



Kunal Jha

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 Computer Science Engineering(CS)

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FULL SYLLABUS TEST-1 (BASIC LEVEL) (GATE - 2021) - REPORTS

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Q. 1
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 Fill in the blank.
 It is cloudy. The rain is _____.

A eminent

B imminent

Correct Option

 Solution :
 (b)

C averse

D adverse

QUESTION ANALYTICS


Q. 2
[FAQ](#)
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Out of the following four sentences select the most suitable sentence with respect to grammar and usages.

A I have read two third of this novel.

B I have read two thirds of this novel.

Correct Option

 Solution :
 (b)

C I have read two third of these novel.

D I have been reading two third of this novel.

QUESTION ANALYTICS


Q. 3
[FAQ](#)
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Find the sum of the given series upto 50 terms :

$$1\frac{1}{2} + 3\frac{1}{6} + 5\frac{1}{12} + 7\frac{1}{20} + \dots$$

A $1250\frac{50}{51}$
B $2500\frac{50}{51}$

Correct Option

 Solution :
 (b)

$$\begin{aligned}
 & (1+3+5+7+\dots+50^{\text{th}} \text{ terms}) + \left(\frac{1}{2} + \frac{1}{6} + \frac{1}{12} + \frac{1}{20} + \dots \right) \\
 &= (1+3+5+7+9+\dots) + \left(\frac{1}{1\times 2} + \frac{1}{2\times 3} + \frac{1}{3\times 4} + \dots \right) \\
 &= \frac{50}{2} [2 \times 1 + (50-1) \times 2] + \left[\frac{1}{1} - \frac{1}{2} + \frac{1}{2} - \frac{1}{3} + \frac{1}{3} - \frac{1}{4} + \dots - \frac{1}{50} + \frac{1}{50} - \frac{1}{51} \right] \\
 &= 25 \times 100 + \left(1 - \frac{1}{51} \right)
 \end{aligned}$$

C $1375\frac{50}{51}$
D $1351\frac{50}{51}$

QUESTION ANALYTICS



Q. 4

[FAQ](#)
[Solution Video](#)
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Find the next term in given series,
0, 1, 3, 4, 8, 15, 27, ?

A 42**B** 45**C** 50

Correct Option

Solution :

(c)
 Given series, 0, 1, 3, 4, 8, 15, 27 ...
 $0 + 1 + 3 = 4$
 $1 + 3 + 4 = 8$
 $3 + 4 + 8 = 15$
 $4 + 8 + 15 = 27$
 $8 + 15 + 27 = 50$

D 55
 QUESTION ANALYTICS

+

Q. 5

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

Two insects start moving from same point along a rectangular path in the same direction with speed 15 m/s and 10 m/s. The rectangular path have sides of 10 m and 5 m. What is the minimum time in sec for their meeting at that point where they both started their Journey?

C 6

Correct Option

Solution :

6 Perimeter of the rectangle = $2(10 + 5) = 30$

$$\therefore V_A = 15 \text{ m/s}$$

$$V_B = 10 \text{ m/s}$$

So for one complete cycle,

$$t_A = \frac{30}{15} = 2 \text{ sec}$$

$$t_B = \frac{30}{10} = 3 \text{ sec}$$

To meet at the same starting point time required

$$= \text{LCM}(t_A, t_B)$$

$$= 6 \text{ sec}$$

 QUESTION ANALYTICS

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Q. 6

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

Six year ago, the ratio of ages of Shyam and Puneet was 6 : 5, four year hence, the ratio of their ages will be 11 : 10, what is the ratio of their present ages?

A 5 : 7**B** 6 : 7**C** 9 : 7**D** 9 : 8

Correct Option

Solution :

(d)
 Suppose the present day of Shyam and Puneet is X and Y.

$$\text{Then, } \frac{X-6}{Y-6} = \frac{6}{5} \quad \dots(i)$$

$$\frac{X+4}{Y+4} = \frac{11}{10} \quad \dots(ii)$$

By solving (i) and (ii)

$$Y = 16, X = 18$$

Ratio of their present age

$$X : Y \Rightarrow 18 : 16$$

$$\Rightarrow 9 : 8$$

 QUESTION ANALYTICS

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Q. 7

[FAQ](#)
[Solution Video](#)
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In the question three statements are given followed by four conclusions. You have to take the given statement true even if they seem to be variance from commonly known facts and then decide which of the given conclusion logically follows from the given statement disregarding commonly known facts.

Statements:

1. All tables are chairs.

2. Some tables are pens.
 3. All pens are laptops.
Conclusion:
 (i) Some chairs are laptops.
 (ii) All chairs are laptops.
 (iii) All tables are laptops.
 (iv) Some tables are laptops.

A Only I and II

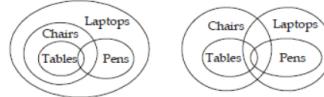
B Only I and III

C Only II and IV

D Only I and IV

Correct Option

Solution :
 (d)



QUESTION ANALYTICS

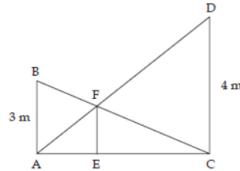
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Q. 8

? FAQ | ► Solution Video | ⚡ Have any Doubt ?

Q

In the given diagram two poles AB and CD of height 3 m and 4 m respectively are placed on the ground. The top of pole AB is connected to bottom of pole CD and likewise top of pole CD is connected to bottom of pole AB by ropes. If a third pole is placed on the ground such that its top point touches the intersection point F, then height of pole EF?



A 2 m

B $\frac{16}{7}$ m

C $\frac{12}{7}$ m

Correct Option

Solution :
 (c)

In $\triangle ACD$ and $\triangle AEF$

∴

$$\angle CAD = \angle EAF$$

$$\frac{EF}{AE} = \frac{4}{AC}$$

... (i)

In $\triangle ABC$ and $\triangle ECF$

$$\angle ACB = \angle ECF$$

$$\frac{EF}{EC} = \frac{3}{AC}$$

... (ii)

From equation (i) and (ii)

$$\frac{EC}{AE} = \frac{4}{3}$$

... (ii)

From equation (i)

$$EF = \frac{4 \times AE}{AC} \quad (\because AC = AE + EC)$$

$$EF = \frac{4 \times AE}{AE + EC}$$

$$EF = \frac{4}{1 + \frac{EC}{AE}} = \frac{4}{1 + \frac{4}{3}} = \frac{12}{7} \text{ m}$$

... (ii)

From equation (i) and (ii)

$$\frac{EC}{AE} = \frac{4}{3}$$

... (ii)

From equation (i)

$$EF = \frac{4 \times AE}{AC} \quad (\because AC = AE + EC)$$

$$EF = \frac{4 \times AE}{AE + EC}$$

$$EF = \frac{4}{1 + \frac{EC}{AE}} = \frac{4}{1 + \frac{4}{3}} = \frac{12}{7} \text{ m}$$

D $\frac{9}{7}$ m

QUESTION ANALYTICS

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Q. 9

[FAQ](#)
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A does 60% of work in 18 days. He then calls B and they together finish the remaining work in 8 days. How long B alone would take to do the whole work?

 A 75 B 18 C 20 D 60

Correct Option

Solution :
(d)

'A' can complete the work in $\frac{18}{0.6} = 30$ days.

Suppose B can complete the work in 'X' days.

$$8\left(\frac{1}{30} + \frac{1}{X}\right) = 0.4$$

$$\frac{1}{30} + \frac{1}{X} = \frac{1}{20}$$

$$\frac{1}{X} = \frac{1}{60}$$

$$X = 60$$

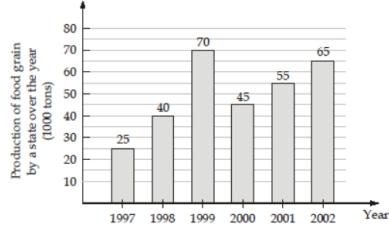
 QUESTION ANALYTICS

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Q. 10

[FAQ](#)
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Study the following graph carefully for the question given below,



Which of the following option(s) is/are correct?

 A The average production of year 1998 and year 1999 is exactly equal to production of year 2001.

Correct Option

 B The average production of year 1997 and year 2002 is exactly equal to production of year 2001. C The average production from year 1997 to year 2002 is equal to 45000 tons. D Maximum production was occurred during year 2002.

YOUR ANSWER - NA

CORRECT ANSWER - a

STATUS - SKIPPED

Solution :

(a)

(a) Average production of year 1998 and year 1999 is

$$= \frac{40000 + 70000}{2} = 55000 \text{ tons}$$

which is equal to production of year 2001

(b) Average production of year 1997 and year 2002 is

$$= \frac{25000 + 65000}{2} = 45000 \text{ tons}$$

(c) Average production from year 1997 to year 2002 is

$$= \frac{25000 + 40000 + 70000 + 45000 + 55000 + 65000}{6} = 50000 \text{ tons}$$

(d) Maximum production occurred is 70000 tons in year 1999.

 QUESTION ANALYTICS

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Q. 11

An infinite sequence of independent trials is to be performed. Each trial results in success with probability p and failure with probability $1 - p$. What is the probability that exactly k successes occur in the first n trials?

A $p^k(1-p)^{n-k}$

B $\binom{n}{k} p^k(1-p)^{n-k}$

Correct Option

Solution :

(b)

Exactly k success in first n trials means k success and $n - k$ failures.
 Select k trials from n and make them success and remaining failures.
 So, answer $\binom{n}{k} * p^k * (1-p)^{n-k}$.

C $\binom{n}{k} p^k$

D $\binom{n}{k} (1-p)^{n-k}$

[QUESTION ANALYTICS](#)

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


Suppose a heap is stored in an array A in the standard fashion. That is, store the root in $A[1]$ and for every node stored in $A[k]$, store its children in $A[2k]$ and $A[2k + 1]$. Consider the following statements:

- A list of the array elements $A[1], A[2], A[3], \dots, A[n]$ form a breadth first traversal of the heap.
 - A list of the array elements $A[1], A[2], A[3], \dots, A[n]$ form a depth first traversal of the heap.
- Which of the above statements are true?

A I only

Correct Option

Solution :

(a)

A list of the array elements $A[1], A[2], A[3], \dots, A[n]$ form a breadth first traversal of the heap... Because we first store the root then its children and then its grand children and so on.

B II only

C I and II both

D None of I and II is true

[QUESTION ANALYTICS](#)

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


Consider the following C code fragment:

```
int a = 7;
int b = a/2;
int c = a%2;
printf("%d,%d,%d", a, b, c);
```

When it is executed, what output will be produced?

A 7, 3.5, 1

B 7, 3, 1

Correct Option

Solution :

(b)

In C, "int b = a/2;" will assign 3 to b, not 3.5.
 "int c = a%2;" will assign 1 to c because % is the remainder operator.

C 7, 1, 3

D None of these

QUESTION ANALYTICS**Q. 14**[FAQ](#)[Have any Doubt?](#)

In BCD code each decimal digit is represented by a 4-bit binary number (ABCD). The Boolean expression that represents the set of invalid codes is

A A \vee BC**B** AB \vee CD**C** AB \vee AC

Correct Option

Solution :

(c)
In 4-bits, the invalid BCD codes are 1010, 1011, 1100, 1101, 1110, 1111.
Hence, option (c) is correct.

D AB \vee AD**QUESTION ANALYTICS****Q. 15**[FAQ](#)[Solution Video](#)[Have any Doubt?](#)

Consider the following decimal numbers:

U = 0.1, V = 0.2, X = 0.3, Y = 0.4, Z = 0.5

Which of the above decimal numbers has an exact representation in binary notation?

A Only U, Z**B** Only U, V, Z**C** U, V, X, Y only**D** Only Z

Correct Option

Solution :

(d)
In order to convert a fraction part, as is the case in this question, multiply the fraction by 2, note the integer part of the product, and continue the same operation with the fraction part of the product until a product of 1.0 is obtained. The required binary fraction is then where the i's are the integer parts of the products starting from the first to the last (if the operation stops at some stage). 0.1 will get the following products 0.2, 0.4, 0.8, 1.6, (take away 1 and continue with 0.6), 1.2, 0.2, ... Stop! We had already encountered 0.2 which means we will encounter it again and again if we continue which means this operation will go indefinitely. Thus all the choices U, V, X and Y do not have finite (exact) binary notation because all the decimal numbers 0.1, 0.2, 0.3 (which will be 0.6 on the second stage) and 0.4 are encountered in the conversion procedure for 0.1 which did not terminate. The only choice left is 0.5; indeed 0.5 will give 1.0 in the second stage which is the terminating stage resulting the binary 0.1 as its binary representation. Hence the answer is option (d).

QUESTION ANALYTICS**Q. 16**[FAQ](#)[Have any Doubt?](#)

Let M be a finite automaton and let M' be obtained from M by interchanging the collections of accepting and non-accepting states.

Now consider the following statements:

I. If M is deterministic, then the language accepted by M' is the complement of the language accepted by M.

II. If M is Non-deterministic, then the language accepted by M' is the complement of the language accepted by M.

Which of the above is/are correct?

A Only I

Correct Option

Solution :

(a)
If M is deterministic, then the language accepted by M' is the complement of the language accepted by M. If M is non-deterministic, then the language accepted by M' may not be the complement of the language accepted by M because NFA might have dead configurations.

B Only II**C** Both I and II**D** None of these**QUESTION ANALYTICS****Q. 17**[FAQ](#)[Have any Doubt?](#)

If the expression $((2 + 3) * 4 + 5 * (6 + 7) * 8) + 9$ is evaluated with * having precedence over +, then the value obtained is the same as the value of which of the following prefix expressions?

A ++*+234**5+6789

Correct Option

Solution :

(a)
The expression in option (a) is correct prefix expression. In prefix representation, we write operator first then operands.

B $+++234**5+6789$

C $*++234**5++6789$

D $*+++234**5+6789$

QUESTION ANALYTICS**Q. 18****FAQ** **Have any Doubt ?**

Consider the following languages:

$L_1 : \{ww \mid w \in \{a\}^*\}$

$L_2 : \{ww \mid w \in \{a\}^*\}$

Which of the above languages is non-regular but CFL?

A Only L_1

B Only L_2

C Both L_1 and L_2

D None of these

Correct Option

Solution :

(d)

L_1 is Regular and regular expression for L_1 is $(aa)^*$

L_2 is Non-CFL. ww is standard non-CFL but CSL.

So, none of these languages is non-regular but CFL.

QUESTION ANALYTICS**Q. 19****FAQ** **Solution Video** **Have any Doubt ?**

A particular parallel program computation requires 100 seconds when executed on a single processor. If 40 percent of this computation is "inherently sequential" (i.e. will not benefit from additional processors), then the theoretically best possible elapsed times for this program running with 2 and 4 processors, respectively, are

A 20 seconds and 10 seconds

B 50 seconds and 25 seconds

C 70 seconds and 55 seconds

Correct Option

Solution :

(c)

When the program is executed on a single processor i.e. All instructions are executed sequentially, then time taken is 100 units. Assume program has 100 instructions. So, each instruction takes 1 unit of time. Program running with 2 processors: 40 percent of computation is "inherently sequential" (i.e. will not benefit from additional processors), so, 40 units of time will be required for these 40 instructions. Remaining 60 instructions can be executed parallel on the two processors, so, 30 units of time more required. Hence, total 70 units of time 70 seconds. Program running with 4 processors: 40 percent of computation is "inherently sequential" (i.e. will not benefit from additional processors), so, 40 units of time will be required for these 40 instructions. Remaining 60 instructions can be executed parallel on the four processors, so, 15 units of time more required. Hence, total 55 units of time 55 seconds.

D 80 seconds and 70 seconds

QUESTION ANALYTICS**Q. 20****FAQ** **Solution Video** **Have any Doubt ?**

Consider the following two arguments:

S_1 : FCFS favours CPU bound process.

S_2 : Round robin scheduling behaves identically to FCFS if all the job lengths are longer than the length of the time slice.

Which of the above arguments is correct?

A Only S_1

Correct Option

Solution :

(a)

Round robin scheduling behaves identically to FIFO if the job lengths are no longer than the length of the time slice.

So, S_1 is true, S_2 is false.

B Only S_2

C Both S_1 and S_2

D None of these

 QUESTION ANALYTICS +

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CORRECT(0)

INCORRECT(0)

SKIPPED(65)

Q. 21

FAQ

Solution Video

Have any Doubt?



N is a three digit number that is multiple of 7, then the probability that it will be a multiple of 5 is _____.

A $\frac{13}{64}$

Correct Option

Solution :

(a)

N is a three digit multiple of 7.
 N could be 105, 112, 119, 126 994.
 Or, $15 * 7, 16 * 7, \dots, 142 * 7$.
 Or there are $142 - 14 = 128$ numbers.

Within these we need to locate the multiples of 5 or, we need to isolate multiples of 35.
 Or, we need to see how many numbers there are in the list 105, 140, 175 980.

$35 * 3, 35 * 4, \dots, 35 * 28$...
 Or, there are 26 such numbers.

Probability $\frac{26}{128} = \frac{13}{64}$

The question is "what is the probability that it will be a multiple of 5?"

Hence the answer is $\frac{13}{64}$.

Option (a) is correct.

B $\frac{25}{64}$ **C** $\frac{13}{128}$ **D** None of these

QUESTION ANALYTICS



Q. 22

FAQ

Solution Video

Have any Doubt?



Consider the following statements:

- I. Cross product and Natural Join, both are commutative and associative.
 - II. Consider the expression, a Natural Join. If a and b have disjoint headings then this expression is equivalent to a PRODUCT b. If a and b have same headings then this expression is equivalent to a INTERSECTION b.
- Which of the above statements is/are true?

A I only**B** II only**C** Both I and II

Correct Option

Solution :

(c)
 Both statements are true.

D None of these

QUESTION ANALYTICS



Q. 23

FAQ

Solution Video

Have any Doubt?



Assume that you have a page reference string for a process. Let the page reference string have length p with n distinct page numbers occurring in it. Let m be the number of page frames that are allocated to the process (all the page frames are initially empty). Let n > m. What is the lower bound on the number of page faults?
 (Your answer is independent of the page replacement scheme that you use.)

A m**B** n

Correct Option

Solution :

(b)
 n - these are compulsory misses. This could occur if page replacement is perfect, or there could be more page fault because $(m > n)$.

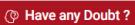
C p

D $n + p - m$

QUESTION ANALYTICS



Q. 24

? FAQ  

Consider the basic block B:

```
q = 3  
r = 10  
s = q + r  
t = 2 * r + s  
t = q  
u = q + r  
w = 3 + x
```

Now consider the following basic block B_2 :

```
q = 3  
r = 10  
s = q + r  
t1 = s  
t = 2 * r + s  
t = q  
u = t1  
w = 3 + x
```

State which optimization was performed on the basic block B to get B_2 :

A Constant propagation/folding

B Copy propagation

C Common sub-expression elimination

Correct Option

Solution :

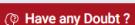
(c)
Common sub-expression elimination (CSE) is a compiler optimization that searches for instances of identical expressions (i.e., they all evaluate to the same value), and analyzes whether it is worthwhile replacing them with a single variable holding the computed value. In basic block B, the common sub-expression $q + r$ at 6 is eliminated with a single variable t_1 .

D Dead code elimination

QUESTION ANALYTICS



Q. 25

? FAQ   

Consider the following matrix:

$$\begin{bmatrix} 0 & 0 & 0 \\ 0 & 2 & 5 \\ 0 & 0 & -1 \end{bmatrix}$$

The summation of all the eigen values of this matrix is _____.

1

Correct Option

Solution :

1

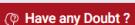
The eigenvalues of a triangular matrix are the entries on its main diagonal.

The eigenvalues of $\begin{bmatrix} 0 & 0 & 0 \\ 0 & 2 & 5 \\ 0 & 0 & -1 \end{bmatrix}$ are 0, 2 and -1, on the main diagonal.

QUESTION ANALYTICS



Q. 26

? FAQ   

Consider four CPU bound processes arriving to a Shortest Remaining Time First (SRTF) scheduler as follows:

Process	Arrival Time	Duration
P ₁	0	8
P ₂	3	3
P ₃	5	1
P ₄	9	4

Let X be the average waiting time across all four processes. And Y be the average turn around time across all four processes. Then X + Y is _____.
(Assume ties are broken by scheduling process which arrived earlier)

8

Correct Option

Solution :

8

The schedule computed by the SRTF scheduler will be P₁, P₂, P₃, P₁, P₄ and average waiting times of the processes P₁, P₂, P₃, P₄ will be 4, 0, 1, 3 respectively. And average turn around times of the processes P₁, P₂, P₃, P₄ will be 12, 3, 2, 7 respectively.
So, X = 2 and Y = 6.

Q. 27

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

Let G be a group with subgroups H and K . If $|G| = 660$; $|K| = 66$ and $K \subset H \subset G$. What is the maximum possible value of $|H|$?

330

Correct Option

Solution :

330

Order of a subgroup divides order of a group.

So, $|K|$ divides $|H|$ and $|H|$ divides $|G|$.

Here we want only proper subgroup so divisor must be more than 66 and less than 660.

So largest such number is 330.

Q. 28

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

Consider the following intermediate code segment in 3-address code form:

 $x = x * x$ $y = y * y$ $x = x * y$ $y = y * x$

The minimum number of total variables in the static single assignment form of the given code segment is _____.

6

Correct Option

Solution :

6

The SSA form of the given code segment is:

$$x_1 = x_0 * x_0$$

$$y_1 = y_0 * y_0$$

$$x_2 = x_1 * y_1$$

$$y_2 = y_1 * x_2$$

So, total 6 variables ($x_0, y_0, x_1, x_2, y_1, y_2$).

Q. 29

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

A student has three mangos, two papayas and two kiwi fruits. If the student eats one piece of fruit each day, and only the type of fruit matters, in how many different ways can these fruits be consumed?

210

Correct Option

Solution :

210

Basically question is asking the number of permutations of MMMPPKK.

$$\text{That will be } \frac{(7!)}{(3!)(2!)(2!)} = 210.$$

Q. 30

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

Consider the following program given below:

```
int demo(int n, int m) {
    if (m < 2) return m;
    if (n < 1) return n;
    else if (n < 10)
        return demo(n/m, m);
    else
        return demo(n - 1, m);
}
```

What is worst case time complexity of this code in terms of n ? (Choose the tightest upper bound)

A O(n)

Correct Option

Solution :

(a)

The recurrence relation for time complexity can be written as

$$T(n) \leq T(n-1) + O(1)$$

Which gives time O(n) in worst case.B O(log n)

C $O(n^2)$

D $O(n \log n)$

 QUESTION ANALYTICS

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[OVERALL ANALYSIS](#) [COMPARISON REPORT](#) **SOLUTION REPORT**
[ALL\(65\)](#) [CORRECT\(0\)](#) [INCORRECT\(0\)](#) [SKIPPED\(65\)](#)
Q. 31
[FAQ](#) [Have any Doubt ?](#)


If a binary search tree is not allowed to have duplicates, there is more than one way to delete a node N from the tree when that node N has two children. One way involves choosing a replacement node from the left subtree of that node N. If this is done, which node are we looking for?

A The largest node in the left subtree.

[Correct Option](#)
Solution :

(a)

- When a node has two children then we can do this:
 - First, we find the deletion node N (= the node that we want to delete).
 - Find the predecessor node of N.
 - Replace the content of node N with the content of the predecessor node.
 - Delete the predecessor node.
- Note: Predecessor node = the node in the left subtree that has the maximum value.

B The smallest node in the left subtree.

C The root of the left subtree.

D Any node in the left subtree will do.

[QUESTION ANALYTICS](#)

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


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

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

The summation of the number of prime implicants and essential prime implicants of this function is _____.

6

[Correct Option](#)
Solution :

6

Prime implicants are:

- Cells(0, 2, 8, 10) : This is an EPI because it covers minterm 2 uniquely.
- Cells(0, 1, 8, 9) : This is an EPI because it covers minterm 1 uniquely.
- Cells (10, 14) : This is an EPI because it covers minterm 14 uniquely.

So, 3 PI, 3 EPI.

$$\text{So, } \text{PI} + \text{EPI} = 3 + 3 = 6$$

[QUESTION ANALYTICS](#)

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


The 8-bit registers M, N, O and P initially have the following values.

M = 1000 1111; N = 0110 0010; O = 0100 1001; P = 0111 0010

The following assembly code is executed:

M ← M ⊕ N

M ← CSL M

N ← M + N

O ← O ∧ N

O ← CSR O

P ← P + 1

P ← P + 0

Determine the 8-bit values in each register after the execution of the above sequence of micro operations

CSL: Circular shift left; CSR: Circular shift right;

∧ : logical AND; + : Arithmetic addition ⊕ : logical Ex-or

A M = 1110 1101; N = 0011 1101; O = 1000 0100; P = 1111 0111

B M = 1101 1011; N = 0011 1101; O = 1000 0100; P = 1111 0111

[Correct Option](#)
Solution :

(b)

M = 1000 1111; N = 0110 0010; O = 0100 1001; P = 0111 0010

Now, program execution begins:

1. M ← M ⊕ N :: //M = 1110 1101

2. M ← CSL M :: //M = 1101 1011

3. N ← M + N :: //N = 0011 1101

4. $O \leftarrow O \wedge N :: // O = 0000\ 1001$
 5. $O \leftarrow \text{CSR } O :: // O = 1000\ 0100$
 6. $P \leftarrow P + 1 :: // P = 0111\ 0011$
 7. $P \leftarrow P + O :: // P = 1111\ 0111$
- Hence, answer is option (b).

C $M = 1101\ 1011; N = 1011\ 1101; O = 1000\ 0100; P = 1111\ 0111$

D $M = 1101\ 1011; N = 0011\ 1101; O = 0000\ 1001; P = 0111\ 0111$

QUESTION ANALYTICS

Q. 34

? FAQ Solution Video

Have any Doubt ?



For a given relation R , which is in 3NF but not in BCNF which of the following is true?

A It is possible that a non-prime attribute can determine a prime attribute.

Correct Option

B It is possible that a non-prime attribute can determine a non-prime attribute.

C It is possible that a combination of a non-prime attribute and a prime attribute can determine a prime attribute.

Correct Option

D It is possible that a prime attribute can determine a prime attribute.

Correct Option

YOUR ANSWER - NA

CORRECT ANSWER - a,c,d

STATUS - SKIPPED

Solution :

(a, c,d)

QUESTION ANALYTICS

Q. 35

? FAQ Have any Doubt ?



A bit stream 1101011011 is transmitted using the standard CRC method. The generator polynomial is $x^4 + x + 1$. What is the decimal value of actual bit string transmitted?

13758

Correct Option

Solution :

13758
Divisor - 10011

FCS to be added at last of message bits - 1110
Final message that is transmitted - 1101011011110.
Decimal value = 13758

QUESTION ANALYTICS

Q. 36

? FAQ Have any Doubt ?



If the TCP round-trip time, RTT is currently 30 msec and the following acknowledgements come in after 26, 32 and 24 msec, respectively, what is the new RTT estimate using the Basic algorithm? (In milliseconds) use $\alpha = 0.9$. (Upto 3 decimal places)

29.256 [29.250 - 29.260]

Correct Option

Solution :

$$\begin{aligned} \text{RTT} &= 30 \text{ msec} \\ \text{RTT}_1 &= 0.9 \times 30 + (1 - 0.9) \times 26 = 29.6 \\ \text{RTT}_2 &= 0.9 \times 29.6 + (1 - 0.9) \times 32 = 29.84 \\ \text{RTT}_3 &= 0.9 \times 29.84 + (1 - 0.9) \times 24 = 29.256 \\ \text{The new round trip time is } 29.256 \text{ msec.} \end{aligned}$$

QUESTION ANALYTICS

Q. 37

? FAQ Have any Doubt ?



Given that

$B(x)$ means " x is a bear",

$F(x)$ means " x is a fish", and

$E(x, y)$ means " x eats y ".

Which is the best English translation of the following formula?

$\forall x[F(x) \rightarrow \forall y(E(y, x) \rightarrow B(y))]$

A All fish eat bears.

B Every fish is eaten by some bear.

C Bears eat only fish.

D Only bears eat fish

Correct Option

Solution :

(d)

Given formula says that "for every fish, every animal that eats it is bear" ... so, it means that only bears eat fish.

QUESTION ANALYTICS



Q. 38

? FAQ

▶ Solution Video

⌚ Have any Doubt ?



Which of the following is true w.r.t. to producer consumer on a shared buffer?

- I. Consumer can execute when the buffer is full.
- II. Producer can execute when the buffer is full.
- III. Consumer can execute when the buffer is empty.

A I only

Correct Option

Solution :

(a)

Consumer can execute when the buffer is full.

B II only

C III only

D I and III only

QUESTION ANALYTICS



Q. 39

? FAQ

⌚ Have any Doubt ?



Consider the following code fragment:

```
int i = 0;  
while(i < 10) {  
    printf("%d", i);  
    i++; }
```

Choose the fragments which does not produce the same output?

A int i = 0;
do {
 printf("%d", i);
 i++; }
while(i < 10);

B int i = 0;
while (i < 10) {
 i++; printf("%d", i); }

Correct Option

Solution :

(b)

Given code will print 0 to 9.

Option (b) will print 1 to 10.

Option (a) and (c) will print 0 to 9.

C for (int i = 0; i <= 9; i++)
 {printf("%d", i); }

D None of the above; they all produce the same output

QUESTION ANALYTICS



Q. 40

? FAQ

⌚ Have any Doubt ?



M be a two dimensional array declared as follows:

M : array [-5 ... 15] [-10 10] of integer;

Assuming that each integer takes one memory location, the array is stored in row-major order and the first element of the array is stored at location 100, what is the address of the element A[i][j]?

A 21j + i + 315

B 21i + j + 215

Correct Option

Solution :

(b)

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

In row major order,

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

So, for the given question,

Address of element $A[i][j] = 100 + [(i + 5) \times 21 + (j + 10)] \times 1 = 21i + j + 215$

C $21j + i + 215$

D $21i + j + 315$

 QUESTION ANALYTICS

+

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



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OVERALL ANALYSIS COMPARISON REPORT **SOLUTION REPORT**

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

Q. 41

? FAQ ▶ Solution Video ⚡ Have any Doubt ?



Let a, b, c, d be four integers such that $a + b + c + d = 4m + 1$ where m is a positive integer. Given m , which one of the following is necessarily true?

A The minimum possible value of $a^2 + b^2 + c^2 + d^2$ is $4m^2 - 2m + 1$.

B The minimum possible value of $a^2 + b^2 + c^2 + d^2$ is $4m^2 + 2m + 1$.

Correct Option

Solution :

(b)

Answer must be true for all values of m which are possible integers. So take the lowest value and check.

m is a positive integer, so, lowest possible value of $m = 1$.

Hence, in order to $a + b + c + d = 4m + 1$, when $m = 1$, at least one of a, b, c, d has to be greater than 1.

Take $a = b = c = 1; d = 2$

Hence, $a^2 + b^2 + c^2 + d^2 = 7$

Which is equal to $4m^2 + 2m + 1$ with $m = 1$.

Hence, answer is (b).

C The maximum possible value of $a^2 + b^2 + c^2 + d^2$ is $4m^2 - 2m + 1$.

D The maximum possible value of $a^2 + b^2 + c^2 + d^2$ is $4m^2 + 2m + 1$.

QUESTION ANALYTICS



Q. 42

? FAQ ⚡ Have any Doubt ?



The following C function "fun" takes a singly-linked list of integers as a parameter.

The structure of a node of this linked list is as follows:

```
struct node {
    int data;
    struct node *next;
};

function fun is as following:
void fun(struct node* Head)
{
    if(Head == NULL)
        return;
    printf("%d", Head → data);
    if(Head → next != NULL)
        fun(Head → next → next);
    printf("%d", Head → data);
}
```

What is the output of the following function when called with "Head" pointing to the first node of the following singly linked list?
 $4 \rightarrow 5 \rightarrow 6 \rightarrow 7 \rightarrow 8 \rightarrow 9$

A 4 6 8 8 6 4

Correct Option

Solution :

(a)

The statement "fun(Head → next → next);" calls the function fun by jumping on alternate values. From pointing 4 to pointing 6 and then pointing 8 then pointing null. First it prints 4 then calls to fun(6) then prints 6, then calls fun(8), then prints 8, then calls fun(null), then returns, then prints 6, then returns then prints 6 then returns then prints 4.
 So, output 4, 6, 8, 8, 6, 4.

B 4 6 8

C 4 5 6 7 8 9

D 4 6 8 6 4

QUESTION ANALYTICS



Q. 43

? FAQ ⚡ Have any Doubt ?



A certain pipelined RISC machine has 8 general-purpose registers R_0, R_1, \dots, R_7 and supports the following operations.

ADD Rs1, Rs2, Rd Add Rs1 to Rs2 and put the sum in Rd

MUL Rs1, Rs2, Rd Multiply Rs1 by Rs2 and put the product in Rd

Both these operations use register addressing mode for source and destination.

An operation normally takes one cycle; however, an operation takes two cycles if it produces a result required by the immediately following operation in an operation sequence. Consider the expression $AB + ABC + BC$, where variables A, B, C are located in registers R_0, R_1, R_2 respectively. If the contents of these three registers must not be modified, what is the minimum number of clock cycles required for an operation sequence that computes the value of $AB + ABC + BC$?

A 5

B 6

Correct Option

Solution :

(b) Given: $R_0 \rightarrow A$; $R_1 \rightarrow B$; $R_2 \rightarrow C$

System has only two types of operations, Addition and Multiplication (Both these operations use register addressing mode for sources and destination)

We need to compute $AB + ABC + BC$ in minimum number of clock cycles.

NOTE that An operation normally takes one cycle; however, an operation takes two cycles if it produces a result required by the immediately following operation in an operation sequence.

So, we will try that we don't have to use result of a instruction in the immediately following instruction.

Hence, we can get this sequence:

$R_3 \leftarrow R_0 R_1$ (one cycle)

$R_4 \leftarrow R_1 R_2$ (one cycle)

$R_5 \leftarrow R_3 R_2$ (one cycle)

$R_6 \leftarrow R_5 + R_4$ (two cycle because we have to use this result in next instruction)

$R_7 \leftarrow R_6 + R_0$ (one cycle)

So, total 6 Cycles required.

We cannot do better than this.

C 7

D 8

QUESTION ANALYTICS



Q. 44

? FAQ ▶ Solution Video

Have any Doubt ?



A $(0)_{16}$

B $(A)_{16}$

C $(8)_{16}$

Correct Option

Solution :

(c) Memory = 64 KB; Address = 16 Bits

Block size = 16 Bytes

Number of lines in cache = 16

8 Bits (Tag)	4 bits (line number)	4 bits (word number)
--------------	----------------------	----------------------

$(9A81)_{16}$ maps to line number 8.

$(9A81)_{16} = 1001\ 1010\ 1000\ 0001$

So, line number to which $(9A81)_{16}$ maps to is $(1000)_2$, which is $(8)_{16}$.

D $(9)_{16}$

QUESTION ANALYTICS

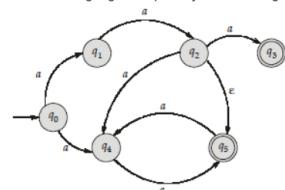


Q. 45

? FAQ ▶ Solution Video



Let L be the language accepted by the following non-deterministic finite automaton with ϵ -transitions:



The number of states in the minimal DFA that accepts the language that is recognised by the above NFA over alphabet {a}, is _____?

B 6

Correct Option

Solution :

6

First find $L(M)$ of NFA by tracing all paths going to final states.

$$\begin{aligned} L(M) &= aaa + aaa(aa)^*a + a(aa)^*a \\ &= aaa + aaaa(aa)^* + aa(aa)^* \end{aligned}$$

Now simplify the expression:

Notice that $aaaa(aa)^* \subseteq aa(aa)^*$ and so it will get absorbed.

$$\begin{aligned} \text{So, } L(M) &= aaa + aa(aa)^* \\ &= aaa + aa + aaaa(aa)^* \end{aligned}$$

Now minimal DFA can be drawn directly



So, 6 states is answer.

QUESTION ANALYTICS

Q. 46

? FAQ

Have any Doubt ?



A context-free grammar has a set of terminals {0, 1, -}, a set of non-terminals {N, P}, where N is the start symbol and productions given by the following:

$$N \rightarrow 0 \mid P \mid -P$$

$$P \rightarrow 1 \mid P_0 \mid P_1$$

What can be said about the language generated by this grammar?

A It is regular.

Correct Option

B It is non-regular but DCFL.

C It is non-DCFL but CFL.

D It is CFL.

Correct Option

YOUR ANSWER - NA

CORRECT ANSWER - a,d

STATUS - SKIPPED

Solution :

(a, d)

QUESTION ANALYTICS

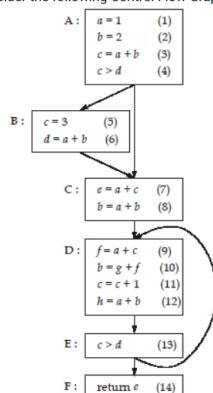
Q. 47

? FAQ

Have any Doubt ?



Consider the following Control Flow Graph G:



For the above CFG of basic blocks. Which of the following is correct?

A All possible statements have been combined to form the right number of basic blocks.

B The basic block C and D can be combined together.

C The basic block D and E can be combined together.

Correct Option

Solution :

(c)

From the given CGG, let's find the leader set.

Statement 1 is a leader. Statement 5, 7 are leader because statement 5 immediately follows a conditional goto/jump instruction ($c > d$). And statement 7 is the target of this conditional goto/ jump instruction. Similarly, statement 9, 14 are leaders. Hence, there should be only 5 basic blocks and hence, we can combine basic blocks D, E in the given CFG.

D The basic block E and F can be combined together.

QUESTION ANALYTICS

Q. 48

? FAQ

Solution Video

Have any Doubt ?



Consider the following statements about computing out-degree of every vertex in a Graph G:

I. Given an adjacency-list representation of a directed graph $G = (V, E)$, it takes $\Theta(V + E)$ time to compute the out-degree of every vertex without any additional storage.

II. Given an adjacency-list representation of a directed graph $G = (V, E)$, it takes $\Theta(V)$ time to compute the out-degree of every vertex with $\Theta(V)$ additional storage.

Which of the above is correct?

A I only

Correct Option

Solution :
(a)

- B II only
- C Both I and II
- D None of these

 QUESTION ANALYTICS



Q. 49

? FAQ  Solution Video  Have any Doubt?

Consider the following solution to a problem known as "Too much milk" problem which says that there shouldn't be more than one milk packets in the fridge. Thread A and Thread B buy the milk packet. If there is none milk packet in the fridge then either Thread A or Thread B can buy the milk and put it into the fridge. We have a milk variable which is initialized to 0 and it indicates the number of milk packets in the fridge. For synchronisation and for achieving the goal of "never making milk ≥ 2 ", we present the following solution where noteA and noteB are two shared variables for the purpose of synchronisation. Note that the buyMilk function will increment the milk variable.

Thread A

```
1. noteA = 1;
2. if (noteB == 0) {
3.     if (milk == 0) {
4.         buyMilk();
5.     }
6. }
7. noteA = 0;
```

Thread B

```
1. noteB = 1;
2. if (noteA == 0) {
3.     if (milk == 0) {
4.         buyMilk();
5.     }
6. }
7. noteB = 0;
```

Which of the following is true for the above attempt/solution to solve the Too much milk problem?

- A This approach suffers from starvation.

Correct Option

- B This approach suffers from deadlock.

- C The goal is Not achieved by this approach i.e. milk variable can have value more than 1.

- D The progress is Not satisfied.

Correct Option

YOUR ANSWER - NA

CORRECT ANSWER - a,d

STATUS - SKIPPED

Solution :

(a, d)

The goal is achieved because the function buyMilk is executed in mutual exclusion fashion. So, milk can never be more than 1. Deadlock is not possible But starvation is possible. If both Threads execute their first instruction simultaneously then starvation is possible. So, progress is not guaranteed.

 QUESTION ANALYTICS



Q. 50

? FAQ  Solution Video  Have any Doubt?

The lost update anomaly is said to occur if a transaction T_j reads a data item X, then another transaction T_k writes that data item X (possibly based on a previous read), after which T_j writes the data item X. The update performed by T_k has been lost, since the update done by T_j ignored the value written by T_k .

Now, consider the following statements:

- 1. Lost update problem may exist in strict recoverable schedules.
- 2. Lost update problem may exist in conflict serializable schedules.
- 3. Lost update problem may exist in view serializable schedules.

Which of the above statements is/are true?

- A 1 and 3 only

Correct Option

- B 2 and 3 only

Solution :
(b)

- C 1 and 2 only

- D All of these

 QUESTION ANALYTICS





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OVERALL ANALYSIS COMPARISON REPORT **SOLUTION REPORT**

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

Q. 51

? FAQ ▶ Solution Video ⚡ Have any Doubt ?



Consider a database COMPANY. The following two tables in this database store the data of employees and their dependents.

Employee(Fname, Lname, Ssn, Sex, Dno)

Dependent(Essn, Dependent_name, Sex, Relationship)

Now consider the following two SQL queries.

Q1 :

```
SELECT E.Fname, E.Lname
FROM EMPLOYEE AS E
WHERE E.Ssn IN ( SELECT Essn
                  FROM DEPENDENT AS D
                  WHERE E.Fname=D.Dependent_name AND E.Sex=D.Sex );
```

Q2 :

```
SELECT E.Fname, E.Lname
FROM EMPLOYEE AS E, DEPENDENT AS D
WHERE E.Ssn=D.Essn AND E.Sex=D.Sex AND E.Fname=D.Dependent_name;
```

We want to Retrieve the name of each employee who has a dependent with the same first name and is the same sex as the employee.

Which of the following is true?

A Q1 produces the desired result, Q2 does not.

B Q2 produces the desired result, Q1 does not.

C Both Q1,Q2 produces the desired result.

Correct Option

Solution :

(c)
 Both queries retrieve the name of each employee who has a dependent with the same first name and is the same sex as the employee. In the nested query of Q1, we must qualify E.Sex because it refers to the Sex attribute of EMPLOYEE from the outer query and DEPENDENT also has an attribute called Sex. If there were any unqualified references to Sex in the nested query, they would refer to the Sex attribute of DEPENDENT. However, we would not have to qualify the attributes Fname and Ssn of EMPLOYEE if they appeared in the nested query because the DEPENDENT relation does not have attributes called Fname and Ssn, so there is no ambiguity.

D Neither Q1 nor Q2 produces the desired result.

QUESTION ANALYTICS



Q. 52

▶ Solution Video ⚡ Have any Doubt ?



Consider a relation R(A, B, C, D, E). For which of the following sets of FD's of R in Boyce-Codd Normal Form (BCNF)?

A BCE → E, BDE → C, BE → D, BE → A

Correct Option

Solution :

(a)
 Option (a) : For each given FD, the closure of the left-side attributes is ABCDE. Thus, the left-side attributes of each FD contain a key, and the relation is in BCNF.
 Option (b) : B* = AB, so B → A is a BCNF violation.
 Option (c) : B* = BC, so B → C is a BCNF violation.
 Option (d) : BC* = BCE, so BC → E is a BCNF violation.
 Hence option (a) is answer.

B AD → B, ABC → E, BD → A, B → A

C BDE → A, AC → E, B → C, DE → A

D ABD → C, ACD → E, ACE → B, BC → E

QUESTION ANALYTICS



Q. 53

? FAQ ⚡ Have any Doubt ?



G(V, E) is a simple graph with 8 vertices. The edges of G are decided by tossing a fair coin for each two vertex combination. Edge is added between any 2 vertices iff head is turned up. Expected number of edges in the graph G(V, E)?

14

Correct Option

Solution :

Since there are 8C_2 vertices combinations.
 So there are maximum ${}^8C_2 = 28$ total edges possible.

Binomial distribution is applicable here with $n = {}^8C_2$ and $p = \frac{1}{2}$

and Expected value = $\frac{28 \times 1}{2(P \text{ of getting head in a fair coin toss})} = 14$

QUESTION ANALYTICS

Q. 54

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

Suppose a program references pages in the following sequence:

A, C, B, D, B, A, E, F, B, F, A, G, E, F, A

Suppose the computer on which this program is running has 4 pages of physical memory.

How many page faults will occur when we use LRU-based demand paging?

8

Correct Option

Solution :

8

	A	C	B	D	B	A	E	F	B	F	A	G	E	F	A
1	A					+					+				+
2		C					E					G			
3			B		+				+				E		
4				D				F		+					+

Total page faults = 8

QUESTION ANALYTICS

Q. 55

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

Consider the following function:

```
int F(int n) {
    if(n > 100)
        return(n - 10);
    else
        return F(F(n + 11));
}
```

What would be returned for the call F(99)?

91

Correct Option

Solution :

91

F(99) will return F(F(99 + 11)), which means final output will be F(F(110)).

F(110) will return 110 - 10 = 100

F(100) will return F(F(111))

F(111) will return 101.

F(101) will return 91.

So, F(99) will return F(F(110)) which is F(100) which is 91.

QUESTION ANALYTICS

Q. 56

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

We insert the following keys into an empty AVL tree in the following order:

5, 9, 3, 8, 6, 7, 11, 2, 10, 4

Which key will be the right child of the root after inserting all keys?

A 7

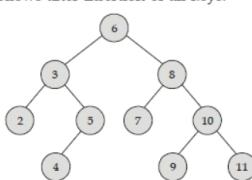
B 8

Correct Option

Solution :

(b)

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



C 9

D 10

QUESTION ANALYTICS

Q. 57

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

Dimensions p_0, p_1, \dots, p_n corresponding to matrix sequence, A_1, A_2, \dots, A_n where A_i has dimension $p_{i-1} \times p_i$. Given a chain of four matrices A_1, A_2, A_3 and A_4 , with $p_0 = 5, p_1 = 4, p_2 = 6, p_3 = 2$ and $p_4 = 7$. The minimum number of scalar multiplications required to find $A_1 \times A_2 \times A_3 \times A_4$ using the basic matrix multiplication method is _____.

158

Correct Option

Solution :

158
 $[A_1(A_2A_3)]A_4$ will give minimum answer.

QUESTION ANALYTICS



Q. 58

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

A digital circuit has three inputs: a, b , and c . It has to recognize three different conditions:

- Condition X is true if c is true and either a is true or b is false
- Condition Y is true if a is true and either b or c is false
- Condition Z is true if b is true and either a is true or c is false

The control circuit realises function F such that it must produce an output of 1 if at least two of the conditions X, Y and Z are true. Then summation of the number of prime implicants and essential prime implicants of function F is _____?

4

Correct Option

Solution :

4
 function F such that it must produce an output of 1 if at least two of the conditions X, Y and Z are true.

So output F can be written as:

$$F = XY + YZ + XZ$$

Where $X = (c)(a + b')$; $Y = (a)(b' + c')$; $Z = (b)(a + c')$

NOTE that F is a function of a, b, c because a, b, c are the inputs to the circuit. F is Not a function of the inputs X, Y, Z.

So, $F = abc + abc' + acb'$

K-map will have two prime implicants and both these PI are also Essential.

So, answer is 4.

QUESTION ANALYTICS



Q. 59

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

Mergesort works by splitting a list of n numbers in half, sorting each half recursively, and merging the two halves. Which of the following data structures will allow mergesort to work in $O(n\log n)$ time?

A singly linked list

Correct Option

B doubly linked list

Correct Option

C An unsorted array

Correct Option

D A sorted array

Correct Option

YOUR ANSWER - NA

CORRECT ANSWER - a,b,c,d

STATUS - SKIPPED

Solution :

(a, b, c, d)

Using array, sorted or unsorted, we already know that merge sort works in $n\log n$ time. Using linked list also it will work in $n\log n$ time. In linked list we will do these things in merge sort:

1. Finding middle of the list ($O(n)$ time)

2. Sorting both halves $\left(2T\left(\frac{n}{2}\right)\text{ times}\right)$

3. Merging the two sorted halves ($O(n)$ time)

So, we have $T(n) = 2T\left(\frac{n}{2}\right) + O(n) + O(n)$

$$T(n) = 2T\left(\frac{n}{2}\right) + O(n)$$

So, $n\log n$.

QUESTION ANALYTICS



Q. 60

[FAQ](#)
[Solution Video](#)
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Two processors, M-5 and M-7, implement the same instruction set. Processor M-5 uses a 5-stage pipeline and a clock cycle of 10 nanoseconds. Processor M-7 uses a 7-stage pipeline and a clock cycle of 7.5 nanoseconds. Which of the following is (are) true?

- I. M-7's pipeline has better maximum throughput than M-5's pipeline.
- II. The latency of a single instruction is shorter on M-7's pipeline than on M-5's pipeline.
- III. Programs executing on M-7 will always run faster than programs executing on M-5.

I only

Correct Option

Solution :

(a)

If program has m instructions then time taken by:M-5 pipeline: $[5 + (m - 1)] \times 10 \text{ ns}$ M-7 pipeline: $[7 + (m - 1)] \times 7.5 \text{ ns}$

Throughput: Number of instructions executed per unit of time.

Throughput of:

$$\text{M-5 pipeline: } \frac{m \times 10^9}{(m+4)10} \text{ instructions per second}$$

$$\text{M-7 pipeline: } \frac{m \times 10^9}{(m+4)7.5} \text{ instructions per second}$$

- (i) Maximum throughput is being compared between both pipelines. Maximum throughput comes when number of instructions is very large i.e. m is very large. So, if m is very large, then

$$\text{M-5 pipeline throughput: } \frac{10^9}{10} \text{ instructions per second}$$

$$\text{M-7 pipeline throughput: } \frac{10^9}{7.5} \text{ instructions per second}$$

So this statement is true.

(ii) For 1 instruction, M-5 takes 50 ns while M-7 takes 52.5 ns so this statement is false.

(iii) If the program has only one instruction, then it is false.

When there is only one instruction or two instructions in the program then time taken by M-7 pipeline will be more than or equal to time taken by M-5 pipeline.

B II only**C** I and III only**D** II and III only QUESTION ANALYTICS

+



Kunal Jha

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INCORRECT(0)

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Q. 61

FAQ

Have any Doubt?



If L is a regular language over alphabet $\{a, b\}$, let L' be the set of strings in L that are palindromes. Which of the following statement is false?

 A L' can never be regular.

Correct Option

 B L' is always regular.

Correct Option

 C If L is infinite regular language then L' is Never regular.

Correct Option

 D If L is set of all strings over the given alphabet then L' is non-regular.

YOUR ANSWER - NA

CORRECT ANSWER - a,b,c

STATUS - SKIPPED

Solution :

(a, b, c)

If L is finite then L' is also finite so L' can be regular. So, option (a) is false. If L is set of all strings over the given alphabet then L' is non-regular. So option (b) is false. Option (d) is true. Option (c) is false for the language a^* .

QUESTION ANALYTICS



Q. 62

FAQ

Solution Video

Have any Doubt?



Which of the following statements about caches is (are) true?

 A A direct-mapped cache can have a lower miss rate than an associative cache of the same size (number of blocks).

Correct Option

 B Programs with high spatial locality have a low cache miss rate primarily because the exact same addresses are re-referenced. C Programs with high temporal locality have a low cache miss rate primarily because the exact same addresses are re-referenced.

Correct Option

 D None of these

YOUR ANSWER - NA

CORRECT ANSWER - a,c

STATUS - SKIPPED

Solution :

(a, c)

Direct-mapped cache may have lower miss rate than an associative cache of the same size (number of blocks) because in case of associative cache, page replacement depends on the page replacement algorithm. But in case of direct mapped cache, page replacement algorithms are not used. So, consider there are four cache lines, and the following reference string (requested block numbers of main memory): 0, 1, 2, 3, 4, 3, 4, 3, ... Assume associative cache uses "Most-recently used" page replacement policy. Then direct mapped cache will have lower miss rate than associative cache. There are two basic types of reference locality - temporal and spatial locality. Temporal locality refers to the reuse of specific data and/or resources, within a relatively small time duration. Spatial locality (also termed data locality) refers to the use of data elements within relatively close storage locations. Temporal locality: Recently referenced items are likely to be referenced in the near future. Spatial locality: Items with nearby addresses tend to be referenced close together in time.
So, (a) and (c) are true.

QUESTION ANALYTICS



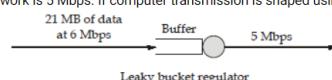
Q. 63

FAQ

Have any Doubt?



A Computer has to 'inject' data into the network. The data is generated and transmitted in bursts of 6 Mbps. The minimum sustainable transmission rate across routers in the network is 5 Mbps. If computer transmission is shaped using a leaky bucket, what is the minimum size of the buffer to prevent any data loss? (in Mbits) [Upto 1 decimal place]

 21.2 [21.2 - 21.3]

Correct Option

Solution :

21.2 [21.2 - 21.3]

Data generation rate = 6 Mbps and sender want to send 21 MB data therefore time required to

$$\text{send 21 MB data} = \frac{21 \times 2^{20} \times 8}{6 \times 10^6} = 29.36 \text{ sec.}$$

Now transmission rate into network = 5 Mbps.

Therefore in 29 sec it will transmit = $29.36 \times 5 \text{ Mbits} = 146.8 \text{ Mbits}$

Injected data = 21 MB = 168 Mbits

Therefore bucket must hold = $168 - 146.8 = 21.2 \text{ Mbits}$ data to prevent data loss.

The lookup page table shown above is for a job in a paged virtual storage system with a page size of 1024 locations. Each virtual address is in the form [p, d] where p and d are the page number and the displacement in that page, respectively.

Virtual page	Actual page
0	3
1	-
2	4
3	0

A virtual address of [0, 514] maps to an actual address of

A 514

B 1024

C 3586

Correct Option

Solution :

(c)
Virtual address has page number 0 and page number 0 is in frame 3.
So, starting address of frame 3 is 3×1024 .
We have page offset 514, so, final word address is $3 \times 1024 + 514 = 3586$.

D 4514

Q. 65

Suppose a client C repeatedly connects via TCP to a given port on a server S and that each time it is C that initiates the close. How many TCP connections a second can C make here before it ties up all its available ports in TIME_WAIT state? Assume client ports are in the range of 1024 to 5223 and TIME_WAIT lasts 60 seconds

C 70

Correct Option

Solution :

70
No of available ports = $5223 - 1024 + 1 = 4200$
Due to time wait of 60 seconds, any repeated connection to same port requires an interval of atleast 60 sec
So average connection that can be opened per second is $= \frac{4200}{60} = 70$.