 4, 5, 6, 7, 8, 9, 10. Let X be the value of the maximum possible weight a MST of G can have. Then the value of X will be _____.

Have any Doubt ?

11

Correct Option

Solution :
11



We can assign the edge weights to the edges in the graph as shown above. The edges included in the MST are highlighted in the figure above and therefore the weight will be $= (1 + 2 + 4 + 7) = 11$.



Your Answer is 14

QUESTION ANALYTICS



Q. 32

Consider a relation R(A, B, C, D, E) with functional dependencies F:

$F = \{AB \rightarrow C, C \rightarrow D, D \rightarrow B, D \rightarrow E\}$

If the number of keys in R is a and number of relation in the 3NF decomposition is b what is the value of $(a - b)$ _____.

Have any Doubt ?

1

Correct Option

Solution :
1

R(A, B, C, D, E)

Closure of $(AB)^+ = \{A, B, C, D, E\}$

Closure of $(AC)^+ = \{A, B, C, D, E\}$

Closure of $(AD)^+ = \{A, B, C, D, E\}$

All of 3 $\{AB, AC, AD\}$ are key for R.

Functional dependencies $\{D \rightarrow E\}$ is not in 3NF

$R_1(ABCD)$

$R_2(DE)$

$\{AB \rightarrow C$

$\{D \rightarrow E\}$

$C \rightarrow D$

$D \rightarrow B\}$

All attribute is prime attribute in R_1 .

Total 2 relations required

$a = 3, b = 2$

$3 - 2 = 1$

QUESTION ANALYTICS



Q. 33

Consider the following program segment:

```
main ()
{
    int *x, y, z;
    x = 5;
    x = &y;
    printf("%d %d", *x);
    y = y/*z*/ + x;
}
```

The number of tokens in the above program segment _____.

Have any Doubt ?

36

Your answer is Correct36

Solution :
36

```

  ① ② ③
main ( )
④ {
  ⑤ ⑥ ⑦ ⑧ ⑨ ⑩ ⑪ ⑫
  int * x , y , z ;
  ⑬ ⑭ ⑮ ⑯
  x = 5 ;
  ⑰ ⑱ ⑲ ⑳ ㉑
  x = & y ;
  ㉒ ㉓ ㉔ ㉕ ㉖ ㉗ ㉘ ㉙
  printf ( "%d %d", * x ) ;
  ㉚ ㉛ ㉜ ㉝ ㉞ ㉟ ㊱ ㊲
  y = y / * z * / + x ;
      ㉟ ㊱ ㊲
      It is a comment
  ㉞
}
```

Q. 34

Consider a simple undirected weighted graph G(V, E) with 10 vertices and 45 edge, assume (u, v) are two vertices weight of a edge is $= 4 \mid u - v \mid$ then the minimum cost of the spanning tree of G _____.

Have any Doubt ?

36

Your answer is Correct36

Solution :

36

G(V, E) has 10 vertices and 45 edge so $45 = \frac{10 \times 9}{2}$ so it is a complete.

MST contain 9 vertices and weight of every edge $= 4 \mid 1 \mid$ since it contain all edge and minimum edge weight between two vertices $= 4 ((u + 1) - u) = 4 \mid 1 \mid$

So cost of MST = Weight \times Number of vertices

$= 4 \times 9 = 36$

Q. 35

Consider the following C code:

```
#include<stdio.h>
int MadeEasy(int k)
{
    static int count = 0;
    while(k)
    {
        count += (k & 1)? 1: - 1;
        k >>= 1;
    }
    return count;
}
void main( )
{
    static int x = 0;
    for(int i = 5; i > 0; i--) x = x + MadeEasy(i);
    printf("%d\n", x);
}
```

The output of the above program is _____.

Have any Doubt ?

8

Correct Option

Solution :

8

Value of 'i'	Value of count upto this point
5 (101)	1 - 1 + 1 = 1
4 (100)	1 - 2 + 1 = 0
3 (11)	0 + 1 + 1 = 2
2 (10)	2 - 1 + 1 = 2
1 (01)	2 + 1 = 3

Therefore the final value = (1 + 0 + 2 + 2 + 3) = 8

Your Answer is 10

Q. 36

Which of the following is true?

Have any Doubt ?

- A

$f(n) = O((f(n))^2)$

Your answer is Wrong
- B

$T(n) = T(n - 1) + \frac{1}{n} = \theta(n)^2$
- C

$T(n) = T(\sqrt{n}) + C = \theta(\log n)$

D

None of these

Correct Option

Solution :

(d)

(a) $f(n) = O((f(n))^2)$

Assume, $f(n) = \frac{1}{n}$

$\frac{1}{n} \neq O\left(\frac{1}{n^2}\right)$

So option (a) is not true.

(b) $T(n) = T(n - 1) + \frac{1}{n}$

$T(n) = \theta(\log n)$

(c) $T(n) = T(\sqrt{n}) + C$

$$T(n) = \theta(\log \log n)$$

So option (d) is true.

 QUESTION ANALYTICS



Q. 37

Host A and Host B uses Diffie-Hellman algorithm to setup a common secret key (D-H key). A chooses 9 as private key and B chooses 7 as a private key. Modulus and its primitive root is 11 and 13 respectively. Find the shared key for A, B and D-H key between A and B respectively.

Have any Doubt ? 

☒ A 6, 7 and 8

Your answer is **Correct**

Solution :

(a)

$$\text{Public key for A} = 13^9 \bmod 11 = 6$$

$$\text{Public key for B} = 13^7 \bmod 11 = 7$$

$$\text{Shared key for A} = 7^9 \bmod 11 = 8$$

$$\text{Shared key for B} = 6^7 \bmod 11 = 8$$

$$\text{D-H key between A and B} = 8$$

☐ B 6, 7 and 1

☐ C 3, 6 and 3

☐ D 5, 4 and 9

 QUESTION ANALYTICS



Q. 38

A group G having $O(G) = 200$ is known to be cyclic with g being one of its generators. It is given that $O(g^x) = 100$ for some $x \in \mathbb{Z}$. Which of the following is the value of x ?

Have any Doubt ? 

☐ A 1

☒ B 2

Correct Option

Solution :

(b)

$$\text{Given } O(g^x) = 100$$

We know that, if g is a generator of G , then

$$O(g^x) = \frac{n}{\gcd(x, n)} \text{ where } n = O(g) = 200$$

$$\Rightarrow 100 = \frac{200}{\gcd(x, 200)}$$

$$\text{or } \gcd(x, 200) = 2$$

Only $x = 2$ will satisfied $\gcd(x, 200) = 2$.

☐ C 3

☐ D 4

 QUESTION ANALYTICS



Q. 39

Consider the following code:

P_i :

While (True)

{

 While ($t \neq i$);

 Critical section

$t = j$;

 Remainder section

}

If P_i executes the above code (where i is the current process and j is another process) which of the following is not correct? (t is shared variable initialized to i)

Have any Doubt ? 

☐ A Mutual exclusion is satisfied

☒ B Progress is satisfied

Correct Option

Solution :

(b)

Mutual exclusion is satisfied only one process can enter into critical section.

If process P_i again want to execute then P_i will not able to execute if another process P_j will not want to execute critical section.

So progress is not satisfied.

Hence option (b) is correct answer.

☐ C Both (a) and (b)

☐ D None of the above

Q. 40

Consider the following relational schema Adjacency (x, y) used to state edges of the directed graph. Which of the following relational algebra expression results vertices set which forms loop atleast two vertices?

Have any Doubt ?

A

$$\pi_x \left(\text{Adjacency} \bowtie_{\substack{Y=X_1 \\ \wedge Y_1=X}} \rho_{X_1,Y_1}(\text{Adjacency}) \right)$$

Correct Option

Solution :

(a)

B

$$\pi_x \left(\text{Adjacency} \bowtie_{\substack{Y=Y_1 \\ \wedge X=X_1}} \rho_{X_1,Y_1}(\text{Adjacency}) \right)$$

C

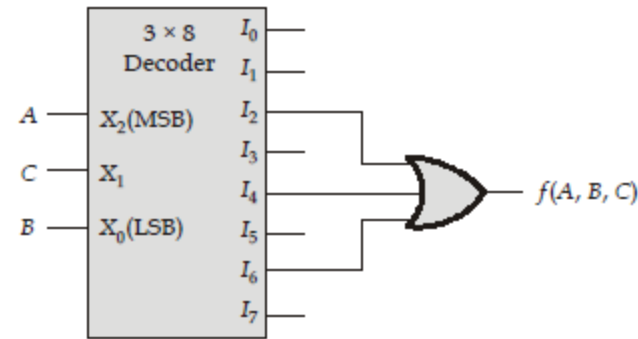
$$\pi_x \left(\text{Adjacency} \bowtie_{\substack{Y=X_1 \\ Y_1 \neq X}} \rho_{X_1,Y_1}(\text{Adjacency}) \right)$$

D

$$\pi_x \left(\text{Adjacency} \bowtie_{\substack{Y \neq X_1 \\ Y_1=X}} \rho_{X_1,Y_1}(\text{Adjacency}) \right)$$

Q. 41

A function $f(A, B, C)$ is to be implemented using an 3×8 decoder, where A is the MSB of the function and C is the LSB of the function at the output. If the connections of the input to the decoder are as shown in the figure below, then the function $f(A, B, C)$ can be expressed as



Have any Doubt ?

A

$f(A, B, C) = \Sigma m(2, 4, 6)$

B

$f(A, B, C) = \Pi M(0, 1, 7)$

C

$f(A, B, C) = \Pi M(2, 4, 6)$

D

$f(A, B, C) = \Sigma m(1, 4, 5)$

Your answer is Correct

Solution :

(d)

From the decoder circuit it is clear that

$$f(A, B, C) = I_2 + I_4 + I_6$$

Now,

	Input	Literals produced	Minterm at the output
I_2	010	$\bar{A} \ C \ \bar{B}$	$(\bar{A} \ \bar{B} \ C) \Rightarrow m_1$
I_4	100	$A \ \bar{C} \ \bar{B}$	$(A \ \bar{B} \ \bar{C}) \Rightarrow m_4$
I_6	110	$A \ \bar{C} \ B$	$(A \ \bar{B} \ C) \Rightarrow m_5$

$\therefore f(A, B, C) = \Sigma m(1, 4, 5)$

Q. 42

Which of the following statements is true of p -persistent CSMA?

Have any Doubt ?

A

When the transmitting node is ready to transmit data, it senses the transmission medium for idle or busy. If idle, then it transmits immediately otherwise waits for a random period of time.

B

When the transmitting node is ready to transmit data, it senses the transmission medium for idle or busy. If idle, then it transmits immediately. If busy then it senses the transmission medium continuously until it becomes idle.

C

When the transmitting node is ready to transmit data, it senses the transmission medium for idle or busy. If idle, then it transmits immediately. If busy then it senses the transmission continuously until it becomes idle then transmits with probability p or with $(1 - p)$ probability waits until the next available time slot.

Your answer is Correct

Solution :

(c)

Option (a) is a definition of non-persistent CSMA.

Option (b) is a definition of 1-persistent CSMA.

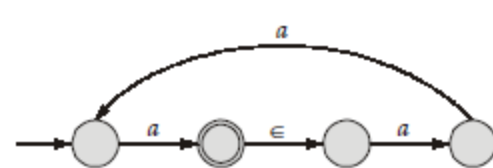
Option (c) is correct definition of p -persistent CSMA.

D

None of the above

Q. 43

Consider the following NFA M_1 over the alphabet $\{a\}$.



Let $L(M)$ be the language accepted by the NFA M . Let \bar{M} denote the machine obtained by the final and non final states respectively. Then which of the following statements is true about $L(M)$ and $L(\bar{M})$?

Have any Doubt ?

- A

$L(\bar{M}) \supseteq L(M)$

Correct Option
- Solution :
- (a)
- $$L(M) = a(aaa)^*$$

$$L(\bar{M}) = a^*$$
- Clearly $L(M)$ is a subset of $L(\bar{M})$.
- B

$L(M) \cup L(\bar{M}) = \phi$
- C

$L(\bar{M}) - L(M) = \phi$
- D

$L(M) \cap L(\bar{M}) = \phi$

Your answer is Wrong

QUESTION ANALYTICS

Q. 44

Consider the following statements given below:
 S_1 : If a graph contain a negative weight cycle then Dijkstra's algorithm may or may not terminate.
 S_2 : Bellman Ford algorithm for every weighted graph which contain two vertices u and v always produces a shortest path.
 Which of the above statements are incorrect?

Have any Doubt ?

- A

Only S_1

Your answer is Wrong
- B

Only S_2
- C

Both S_1 and S_2

Correct Option
- Solution :
- (c)
- S_1 : Dijkstra's algorithm may give incorrect result but it always terminate. S_1 is false
 S_2 : If a graph contain a negative weigh cycle then no shortest path exists. S_2 is false
- D

None of these

QUESTION ANALYTICS

Q. 45

Consider the following functions, `foo()` and `bar()`.
`void bar(unsigned long long int a, int b, int c)`
`{`
`if(a! = 1)`
`{`
`printf("$");`
`foo(a/4, b/2, c);`
`}`
`}`
`void foo(unsigned long long int a, int b, int c)`
`{`
`if(a! = 1)`
`{`
`printf("**");`
`bar(a/2, b*2, c);`
`}`
`}`

Let X and Y denote the number of times, the characters `**` and `$` are printed respectively after the execution of the function call `foo(260, 30, 30)`. Assume that the size of unsigned long long int is 8 Bytes. Then the value of $X + Y$ will be

FAQ | Have any Doubt ?

- A

30
- B

2048
- C

84
- D

40

Your answer is Correct
- Solution :
- (d)
- After execution of the above code, both `*` and `+` will be printed 20 times each. Hence $X + Y = 40$ (as $X = Y = 40$).

QUESTION ANALYTICS

Q. 46

Which of the following statement is correct about the wound-wait, wait die deadlock prevention scheme and assume T is a older transaction and S is newer transaction

Have any Doubt ?

A If S needs a resource which is held by T then S waits in wait die scheme.

B If S needs a resource which is held by T then S is aborted in wound wait scheme.

C If T needs a resource which is held by S then T is aborted in wait die scheme.

D If T needs a resource which is held by S then S is aborted in wound wait scheme.

Your answer is **Correct**

Solution :

(d)

In wait die scheme if newer transaction (S) needs a resource which is held by older transaction (T) then (S) is aborted otherwise if older transaction needs a resource held by newer transaction then older transaction should wait.

In wound wait scheme if older transaction needs a resource held by newer transaction then newer transaction will be aborted.

So option (d) is correct.

 QUESTION ANALYTICS



Q. 47

A computer uses two level cache L_1 and L_2 and in 2000 memory references there are 320 misses in L_1 cache and 150 misses in L_2 lcache. If the miss penalty of L_2 is 300 clock cycles, hit time of L_1 is 1 clock cycle and hit time of L_2 is 10 clock cycles what is the average memory access time?

Have any Doubt ?



A 3.6 cycles

B 5.4 cycles

C 25.064 cycles

Correct Option

Solution :

(c)

$$\text{miss rate } L_1 = 0.16$$

$$\text{miss rate } L_2 = 0.46875$$

$$\begin{aligned}\text{Average Access Time} &= T_1 + (1 - H_1) \times [T_2 + (1 - H_2) \times \text{Miss penalty of } L_2] \\ &= 1 + 0.16 [10 + (0.46875 \times 300)] \\ &= 1 + 0.16 [10 + 140.4] \\ &= 25.064 \text{ cycles}\end{aligned}$$

D 4.8 cycles

 QUESTION ANALYTICS



Q. 48

Consider the following grammar:

$S \rightarrow A$

$A \rightarrow BC \mid DBC$

$C \rightarrow c \mid \epsilon$

$B \rightarrow Bb \mid \epsilon$

$D \rightarrow e \mid g$

Which of the following is correct about the above grammar?

Have any Doubt ?



A FOLLOW (D) = {b, \$}
FIRST (S) = {b, c, e, \epsilon}

B FOLLOW (D) = {b, c, \$}
FIRST (S) = {b, c, e, g, \epsilon}

Your answer is **Correct**

Solution :

(b)

$$\text{FIRST (S)} = \text{FIRST (A)}$$

$$\text{FIRST (A)} = \text{FIRST (B)} \cup \text{FIRST (D)}$$

$$= \{b, \epsilon\} \cup \{e, g\}$$

FIRST (B) contain \epsilon

$$\text{So FIRST (A)} = \text{FIRST (B)} \cup \text{FIRST (C)} \cup \text{FIRST (D)}$$

$$= \{b, \epsilon\} \cup \{c, \epsilon\} \cup \{e, g\}$$

$$\text{FIRST (S)} = \{b, c, e, g, \epsilon\}$$

$$\text{FOLLOW (D)} = \{b, c, \$\}$$

Hence option (b) is correct.

C FOLLOW (D) = {b, c}
FIRST (S) = {b, e, g, \epsilon}

D FOLLOW (D) = {e, g, b, \$}
FIRST (S) = {b, c, e, g, \epsilon}

 QUESTION ANALYTICS



Q. 49

Given $BPA = \begin{bmatrix} 1 & 0 \\ 0 & 1 \end{bmatrix}$, If $A = \begin{bmatrix} 1 & 1 \\ 3 & 2 \end{bmatrix}$ and $B = \begin{bmatrix} 2 & 3 \\ 3 & 4 \end{bmatrix}$ then P =

Have any Doubt ?



A $\begin{bmatrix} -4 & 3 \\ 3 & -2 \end{bmatrix}$

B

$$\begin{bmatrix} -2 & 1 \\ 3 & -1 \end{bmatrix}$$

C

$$\begin{bmatrix} 17 & -7 \\ -12 & 5 \end{bmatrix}$$

Your answer is Correct

Solution :

(c)

$$BPA = \begin{bmatrix} 1 & 0 \\ 0 & 1 \end{bmatrix}$$

Pre-multiplying both sides by B^{-1}

$$B^{-1}BPA = B^{-1} \begin{bmatrix} 1 & 0 \\ 0 & 1 \end{bmatrix}$$

$$PA = B^{-1}$$

Post-multiplying both sides by A^{-1}

$$PAA^{-1} = B^{-1}A^{-1}$$

$$P = B^{-1}A^{-1}$$

$$= \begin{bmatrix} -4 & 3 \\ 3 & -2 \end{bmatrix} \begin{bmatrix} -2 & 1 \\ 3 & -1 \end{bmatrix} = \begin{bmatrix} 17 & -7 \\ -12 & 5 \end{bmatrix}$$

D

$$\begin{bmatrix} 1 & 0 \\ 0 & 1 \end{bmatrix}$$

QUESTION ANALYTICS

+

Q. 50

Consider the following function foo().

void foo(struct node * head)

```

{
    if (! head) return;
    if (head → next == NULL) return;
    struct node *p = head;
    struct node *q = head;
    while (q → next && q → next → next)
    {
        p = p → next;
        q = q → next → next;
    }
    q = p → next;
    while (q → next)
    {
        struct node* tmp = p → next;
        p → next = q → next;
        q → next = q → next → next;
        p → next → next = tmp;
    }
    q = head;
    while (p! = q && p → next)
    {
        struct node* tmp = q → next;
        q → next = p → next;
        p → next = p → next → next;
        q → next → next = tmp;
        q = q → next → next;
    }
    return;
}

```

If input linked list given to this function is $1 \rightarrow 2 \rightarrow 3 \rightarrow 4 \rightarrow 5 \rightarrow 6$ (the head points to the first node of this linked list), what will be the output?

Have any Doubt ?

A

 $2 \rightarrow 6 \rightarrow 1 \rightarrow 5 \rightarrow 4 \rightarrow 3$

B

 $1 \rightarrow 6 \rightarrow 2 \rightarrow 4 \rightarrow 3 \rightarrow 5$

C

 $1 \rightarrow 6 \rightarrow 2 \rightarrow 5 \rightarrow 4 \rightarrow 3$

D

 $1 \rightarrow 6 \rightarrow 2 \rightarrow 5 \rightarrow 3 \rightarrow 4$

Correct Option

Solution :

(d)

From the given code, we can understand that the linked list actually reorders the linked list L : $L_0 \rightarrow L_1 \rightarrow \dots \rightarrow L_{n-1} \rightarrow L_n$ to $L: L_0 \rightarrow L_n \rightarrow L_1 \rightarrow L_{n-1} \rightarrow L_2 \rightarrow L_{n-2} \rightarrow \dots$

Therefore option (d) is the correct answer.

QUESTION ANALYTICS

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Q. 51

Let L be the language of all strings on $\{0, 1\}$ ending with 1.Let X be the language generated by the following grammar G . $S \rightarrow 0S \mid 1A \mid \epsilon$ $A \rightarrow 1S \mid 0A$ Then $L \cup X = ?$

Have any Doubt ?

A

 ϕ

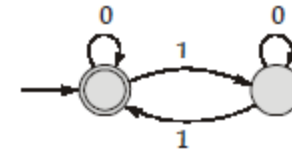
B Σ^*

Your answer is Correct

Solution :

(b)

Machine of X:



$L(X) =$ Not ending with 1

$L \cup X =$ Ending with 1 \cup not ending with 1
 $= \Sigma^*$

C L

D X

QUESTION ANALYTICS

+

Q. 52

Consider the following 8 bit multiplication process $(-121) \times (-113)$. What is the recorded multiplier in the multiplication.

Have any Doubt ?

A $-100 + 1000 -1$

Correct Option

Solution :

(a)

113: 01110001

2's of complement (113) = 10001111

Bit pairs:

$q_0: 1$	$q_{-1} (0)$	-1	(LSB)
1	1	0	<div style="text-align: center;"> <div style="border-left: 1px solid black; border-right: 1px solid black; height: 100px; margin: 0 auto; width: 2px;"></div> <div style="margin-top: 5px;">MSB</div> </div>
1	1	0	
1	1	0	
1	1	0	
0	1	+1	
0	0	0	
0	0	0	
1	0	-1	

Recorded multiplier is $-100 + 1000 -1$.

B $100 + 1000 -1$

C $-100 - 1000 +1$

D None of these

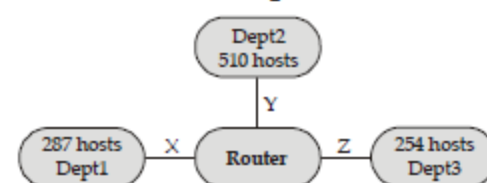
Your answer is Wrong

QUESTION ANALYTICS

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Q. 53

Considered the following router with three sub networks



If above network uses class C network 192.203.16.0 then find the DBA used for the department Y.
 [Assume all are in the same network].

Have any Doubt ?

A 255.255.255.0

B 255.255.255.254

Correct Option

Solution :

(b)

The network mask of class C = 255.255.255.0.

To satisfied the need of 510 host we have to borrow 1 bit from network portion i.e. 255.255.254.0.

The DBA of this network is: 255.255.255.254 i.e., 255.255.11111111.11111110.

C 255.255.254.192

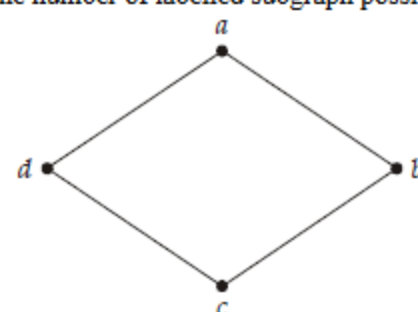
D 255.255.254.255

QUESTION ANALYTICS

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Q. 54

The number of labelled subgraph possible for the graph given below are _____.



Have any Doubt ?

Solution :
112

$$\begin{aligned} \text{The number of subgraph for a labelled graph with vertices } n &= \sum_{r=1}^n {}^nC_r 2^{\frac{r(n-r)}{2}} \\ &= \sum_{r=1}^4 {}^4C_r 2^{\frac{r(n-r)}{2}} \\ &= {}^4C_1 \cdot 2^0 + {}^4C_2 \cdot 2^2 + {}^4C_3 \cdot 2^3 + {}^4C_4 \cdot 2^6 \\ &= 4 + 12 + 32 + 64 \\ &= 112 \end{aligned}$$

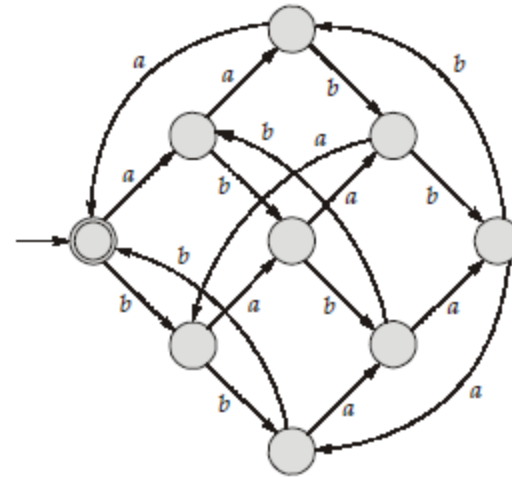
Your Answer is 18

QUESTION ANALYTICS

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Q. 55

Consider the DFA X given above over $\Sigma = \{0, 1\}$. Let $L(X)$ be the language generated by the above DFA. We are given the following strings.



- I. $a^{32} (ba)^{128}$
- II. $a^{2017} b^{2018} a^{2019}$
- III. $(a^{72} b^{14})^2$
- IV. ϵ^{32}

How many of the above strings belong to $L(X)$ = _____.

Have any Doubt ?

1

Correct Option

Solution :
1

$L(X)$ = Number of a's and number of b's is multiple of 3

Now let's see the strings.

I: $a^{32} (ba)^{128}$

$$\begin{aligned} n_a &= 32 + 128 \\ &= 160 \text{ (which is not divisible by 3)} \end{aligned}$$

So this string does not belongs to $L(X)$.

II: $a^{2017} b^{2018} a^{2019}$

$$\begin{aligned} n_a &= 2017 + 2019 \\ &= 4036 \text{ (which is also not divisible by 3)} \end{aligned}$$

So this string does not belongs to $L(X)$.

III: $(a^{72} b^{14})^2$

$$\begin{aligned} n_a &= 72 \times 2 \\ &= 144 \text{ (which is divisible by 3)} \\ n_b &= 14 \times 2 \\ &= 28 \text{ (which is not divisible by 3)} \end{aligned}$$

So this string does not belongs to $L(X)$.

IV: ϵ^{32}

$$\begin{aligned} n_a &= 0 \text{ (which is divisible by 3)} \\ n_b &= 0 \text{ (which is divisible by 3)} \end{aligned}$$

So this string belongs to $L(X)$.

So only 1 string belongs to the $L(X)$.

QUESTION ANALYTICS

+

Q. 56

Consider a TCP connection using the multiplicative additive congestion control algorithm where the window size at the start is 1 MSS and the threshold is 32 MSS. At the 8th transmission timeout occurs and enters in a congestion detection phase. The value of window size (in MSS) at the end of 12th transmission is _____.

Have any Doubt ?

8

Correct Option

Solution :
8

- For 1st transmission window size = 1
- For 2nd transmission window size = 2
- For 3rd transmission window size = 4
- For 4th transmission window size = 8
- For 5th transmission window size = 16
- For 6th transmission window size = 32
- For 7th transmission window size = 33
- For 8th transmission window size = 34

$$\text{Timeout occurs at 8th transmission, new threshold value} = \frac{34}{2} = 17$$

- For 9th transmission window size = 1
- For 10th transmission window size = 2
- For 11th transmission window size = 4
- For 12th transmission window size = 8

Q. 57

Consider the following statements given below:

S_1 : In inverted page table, size of the page table depends only on the number of processes.

S_2 : Race condition is occur if mutual exclusion is satisfied.

S_3 : Using semaphore to achieve the synchronization between two or more process always guarantee mutual exclusion.

The number of incorrect statements are _____.

Have any Doubt ?

3

Correct Option

Solution :

3

S_1 : In inverted page table, size of the table mainly depends on the number of frames in main memory.

S_2 : Race condition is occur when mutual exclusion is not satisfied.

S_3 : Use of semaphore does not always guarantee mutual exclusion.

Q. 58

Consider the following code segment:

```
int j, k, n;
for (j = 1, j ≤ n - 1; j++) {
    for (k = j + 1; k < n + 1; k++)
        if (A[j] > A[k])
            A[j] = A[j + 2];
}
```

(Where n is the size of array $A[]$ and starting index is 1)

Number of comparison made by the above code when $n = 84$ _____.

Have any Doubt ?

3486

Correct Option

Solution :

3486

$$\begin{aligned} \text{Total number of comparisons} &= \sum_{j=1}^{n-1} n - j \\ &= (n - 1) + (n - 2) + \dots + 1 \\ &= \frac{n(n-1)}{2} \\ n &= 84 \\ &= \frac{84 \times 83}{2} = 3486 \end{aligned}$$

Q. 59

Consider a computer system with 32 bit virtual addressing 36 bit physical addressing and page size of 8 KB. Each page table entry contain 2 valid bit 3 protection bit and 2 reference bit. The approximate size of page table if system uses single level paging _____ MB.

Have any Doubt ?

2

Your answer is Correct2

Solution :

2

Page table size = Number of page × Page table entry size

$$\text{Number of frames} = \frac{2^{36}}{2^{13}} = 2^{23}$$

Page table entry size = 23 + 2 + 2 + 3 = 4 B

$$\begin{aligned} \text{Page table size} &= \frac{2^{32}}{2^{13}} \times 4\text{B} \\ &= 2^{19} \times 4\text{B} = 2^{19} \times 2^2 \text{ B} \\ &= 2 \text{ MB} \end{aligned}$$

Q. 60

$x_1, x_2, x_3 \dots x_{10}$ are ten real numbers such that $x_n < x_{n+1}$ for $n = 1, 2, 3 \dots 10$. Five number out of these are picked up at random. The probability that these numbers have x_7 as the second last number is _____. (Upto 3 decimal places)

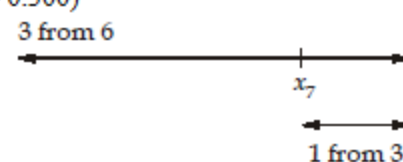
Have any Doubt ?

0.238 (0.200 - 0.300)

Correct Option

Solution :

0.238 (0.200 - 0.300)



$$P(E) = \frac{{}^6C_3 \times {}^3C_1}{1} = 0.238$$

Q. 61

Consider the following C code:

```
#include <stdio.h>
void f(int *a, int *b)
{
    *a = *a ^ *b;
    *b = *a ^ *b;
    *a = *a ^ *b;
}
int main()
{
    int a = 400, b = 500, c = 600;
    f(&a, &b);
    f(&c, &b);
    printf("%d", b - a + c);
    return 0;
}
```

Note that the operator ‘^’ refers to the bit wise exclusive-OR operator. The output of the above program will be _____.

Have any Doubt ?

500

Correct Option

Solution :
500

The function $f()$ is actually swapping the 2 integers given to it as input. So after the 1st function calls, a and b values will get interchanged, and then after 2nd call, b and c values will get interchanged.

So finally, $a = 500, b = 600, c = 400$

Then the value of $b - a + c = 600 - 500 + 400 = 500$

Your Answer is 1540

Q. 62

Consider the following relation $R(A_1, A_2, A_3, \dots, A_{15})$ with $\{A_1, A_2, \dots, A_6\}$ of relation R are simple candidate key. The number of possible superkey in relation R is _____.

Have any Doubt ?

32256

Correct Option

Solution :
32256

m simple candidate key forms $(2^m - 1)$ superkey

$m = 6$

$2^m - 1 = 63$

Total $15 - 6 = 9$ non prime attributes

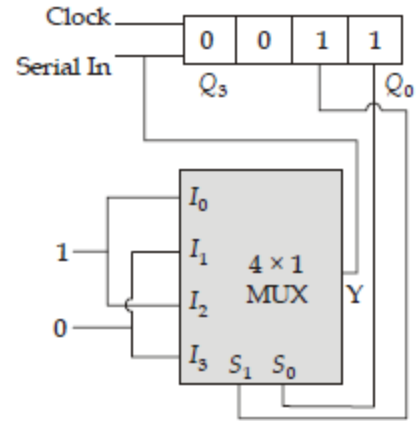
Total superkey = $63 \times 2^9 = 63 \times 512$

= 32256

Your Answer is 512

Q. 63

The initial content of serial IN parallel OUT, right shift, shift register shown below is 0011. The number of clock pulses required to return the content of register to its initial value is _____.



Have any Doubt ?

8

Correct Option

Solution :
8

Clock	S.I = Y	Q ₃	Q ₂	Q ₁	Q ₀
		0	0	1	1
1	0	0	0	0	1
2	0	0	0	0	0
3	1	1	0	0	0
4	1	1	1	0	0
5	1	1	1	1	0
6	1	1	1	1	1
7	0	0	1	1	1
8	0	0	0	1	1

After 8 clock pulse.

Q. 64

Assume +, −, ×, / are usual arithmetic operators, their precedences and associativity is given:

1. / has highest precedence and left associative.
2. + has higher precedence than −, × and right associative.
3. ×, − have equal precedence and left associative.

Using the above rule, the value of the expression $5 + 9/3 - 4 \times 8 + 9 - 4$ is _____.

Have any Doubt ?

64Correct Option

Solution :
64

$$\begin{aligned} & (((((5 + (9/3)) - 4) \times (8 + 9)) - 4) \\ &= (((((5 + 3) - 4) \times (8 + 9))) - 4) \\ &= ((8 - 4) \times 17) - 4) \\ &= ((4 \times 17) - 4) \\ &= 68 - 4 \\ &= 64 \end{aligned}$$

Q. 65

In an enhanced CPU, the speed of a floating point operations has been increased by 30% and the speed of a fixed point operations has been increased by 20%. In the original design floating point operations used to take twice the time compared to fixed point operations. The overall speedup achieved if the ratio of the number of floating point instructions to the number of fixed point instructions is 2 : 3 is _____. (Upto 2 decimal places)

Have any Doubt ?

1.34 (1.32 - 1.36)Correct Option

Solution :
1.34 (1.32 - 1.36)

Assume total instruction (n) = 100

Number of floating instructions = $\frac{2}{5} \times 100 = 40$

Number of fixed point instructions = $\frac{3}{5} \times 100 = 60$

Assume T_1 and T_2 time for floating and fixed point respectively.

Without enhancement:

$$T_1 = 2 \text{ sec}$$
$$T_2 = 1 \text{ sec}$$

Total time to execute (T_{E1}) = $40 \times 2 \text{ sec} + 60 \times 1 = 140 \text{ sec}$

After enhancement:

$$t_1 = 2 \text{ sec} - (2 \text{ sec} \times 0.3) = 1.4 \text{ sec}$$
$$t_2 = \frac{1}{1.2} = 0.8 \text{ sec}$$

Total time to execute (T_{E2}) = $40 \times 1.4 \text{ sec} + 60 \times 0.8 = 104 \text{ sec}$

Now, $\text{Speedup} = \frac{T_{E1}}{T_{E2}} = \frac{140 \text{ sec}}{104 \text{ sec}} = 1.34$