



Kunal Jha
 Course: GATE
 Computer Science Engineering(CS)

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FULL SYLLABUS TEST-4 (BASIC LEVEL) GATE 2020 - REPORTS

[OVERALL ANALYSIS](#) [COMPARISON REPORT](#) **SOLUTION REPORT**

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

Q. 1

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[Have any Doubt ?](#)


Some members of the basketball team are members of the chess club, but no members of the basketball team are members of the debate society. If the statements above are true, which of the following may be drawn from them?

- (A) No members of the chess club are members of the debate society.
- (B) Some members of the chess club are members of the debate society.
- (C) No members of the debate society are members of the chess club.
- (D) Some members of the chess club are not members of the debate society.

Correct Option

Solution :

(d)

Option (a) : No members of the chess club are members of the debate society. Wrong. Maybe some chess members are member of debate society.

Option (b) : Some members of the chess club are members of the debate society. Wrong. Maybe No members of chess club are members of debate society.

Option (c) : No members of the debate society are members of the chess club .Wrong. Maybe some debate society are members of chess club.

Option (d) : Some members of the chess club are not members of the debate society. Correct. They are the people who are members of both chess and basketball team. Because

All basketball = No debate society

Some chess = some basketball

⇒ Some chess = No debate society

QUESTION ANALYTICS



Q. 2

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


A lift has the capacity of 18 men or 24 women or 32 children. What will be the maximum number of children that can board the lift if there are already 6 men and 10 women in the lift?

(A) 4

(B) 6

(C) 8

Correct Option

Solution :

(c)

Let the number of children in the lift is x

$$\text{Now, } \frac{6}{18} + \frac{10}{24} + \frac{x}{32} = 1$$

$$\frac{x}{32} = 1 - \frac{1}{3} - \frac{5}{12}$$

Maximum number of children that can board the lift $x = \frac{32}{4} = 8$ children

(D) 10

QUESTION ANALYTICS



Q. 3

[▶ Solution Video](#)
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Pick out the most effective word from the given words to fill in the blank to make the sentence meaningfully complete.
 He is so _____ to light that he never leaves the house without sunglasses.

(A) insensitive

(B) sensitive

Correct Option

Solution :

(b)

(C) afraid

(D) immune

Q. 4

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

If three sides of a rectangular solid have areas of 12, 18, and 24 unit² respectively, what is the volume of the solid in unit³?

A 72

Correct Option

Solution :

(a)

$$lb = 12$$

$$bh = 18$$

$$lh = 24$$

Multiplying the three equations,

$$\begin{aligned} (lwh)^2 &= 12 \times 18 \times 24 = 2 \times 2 \times 3 \times 2 \times 3 \times 2 \times 2 \times 2 \times 3 \\ &= (2)^3 \times (3)^4 \\ lwh &= (2)^3 \times (3)^2 = 8 \times 9 = 72 \end{aligned}$$

B 144**C** 576**D** 2,592

Q. 5

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

For passing an exam every student needs to score at least 40% marks. Suppose Ram gets 35 marks in exam and failed by 25 marks, then the maximum marks in the exam will be _____.

A 150

Correct Option

Solution :

150

Let maximum marks in the exam is 'x'.

Total marks required for passing the exam = 35 + 25 = 60

Given, marks required for passing the exam = 40% of x

$$60 = \left(\frac{40}{100}\right) \times x$$

Maximum marks in exam, x = 150

Q. 6

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

Stress is a common cause of high blood pressure. By calming their minds and thereby reducing stress, some people can lower their blood pressure. And most people can calm their minds, in turn, by engaging in exercise. Which one of the following is most strongly supported by the information above?

A For at least some people, having lower blood pressure has at least some tendency to cause their stress levels to be reduced.**B** Most people with high blood pressure can lower their blood pressure by reducing their stress levels.**C** Most people who do not exercise regularly have higher stress levels as a result.**D** For at least some people, engaging in exercise can cause their stress levels to be reduced.

Correct Option

Solution :

(d)

Premises:

Engaging in exercise leads to calm minds in most people.

Calm mind reduces stress (presumably in most/all people).

Lower stress can lower BP in some people because stress is a common cause of high BP.

Exercise → Calm Mind → Reduction in stress → Lower BP

Option (a) : For at least some people, having lower blood pressure has at least some tendency to cause their stress levels to be reduced.

This is suggesting

Lower BP → Reduction in stress

The argument does not give this relation at all. The argument says reduction in stress could lead to lower BP, not the other way around.

Option (b) : Most people with high blood pressure can lower their blood pressure by reducing their stress levels.

The argument says "some people can lower their BP by lowering their stress". Use of "most" is definitely wrong.

Option (c) : Most people who do not exercise regularly have higher stress levels as a result. Irrelevant. We don't know what is up with people who do not exercise.

Option (d) : For at least some people, engaging in exercise can cause their stress levels to be reduced.
The argument gives: Engaging in exercise leads to calm minds in most people. Calm mind reduces stress (presumably in most/all people).
Hence, you can certainly conclude that for some people, exercise can reduce stress.

QUESTION ANALYTICS

Q. 7

Solution Video

Have any Doubt?



A book seller sold 240 books on any particular day. He sells one third of the books at the rate of ₹ x per book, 78 books at the rate of ₹($x + a$) per book and rest of the books at the rate of ₹($x - a$) per book. If the total sale on that day is ₹14384 then what will be the minimum and maximum price of the book ? (If x and a both are positive integers)

A ₹66 and ₹74

B ₹47 and ₹53

C ₹54 and ₹58

D ₹56 and ₹64

Correct Option

Solution :

(d)

Total books = 240

I. 80 books at the rate of ₹ x per book

II. 78 books at the rate of ₹($x + a$) per book

III. [240 - (78 + 80)] = 82 books at the rate of ₹($x - a$) per book.

Total sale = ₹14384

Now, $80x + 78(x + a) + 82(x - a) = 14384$

$240x - 4a = 14384$

$60x - a = 3596$

....(1)

This equation has two variables and only one equation. So it can be solved by putting option value.

Putting,

$x = 60$

$60 \times 60 - a = 3596$

$a = 4$

Hence,

Maximum price of book = $60 + 4 = ₹64$ /book

Minimum price of book = $60 - 4 = ₹56$ /book

Note : Reason behind putting $x = 60$ is that in any option a value is not more than 4. According to that nearest integer value of x should be 60.

QUESTION ANALYTICS

Q. 8

Solution Video

Have any Doubt?



Seven digits from the numbers 1, 2, 3, 4, 5, 6, 7, 8, 9 are written in a random order. The probability that this seven digit number will be divisible by 9 is:

A $\frac{1}{45}$

B $\frac{5}{63}$

C $\frac{1}{9}$

Correct Option

Solution :

(c)

An integer is divisible by 9 if the sum of its digits is divisible by 9.

Since the sum of first 9 natural numbers is $\frac{9(9+1)}{2} = 45$, which is divisible by 9, it must be the case

that the sum of the two integers that we don't pick to form the seven digit number is divisible by 9.

Number of ways of choosing two integers from 9 integers : ${}^9C_2 = 36$

Number of two digit pairs whose sum is divisible by 9 : {(1, 8), (2, 7), (3, 6), (4, 5)} = 4

Simply take the ratio to get the probability that the seven digit number so formed is

divisible by 9 : $\frac{4}{36} = \frac{1}{9}$

D $\frac{1}{4}$

QUESTION ANALYTICS

Q. 9

Solution Video

Have any Doubt?



A person bought a car worth ₹2,80,000 with 12.5% interest compounded yearly. At the end of first year he paid ₹65,000; at the end of second year he paid ₹81,250 and at

the end of third year he paid ₹95,000. How much money he paid at the end of fourth year to clear his debt?

A ₹162450

B ₹142605

C ₹182460

D ₹146250

Correct Option

Solution :

(d)

$$P = ₹280000, R = 12.5\%$$

$$\text{At the end of first year total amount} = P \left[1 + \frac{R}{100} \right]$$

$$= 280000 \times \left[1 + \frac{12.5}{100} \right]$$

$$= ₹315000$$

$$\text{After paying ₹65000 amount left} = 315000 - 65000$$

$$= ₹250000$$

$$\text{Amount to be paid at the end of second year} = 250000 \left[1 + \frac{12.5}{100} \right] = ₹281250$$

$$\text{After paying ₹81250, amount left} = ₹200000$$

$$\text{Amount to be paid at the end of the third year} = 200000 \left[1 + \frac{12.5}{100} \right] = ₹225000$$

$$\text{After paying ₹95000 amount left} = 225000 - 95000 = ₹130000$$

$$\text{Amount to be paid at the end of fourth year} = 130000 \left[1 + \frac{12.5}{100} \right] = ₹146250$$

Hence ₹146250 to be paid at the end of fourth year to clear the debt.

QUESTION ANALYTICS



Q. 10

Solution Video

Have any Doubt ?



A number consists of three digits of which the middle one is 1 and their sum is 7. If the difference between the number formed by reversing the digits and original number is 396, then the original number is_____.

115

Correct Option

Solution :

115

Let unit digit be x and hundred's digit be y .

$$\begin{aligned} \text{Number} &= x \times 1 + 1 \times 10 + y \times 100 \\ &= (x + 10 + 100y) \end{aligned}$$

$$\text{After interchanging digits of number} = x \times 100 + 1 \times 10 + y = (100x + 10 + y)$$

$$\text{Given : } (100x + 10 + y) - (x + 10 + 100y) = 396$$

$$99(x - y) = 396$$

$$x - y = 4$$

....(1)

$$\text{II}^{\text{nd}} \text{ Condition } x + y + 1 = 7$$

$$x + y = 6$$

....(2)

Adding eqⁿ (1) and (2)

$$2x = 10$$

$$x = 5$$

$$y = x - 4 = 5 - 4 = 1$$

Hence the number is $= x + 10 + 100y$

$$= 5 + 10 + 100 \times 1$$

$$\text{Number} = 115$$

QUESTION ANALYTICS



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

Q. 11

Have any Doubt?



Consider the following languages L_1 and L_2 :

$$L_1 = \{a^m b^n \mid m, n \geq 0\}$$

$$L_2 = \{a^m b^n \mid m = n\}$$

If $(L_1 \cup \bar{L}_2) = L$ then what is the language L ?

A $L = (a + b)^*$

Correct Option

Solution :

(a)

$$L_2 = \{a^n b^n\}, L_1 = \{a^* b^*\}$$

$$L = (a^* b^*) \cup ((a + b)^* - \{a^n b^n\})$$

$$= (a + b)^*$$

B $L = \{a^m b^n \mid m \neq n\}$

C $L = (a + b)^* - \{a^n b^n\}$

D $L = (a + b)^* - \{a^m b^n \mid m \neq n\}$

QUESTION ANALYTICS



Q. 12

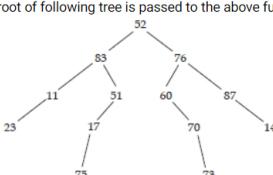
Have any Doubt?



Assume type intBTnode is a structure with three members: integer data, and both right and left member of type intBTnode. Consider the following code.

```
int f(intBTnode *P)
{
    int val;
    if (P == null) return 0;
    val = P->data;
    if (val % 2 == 0)
        return val + f(P->left) + f(P->right);
    else
        return f(P->left) + f(P->right);
}
```

If the root of following tree is passed to the above function f , then what is the return value of f ?



A 360

Correct Option

B 272

Solution :

(b)

The above code returns the sum of the nodes storing even values in the tree. It traverses the tree recursively, and add even values while returning.
 $52 + 76 + 60 + 70 + 14 = 272$

C 340

D 320

QUESTION ANALYTICS



Q. 13

Solution Video

Have any Doubt?



Which of the following language is CFL?

A $\{a^m b^n c^n \mid m \neq n\}$

B $\{a^m b^n c^k \mid \text{if } (m = n) \text{ then } (n! = k)\}$

Correct Option

Solution :

- (c)
 $a^m b^n c^n \mid m! = n$ is CSL because it can not be done by using one stack.
 $a^m b^n c^n \mid \text{if } (m = n) \text{ then } (n! = k)$ is CSL can not be done by using one stack.
 $a^m b^n c^n \mid m > n \text{ or } n < k$ is not DCFL, but CFL.
- ↓ ↓
Push Push
a's a's / b's

- D. None of these

QUESTION ANALYTICS



Q. 14

▶ Solution Video

Have any Doubt ?



Which of the following is/are NOT true?

- S_1 : In the DMA operation the DMA controller hand over the system bus to CPU when the count register becomes 0.
 S_2 : During DMA transfer both the "CPU" and "the program that requested DMA", can continue their execution.

- A. Only S_1

- B. Only S_2

Correct Option

Solution :

- (b)
• While a DMA transfer is taking place, program that requested the transfer cannot continue, but processor can be used to execute other programs.

- C. Both of them

- D. Neither of them

QUESTION ANALYTICS



Q. 15

▶ Solution Video

Have any Doubt ?



Consider two arrays A[] and B[], if A[1 ... n] is in increasing order, and B[1 ... n] is in decreasing order is input to a join algorithm. The output is an array C[1 ... 2n] which has all the value of the arrays A[] and B[] and is in increasing order. What is the worst case time complexity for join algorithm to join the two array?

- A. $O(n^2)$

- B. $O(n)$

Correct Option

Solution :

- (b)
This Join algorithm is similar to merge algorithm in merge sort
It takes $O(n+n) = O(2n) = O(n)$.

- C. $O(n \log n)$

- D. $O(1)$

QUESTION ANALYTICS



Q. 16

▶ Solution Video

Have any Doubt ?



The set $(A \cup B \cup C) \cap (A \cap B' \cap C') \cap C'$ is equal to

- A. $B \cap C'$

Correct Option

Solution :

- (a)
Since set theory is equivalent to Boolean algebra, we can write the given expression as,
 $(a + b + c) \cdot (ab'c')' \cdot c'$
where '+' stands for ' \vee ' and ' $'$ ' stands for ' \wedge '.
or $(a + b + c) (a' + b + c) \cdot c'$
or $(a \cdot a' + b + c)c'$ [using $(a + x)(a + y) = a + xy$]
or $(0 + b + c)c'$
 $= bc' \equiv B \cap C'$

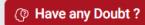
Hence option (a) is the answer.

- B. $A \cap C$

- C. $B' \cap C'$

- D. None of these

Q. 17



Consider the following code:
 Void main () {
 ...
 for (int k = 1; k < 5; k ++)
 pid [k] = fork();
 }

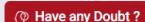
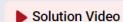
In the given code all fork() statements executed successfully and all pid variables initialized to 0.
 How many child processes created by the above code?

A 4**B** 15

Correct Option

C 16**D** 32

Q. 18



Identify the minimal product of sum function described by the K-map given in figure.

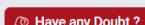
	AB	00	01	11	10
C\B	0	1	0	0	1
1	0	x	x	0	

A CB**B** CB

Correct Option

C C + B**D** C + B

Q. 19



Consider the following statements:

S₁: In IPv6, provider based unicast address is identified by prefix bits of address as 001.

S₂: In IPv6, geographic based unicast address is identified by prefix bits of address as 010.

Which of the following is true?

A Only S₁**B** Only S₂**C** Both S₁ and S₂**D** Neither S₁ nor S₂

Correct Option

Solution :

(d)

In IPv6 address:

Prefix bits : 001 indicate geographic unicast address.

Prefix bits : 010 indicate provider unicast address.

So, both statements are false.

Consider the linked list of integers represented by the following diagram.



Run the following code with the above list of integers.

```

Node * Prev, * nodeToDelete;
Prev = Head -> next;
nodeToDelete = (structnode *) malloc (size of (node));
nodeToDelete -> item = 28
nodeToDelete -> next = Prev -> next;
Prev -> next = nodeToDelete;
Assume that the following structure is used to create a node in the list.
struct Node
{
    int item;
    Node * next;
};
  
```

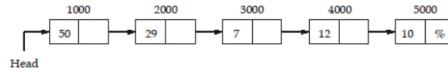
Which of the following is the effect of code?

A Element 28 becomes the first element of the list.

B Element 28 becomes the second element of the list. Correct Option

Solution :

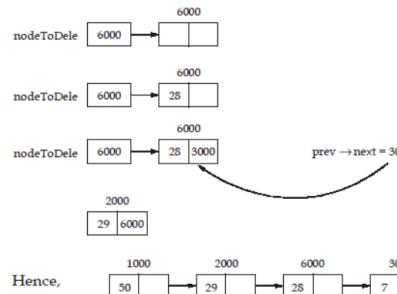
(b)



Defined variables prev, nodeToDelete of typeNode *.

prev = 2000

Allocate new node and keep its address into nodeToDelete.



Hence,

C No element is inserted into the list.

D Element 28 becomes the 3rd element of the list.

QUESTION ANALYTICS

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OVERALL ANALYSIS COMPARISON REPORT **SOLUTION REPORT**

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

Q. 21

Solution Video

Have any Doubt ?



Consider X and Y are two random independent events. It is known that $P(Y) = 0.60$ and $P(X^C \cup Y) = 0.80$. Which one of the following is the value of $P(X \cup Y)$?

A 0.5

B 0.6

C 0.7

D 0.8

Correct Option

Solution:

(d)

$$\begin{aligned} P(X^C \cup Y) &= 0.8 \\ \Rightarrow P(X^C) + P(Y) - P(X^C) \times P(Y) &= 0.8 \\ (\text{Since } X, Y \text{ are independent events}) \\ \Rightarrow P(Y) + 1 - P(X) - [P(Y) \times (1 - P(X))] &= 0.8 \\ \Rightarrow P(X) - P(X) \times P(Y) &= 0.2 \\ P(X) &= \frac{0.2}{1 - P(Y)} = \frac{0.2}{1 - 0.6} = 0.5 \\ \Rightarrow P(X \cup Y) &= P(X) + P(Y) - P(X \cap Y) \\ &= P(X) + P(Y) - P(X) \times P(Y) \\ &= 0.5 + 0.6 - 0.3 = 0.8 \end{aligned}$$

QUESTION ANALYTICS



Q. 22

Have any Doubt ?



Consider the following statements:

- I. Hamiltonian graphs have no cut edges.
 - II. If a bipartite graph is Hamiltonian, then it has an equal number of vertices in the two parts of the bipartition.
- Which of the above statements are true?

A Both I and II

Correct Option

Solution:

(a)

Both statements are true.

I is true as it is a consequence of the theorem which states that, a graph G which has a cut edge cannot be Hamiltonian. II is also true, as any cycle in bipartite graph will be of even length, and will alternate between the vertices of partite-sets. That means any Hamiltonian cycle in $K_{n,n}$ will have equal number of elements from both the partite-sets and as it covers entire vertex set, together we get $m = n$.

B I only

C II only

D None of these

QUESTION ANALYTICS



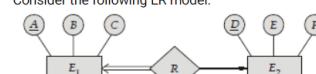
Q. 23

Solution Video

Have any Doubt ?



Consider the following ER model:



If 'n' entries in E_1 and 'm' entries in E_2 . How many entries in relationship set (R)?

A At least n

B At most n

C Exactly n

Correct Option

Solution:

(c)

Every object of E_1 must relate with at least one entry of E_2 .

- D At least n and atmost m

QUESTION ANALYTICS

Q. 24

Solution Video

Have any Doubt?



Let D_n represents the set of all positive divisors of n. Also ' $/$ ' stands for the usual divides relation. It is known that $(D_{330}, /)$ is a Boolean Algebra where k is an integer. Which of the following cannot be a possible value of k?

- A 11

Correct Option

Solution:

(a)

We know that $(D_n, /)$ is a boolean algebra if and only if in the prime factorization of n, each prime occurs exactly once (n is a square free number).

Here

$$n = 330 \quad k = 2, 3, 5, 11, k$$

Now if k equals 11, n will no longer remain a square free number, as 11 now occurs twice. Hence

(a) is the answer.

- B 13

- C 29

- D 97

QUESTION ANALYTICS

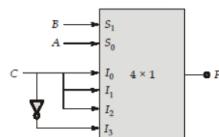
Q. 25

Solution Video

Have any Doubt?



For the 4×1 MUX shown below:



The function F will be

- A $F(A, B, C) = \Sigma_m(0, 1, 3, 6)$

- B $F(A, B, C) = \Sigma_m(1, 2, 5, 6)$

- C $F(A, B, C) = \pi_M(0, 2, 3, 6)$

- D $F(A, B, C) = \pi_M(0, 2, 4, 7)$

Correct Option

Solution:

(d)

For 4×1 MUX

$$F = \bar{B}\bar{A}I_0 + \bar{B}AI_1 + B\bar{A}I_2 + BA I_3$$

$$S_1 = B, \quad I_0 = C, \quad I_2 = \bar{C}$$

$$S_0 = A, \quad I_1 = C, \quad I_3 = \bar{C}$$

$$F(A, B, C) = \bar{B}\bar{A}C + \bar{B}AC + B\bar{A}C + BA\bar{C}$$

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

$$= \Sigma_m(1, 3, 5, 6)$$

$$= \pi_M(0, 2, 4, 7)$$

Using Truth Table:

A	B	C	F
0	0	0	0
0	0	1	1
0	1	0	0
0	1	1	1
1	0	0	0
1	0	1	1
1	1	0	1
1	1	1	0

$$\therefore F = \Sigma_m(1, 3, 5, 6) = \pi_M(0, 2, 4, 7)$$

QUESTION ANALYTICS

Q. 26

Solution Video

Have any Doubt?



A computer system contains a main memory of 32 K size with 16 bit words. It also has a 4 K word cache divided into 4 slot sets with 64 words per slot. Assume that the cache is initially empty. The processor fetches words from 0, 1, 2,...4351 in that order repeatedly 10 times. Assume a LRU policy for block replacement. How many miss operations will occur?

248

Correct Option

Solution :

248

Cache holds 64 blocks without replacement.

CPU fetches words from 0 to 4351 (Total 4352 words)

$$\text{Number of blocks required} = \frac{4352}{64} = 68 \text{ blocks}$$

1st time = 68 miss operations (initially cache was empty)

For 2nd time reference, the available blocks in cache are 64. But the misses (B_0, B_1, B_2 and B_3) lead to subsequent misses of (B_{16} to B_{19}), (B_{32} to B_{35}), (B_{48} to B_{51}) and (B_{64} to B_{67}) with LRU policy. The same processes repeated 9 times.

$$\therefore \text{Total} = 68 + 9 \times (4 + 4 + 4 + 4 + 4) = 248$$

QUESTION ANALYTICS



Q. 27

Solution Video

Have any Doubt ?



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

0.50 [0.48 - 0.52]

Correct Option

Solution :

0.50 [0.48 - 0.52]

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

Where

C : Capacity of token bucket

p : Token generation rate

M : Maximum data rate of token bucket

t = Time for which token bucket can send the data with maximum data rate.

So,

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

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

QUESTION ANALYTICS



Q. 28

Solution Video

Have any Doubt ?



In the mean value theorem $f(b) - f(a) = (b - a) f'(c)$ determine c lying between a and b,

if $f(x) = x(x - 1)(x - 2)$, $a = 0$ and $b = \frac{1}{2}$ _____. (Upto 2 decimal places)

0.23 [0.22 - 0.24]

Correct Option

Solution :

0.23 [0.22 - 0.24]

$$f(a) = 0$$

$$f(b) = \frac{1}{2} \left(-\frac{1}{2} \right) \left(-\frac{3}{2} \right) = \frac{3}{8}$$

$$f'(x) = 3x^2 - 6x + 2$$

$$f'(c) = 3c^2 - 6c + 2$$

Substituting in, $f(b) - f(a) = (b - a) f'(c)$

$$\frac{3}{8} - 0 = \left(\frac{1}{2} - 0 \right) (3c^2 - 6c + 2)$$

$$\text{or } 12c^2 - 24c + 5 = 0$$

$$\text{where } c = \frac{24 \pm \sqrt{(24)^2 - 12 \times 5 \times 4}}{24} \\ = 1 \pm 0.764 = 1.764; 0.236$$

Hence, $c = 0.236$, since it only lies between 0 and $\frac{1}{2}$.

QUESTION ANALYTICS



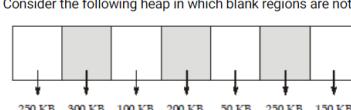
Q. 29

Solution Video

Have any Doubt ?

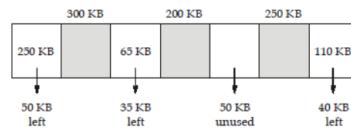


Consider the following heap in which blank regions are not in use and shaded regions are in use.



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

Solution :
125



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

QUESTION ANALYTICS

+

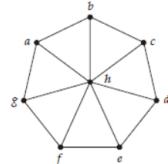
Q. 30

Solution Video

Have any Doubt ?

Q

Consider the following graph G:



Then the cardinality of largest independent set is equal to _____.

3

Correct Option

Solution :
3

The cardinality will be (3), as the largest independent set {a, d, f} has 3 elements.
Hence (3) is the correct answer.

QUESTION ANALYTICS

+

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OVERALL ANALYSIS COMPARISON REPORT **SOLUTION REPORT**

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

Q. 31

Have any Doubt?



Consider the following foo function:

```
int foo (unsigned int n)
{
    int c, x = 0;
    while (n != 0)
    {
        if ((n & 01) x++);
        n >>= 1;
    }
    return x;
}
```

The value returned by the foo (10) is _____.

2

Correct Option

Solution :

```
2
while (n != 0)
{
    if ((n & 01) x++);
    /* performs bit wise AND operation*/
    n >>= 1;
}
x++; Maintains the count for number of 1's.
n >>= 1 Shift the number by 1 bit to right.
10 = (1010)2 ⇒ Number of 1's = 2. It counts the number of bits set in an unsigned integer.
```

QUESTION ANALYTICS



Q. 32

Solution Video

Have any Doubt?



Consider the following relation SQL query:

R	A	B	C
4	Null	5	
5	6	Null	
6	Null	6	
10	8	Null	
8	8	5	

```
Select *
From R
Where A ≥ 5 and (B ≥ C or C ≥ 5)
```

The number of records resulted by above query on given instant of relation R _____.

2

Correct Option

Solution :

Given query will result tuple where $A \geq 5$ (i.e. $A = 5, 6, 10, 8$) and $B \geq C$ (i.e. $B = 8$ because we can not compare Null values) or $C \geq 5$ (i.e. $C = 5, 6, 8$ because we can not compare Null values) so the resulting tuple are 2 i.e. $A = 6, A = 8$.

QUESTION ANALYTICS



Q. 33

Have any Doubt?



Consider the following grammars:

G1: $S \rightarrow AB/CD$

$A \rightarrow 0A1/01$
 $B \rightarrow 2B/2$
 $C \rightarrow 0C/0$
 $D \rightarrow 1D2/12$

G2: $F \rightarrow I \mid (E)$

$I \rightarrow a \mid b \mid 1a \mid 1b \mid 10 \mid 11$
 $T \rightarrow F \mid T * F$
 $E \rightarrow T \mid E + T$

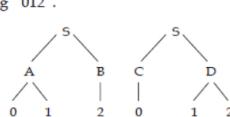
The number of grammars that are ambiguous _____.

1

Correct Option

Solution :

1
G1: Let's consider the string "012".



Since two parse trees are constructed for the same string 012. Hence the grammar is ambiguous.
G2: For every string in the grammar, we can construct only 1 parse tree. Hence the grammar is an

unambiguous grammar.

QUESTION ANALYTICS

Q. 34

Solution Video

Have any Doubt ?



Consider the following, five binary string each of length 8 bits:

11110111, 01101010, 01010010, 11011011, 10011010

A hash table of size $S = 8$ (0 to 7) using open addressing for hashing the binary strings. Assume finding an empty slot is a successful probe, while non-empty is an unsuccessful probe. The total number of unsuccessful probes needed using linear probing to hash all strings are _____.

8

Correct Option

Solution :

8

Checks last 3 bits:

[000] 0	
[001] 1	
[010] 2	01101010 [Success full] 1
[011] 3	11110111 [Success full] 1
[100] 4	01010010 → 2 unsuccessful + 1 successful
[101] 5	11011011 → 2 unsuccessful + 1 successful
[110] 6	10011010 → 4 unsuccessful + 1 successful
[111] 7	

Total unsuccessful probes = $[2 + 2 + 4] = 8$ probes.

QUESTION ANALYTICS

Q. 35

Have any Doubt ?



The maximum size of operator stack, when converting the following infix expression to postfix expression? Assume that \uparrow as the highest precedence and follows right associativity is _____.

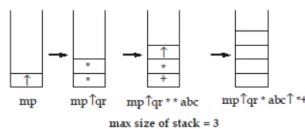
Infix: $m \uparrow p * q * r + a * b \uparrow c$

3

Correct Option

Solution :

3



max size of stack = 3

QUESTION ANALYTICS

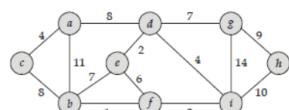
Q. 36

Solution Video

Have any Doubt ?



Consider the following graph:



Which one of the following is not the sequence of edges added to the minimum spanning tree using Prim's algorithm?

A (a, c), (c, b), (b, f), (f, i), (d, i), (d, e), (d, g), (g, h)

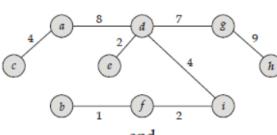
B (a, c), (a, d), (d, e), (d, i), (i, f), (f, b), (d, g), (g, h)

C (a, c), (a, d), (b, f), (f, i), (d, i), (d, e), (d, g), (g, h)

Correct Option

Solution :

(c)
Graph has 2 MST's:



Since option (c) has forest edge (b, f) after (a, d) which is not allowed in Prim's.

- D (b, f), (f, i), (i, d), (d, e), (d, g), (d, a), (a, c), (g, h)

QUESTION ANALYTICS



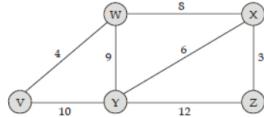
Q. 37

Solution Video

Have any Doubt ?



Consider the following subnet:



Find the link state routing table for node V using OSPF.

A

	Cost	Via
V	0	V
W	4	V
X	16	Y
Y	10	V
Z	22	Y

B

	Cost	Via
V	0	V
W	4	V
X	12	W
Y	10	V
Z	22	X

C

	Cost	Via
V	0	V
W	4	V
X	12	W
Y	10	V
Z	15	X

Correct Option

Solution :

(c)

Routing table for 'V' by using Dijkstra's Algorithm.
 V to V = 0
 V to W = 4 (Via V)
 V to Y = 10 (Via V)
 V to X = 12 (Via W)
 V to Z = 15 (Via X)

D

	Cost	Via
V	0	V
W	4	W
X	16	X
Y	10	Y
Z	22	Z

QUESTION ANALYTICS



Q. 38

Have any Doubt ?



A binary relation r on $N \times N$ is defined as follows: aRb if a is a sister of b . Consider the following propositions:

P : R is reflexive

Q : R is symmetric

Which one of the following statements is true?

A P & Q both true

B $P \rightarrow F \& Q \rightarrow T$

C $P \rightarrow T \& Q \rightarrow F$

D None of the above

Correct Option

Solution :

(d)

$aRb \Rightarrow$ someone cannot be their own sister hence not reflexive.

$aRb \Rightarrow bRa$ if a sister of b does not imply b is a sister of a because b may be brother.

QUESTION ANALYTICS



Q. 39

Have any Doubt ?



Consider program for P_1 and P_2 :

```

 $P_1()$           |  $P_2()$ 
{               |
    wait(m);
    x++;
    wait(n);
    y++;
    signal(n);
    Signal(m);
}               |
  
```

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

A Deadlock and no mutual exclusion

Correct Option

Solution :

(a) P_1 first executes wait (m) i.e. $m = 0$; P_2 executes wait (n) then $n = 0$; now the process which will perform wait () than any of the two semaphore will block the process. Hence deadlock occurs. No mutual exclusion occurs.

B Deadlock and no race condition

C No deadlocks and no race condition

D Race condition and no deadlock

 QUESTION ANALYTICS

+

Q. 40

 Solution Video

 Have any Doubt ?

Q

Consider the following relational schema $R(ABCDEFG)$ with FD set $\{AB \rightarrow C, BC \rightarrow A, AC \rightarrow B, B \rightarrow D, D \rightarrow E\}$. What is the minimum relations required to decompose R into BCNF which satisfy lossless join and dependency preserving decomposition?

A 3

Correct Option

Solution :

(b)

Given relation in 1NF:

for 2NF	$R_1(ABCDEFG)$	$R_2(BDE)$
	$AB \rightarrow C$	$B \rightarrow D$
	$BC \rightarrow A$	$D \rightarrow E$
	$AC \rightarrow B$	

for 3NF	$R_1(ABCDEFG)$	$R_2(BD)$	$R_3(DE)$
	$AB \rightarrow C$	$B \rightarrow D$	$D \rightarrow E$
	$BC \rightarrow A$		
	$AC \rightarrow B$		

FOR BCNF (Lossless join) (Dependency Preserving)	$R_1(ABC)$	$R_2(ABFG)$	$R_3(BD)$	$R_4(DE)$
	$AB \rightarrow C$		$B \rightarrow D$	$D \rightarrow E$
	$BC \rightarrow A$			
	$AC \rightarrow B$			

C 5

D 2

 QUESTION ANALYTICS

+



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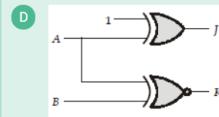
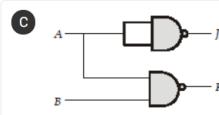
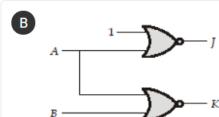
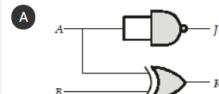
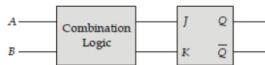
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[SKIPPED\(65\)](#)
Q. 41
[Have any Doubt ?](#)


A new two input flip flop is designed as shown in figure. The table shows the characteristic table of the A - B flip-flop.

A	B	Q_{n+1}
0	0	\bar{Q}_n
0	1	1
1	0	Q_n
1	1	0

The combination logic is

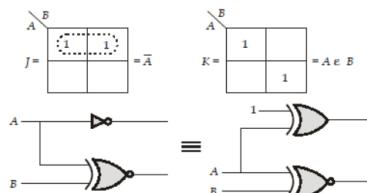


Correct Option

Solution :
 (d)

A	B	Q_{n+1}	J	K
0	0	\bar{Q}_n	1	1
0	1	1	1	0
1	0	Q_n	0	0
1	1	0	0	1

State Table



QUESTION ANALYTICS

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


A router uses the following routing table:

Network Address	Mask	Interface
205.32.0.0	/25	R0
205.32.16.0	/26	R1
205.32.32.0	/24	R2
205.32.16.32	/27	R3

Find the next hop (where router will send the packet), if the router has IP address "205.32.16.63"

A R0

B R1

C R2

D R3

Correct Option

Solution :
 (d)

Routing in classless addressing follows "Longest Mask Matching". This states that the routing table is sorted from the longest mask to the shortest mask.
 So here firstly starts with /27

To find N/W address = 205.32.16.63 AND 255.205.255.224
= 205.32.16.32 [Matched with R3]

So interface chosen is R3.

QUESTION ANALYTICS

Q. 43

Have any Doubt?



Which of the following CFG generates the language $L = \{a^m b^n \mid m \geq n\}$?

A $S \rightarrow aA \mid \epsilon$
 $A \rightarrow Sb \mid Ab$

B $S \rightarrow Ab \mid \epsilon$
 $A \rightarrow aS \mid aA$

Correct Option

Solution :

- (b) $S \rightarrow aA \mid \epsilon$
 $A \rightarrow Sb \mid Ab$
 $\Rightarrow L = \{a^m b^n \mid m < n\}$
- (b) $S \rightarrow Ab \mid \epsilon$
 $A \rightarrow aS \mid aA$
 $\Rightarrow L = \{a^m b^n \mid m \geq n\}$
- (c) $S \rightarrow aAb \mid \epsilon$
 $A \rightarrow aB \mid aA \mid \epsilon$
 $B \rightarrow Bb \mid \epsilon$
 $\Rightarrow aabb string is possible.$
 \therefore Option (b) is correct.

C $S \rightarrow aAb \mid \epsilon$
 $A \rightarrow aB \mid aA \mid \epsilon$
 $B \rightarrow Bb \mid \epsilon$

D None of these

QUESTION ANALYTICS

Q. 44

Solution Video

Have any Doubt?



Consider the following statements:

S_1 : A graph where all edge weights are distinct can have more than one shortest path between two vertices.

S_2 : Multiplying all edge weights by a positive number will always change the cost of minimum spanning tree.

S_3 : Bellman Ford algorithm finds all negative edge weight cycles in the graph and gives correct shortest path.

Which of the above statements are correct?

A Only S_2 and S_3

B Only S_1 and S_2

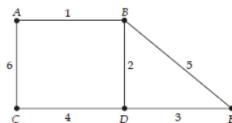
C Only S_1

Correct Option

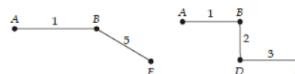
Solution :

- (c)
Considering each statement:

- Consider the graph,



Path between A to E:



Even though all edge weights are distinct, there are 2 shortest path between A and E vertices.

- Multiplying all edge weights by a positive number will always not change the cost of Minimum Spanning Tree i.e. positive integer 1 multiplying all edge weights will give same cost.
- Bellman Ford algorithm finds all negative edge weight cycles in the graph that are reachable from the source. If a graph contains a "negative cycle" reachable from the source, then there is no cheapest path. Any path that has a point on the negative cycle can be made cheaper by one more walk around the negative cycle.

D All S_1 , S_2 and S_3

QUESTION ANALYTICS



Consider the following code:

```

int P = 0;
for (i = 1; i < 2n; i++)
{
    for (j = 1, j <= n; j++)
    {
        if (j < i) P = P +1;
    }
}
printf("%d", P);

```

What is the output printed by the above code in terms of n ?

A $\frac{4n^2 - n}{2}$

B $\frac{3n^2 - n}{2}$

Correct Option

Solution :

(b)

$$\begin{aligned}
\sum_{i=1}^{2n} \sum_{j=1}^n 1 - \sum_{j=1}^n j &= \sum_{i=1}^{2n} n - \frac{n(n+1)}{2} \\
&= 2n^2 - \frac{n^2}{2} - \frac{n}{2} = \frac{3}{2}n^2 - \frac{n}{2} = \frac{3n^2 - n}{2}
\end{aligned}$$

Alternate method:

$i = 1$	$i = 2$	$i = 3$	$i = n$
$j = 1$	$j = 1$	$j = 1$	$j = 1$
$1 < 1$ F	$1 < 2$ T	$1 < 3$ T	$1 < n$ T
$P = P + 1$ (0 time)	$P = P + 1$ (1 time)	$P = P + 1$ (2 times)	$P = P + 1$ ($n - 1$ times)

$i = n + 1 \dots \dots \dots i = 2n - 1$
 $j = n \text{ times} \quad j = n \text{ times}$
 Total = $1 + 2 + \dots + n - 1 + n + \underbrace{n + n + \dots + n}_{(n-2) \text{ times}}$
 $\frac{n(n+1)}{2} + n(n-2) = \frac{3n^2 - 3n}{2}$

C $\frac{n^2 - 4n}{2}$

D $\frac{n^2 - 3n}{2}$

QUESTION ANALYTICS



Consider a database that has the relation schemas;

`student(ID, name, dept_name, tot_cred)`

`course(courses_id, dept_name)`

`takes(ID, courses_id, sec_id, semester, year, grade)`

"Find all students who have taken all courses offered in the CS department". Which of the following will represent above queries?

A $\{t \mid \exists r \in \text{student } (r[\text{ID}] = t[\text{ID}]) \wedge (\forall u \in \text{course } (u[\text{dept_name}] = "CS" \Rightarrow \exists s \in \text{takes } (t[\text{ID}] = s[\text{ID}] \wedge s[\text{course_id}] = u[\text{course_id}]))\}$

B $\{t \mid \exists r \in \text{student } (r[\text{ID}] = t[\text{ID}]) \wedge (\forall u \in \text{course } (u[\text{dept_name}] \neq "CS" \vee \exists s \in \text{takes } (t[\text{ID}] = s[\text{ID}] \wedge s[\text{course_id}] = u[\text{course_id}]))\}$

C Both (a) and (b)

Correct Option

Solution :

(c)

$\{t \mid \exists r \in \text{student } (r[\text{ID}] = t[\text{ID}]) \wedge (\forall u \in \text{course } (u[\text{dept_name}] = "CS" \Rightarrow \exists s \in \text{takes } (t[\text{ID}] = s[\text{ID}] \wedge s[\text{course_id}] = u[\text{course_id}]))\}$ will result all students who have taken all courses offered in the CS department. Since we know that $P \Rightarrow Q \equiv \neg P \vee Q$, so option (b) is also true.

D None of these

QUESTION ANALYTICS



Consider the following 4-stages instruction pipeline where different instructions are spending different amount of time at different stages.

c c c c

	ω_1	ω_2	ω_3	ω_4
I_1	1	1	2	1
I_2	2	1	1	1
I_3	2	2	3	3
I_4	1	3	2	1

Following loop is executed in the pipeline:

```

        following loop is executed
        for (i = 1; i <= 2; i++)
    {
        I1;
        I2;
        I3;
        I4;
    }
}

```

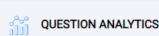
How many cycles are overlapped between the iterations?

- A 9
 - B 8
 - C 10

Correct Option

Solution :
(d)

7 cycles are overlapped between the loops.



+

Q. 48

Have any Doubt ?



Consider the following grammar:

$$\begin{array}{l} E \rightarrow E + T | T \\ T \rightarrow T * F | F \\ F \rightarrow (E) | id \end{array}$$

A string (`id + id * id`) is parsed using above grammar. Which of the following statement is correct with respect to above parsing?

- A "E + F *" is a viable prefix

Correct Option

Solution :
(a)

```

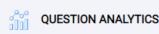
Using bottom-up parsing:
⇒ (id + id * id)
⇒ (F + id * id)
⇒ (T + id * id)
⇒ (E + id * id)
⇒ (E + F * id)   (E + F * is a viable prefix since present on stack)
⇒ (E + T * id)

⇒ (E + T * id)
⇒ (E + T)    }   T * F → T thus T * F is a handle.

⇒ (E)
⇒ F
⇒ T
⇒ E

```

- B "E + F *" is a handle
 - C "T * F" is a viable prefix
 - D "T * F" is not a handle



+

0.49

Have any Doubt?



How many different values of x exist for the following equation?

$$\begin{vmatrix} x+2 & 2x+3 & 3x+4 \\ 2x+3 & 3x+4 & 4x+5 \\ 3x+5 & 5x+8 & 10x+17 \end{vmatrix} = 0$$

- 2

Correct Option

Solution :

Operating $R_3 - (R_1 + R_2)$ we get

$$\begin{vmatrix} x+2 & 2x+3 & 3x+4 \\ 2x+3 & 3x+4 & 4x+5 \\ 0 & 1 & 3x+8 \end{vmatrix} = 0$$

(Operating $R_2 - R_1$ and $R_1 + R_3$)

$$\text{or } \begin{vmatrix} x+2 & 2x+4 & 6x+12 \\ x+1 & x+1 & x+1 \\ 0 & 1 & 3x+8 \end{vmatrix} = 0$$

$$\text{or } (x+1)(x+2) \begin{vmatrix} 1 & 2 & 6 \\ 1 & 1 & 1 \\ 0 & 1 & 3x+8 \end{vmatrix} = 0$$

To bring one more zero in C_L , operate $R_1 - R_2$.

$$\therefore (x+1)(x+2) \begin{vmatrix} 0 & 1 & 5 \\ 1 & 1 & 1 \\ 0 & 1 & 3x+8 \end{vmatrix} = 0$$

Now expand by C_1 :

$$\therefore -(x+1)(x+2)(3x+8-5) = 0 \text{ or } -3(x+1)(x+2)(x+1) = 0$$

Thus, $x = -1, -1, -2$.

B 3

C 1

D 4

QUESTION ANALYTICS



Q. 50

Have any Doubt ?



Consider the following Max-heap tree stored in the form of array.

97	61	88	21	47	79	21	5	9
----	----	----	----	----	----	----	---	---

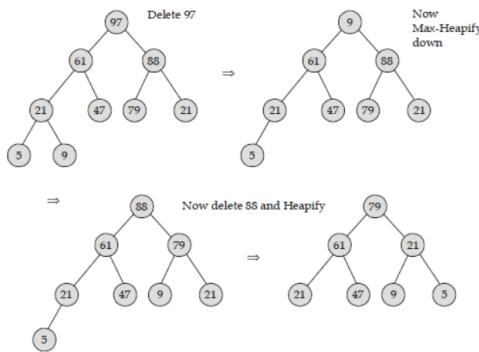
Which of the following is a heap tree after two deletions?

A 88, 79, 21, 47, 9, 21, 5

B 79, 61, 21, 21, 47, 9, 5

Correct Option

Solution:
(b)



$\therefore 79, 61, 21, 21, 47, 9, 5$

C 88, 79, 47, 21, 9, 21, 5

D None of these

QUESTION ANALYTICS





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FULL SYLLABUS TEST-4 (BASIC LEVEL) GATE 2020 - REPORTS

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


Find a regular expression for the language: $L = \{w \mid w \in (0+1)^*, w \text{ has no pair of consecutive zeros}\}$.

A $(1^*011^*)^*(0+\epsilon) + 1^*(0+\epsilon)$

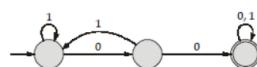
B $(1+01)^*(0+\epsilon)$

C $(1^*011^*)^*$

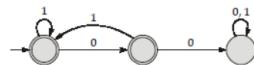
D Both (a) and (b)

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

State diagram for language $L = \{w \mid w \text{ has atleast one pair of consecutive zeros}\}$



Its complement $L = \{w \in \{0, 1\}^* : w \text{ has no pair of consecutive zeros}\}$.



Its regular expression $(1^*011^*)^*(0+\epsilon) + 1^*(0+\epsilon) = (1+01^*)(0+\epsilon)$

[QUESTION ANALYTICS](#)

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


Kalipsh is setting up a website, He bought a fancy new hard disk which advertises:

- an 8 ms average seek time.
- 10000 RPM, or roughly 6 ms per rotation.
- a 2 ms overhead for each disk operation.
- a transfer speed of 10,000,000 bytes per second.

Kalipsh had enough money left for a 10,000,000 bytes per second network connection. His system bus has a maximum bandwidth of 133 mega bytes per second, and his HTML files have an average size of 8000 bytes. How much time will it take on an average to read a random HTML file from the disk?

A 10.7 ms

B 9.5 ms

C 17.9 ms

D 13.8 ms

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

It will take $\frac{8000}{10^7} = 0.8 \text{ ms}$ to transfer 1 HTML file.

Average rotational delay = $\frac{6}{2} = 3 \text{ ms}$

$$\therefore \text{Average time to read} = 8 \text{ ms (seek time)} + 2 \text{ ms} + 3 \text{ ms} + 0.8 \text{ ms} \\ = 13.8 \text{ ms on an average}$$

[QUESTION ANALYTICS](#)

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


Consider the following statements:

S_1 : Asymmetric key cryptography and digital signature both use the private and public keys of the sender.

S_2 : Public key cryptosystems require $\frac{n(n-1)}{2}$ keys for a set of n individual to be able to communicate with each other.

Which of the statements options are true?

A S_1 and S_2 are true

B S_1 is true, S_2 is false

C S_1 is false, S_2 is true

D Both are false

Correct Option

Solution :

- (d)
- Asymmetric key cryptography use the private key for decryption and public key for encryption of the receiver. While digital signature use the private and public keys of the sender.
- For public key encryption, each individual needs to have a public and private key, so the total keys required is $2 \times n$.

QUESTION ANALYTICS



Q. 54

▶ Solution Video

Have any Doubt ?



Let $f: R \rightarrow [2, \infty)$ be defined by $f(x) = x^2 + 2x + b$. It is known that $f(x)$ is an onto function. Then the value of b is equal to _____.

3

Correct Option

Solution :

3

$$\begin{aligned} f(x) &= x^2 + 2x + b \\ &= x^2 + 2x + (1 - 1) + b \\ &= (x + 1)^2 + b - 1 \end{aligned}$$

So clearly, range will be $[b - 1, \infty)$ as the minimum value of $f(x)$ will be $b - 1$ and max will be ∞ .

Also according to question, range of $f(x)$ is $[2, \infty)$

$$\begin{aligned} \Rightarrow (b - 1) &= 2 \\ \Rightarrow b &= 3 \end{aligned}$$

Alternate method:

$$\begin{aligned} f(x) &= x^2 + 2x + b \\ \text{Since, coefficient of } x^2 > 0 \text{ thus, the parabola is open upwards.} \end{aligned}$$

$$\Rightarrow \text{Minimum value} = \frac{-b}{2a} = -\left[\frac{\text{Coefficient of } x}{2(\text{coefficient of } x^2)}\right]$$

thus $\frac{-b}{2a} + b$ must equal to 2 as $[2, \infty)$

$$\begin{aligned} \frac{-2}{2 \times 1} + b &= 2 \\ b &= 3 \end{aligned}$$

QUESTION ANALYTICS



Q. 55

Have any Doubt ?



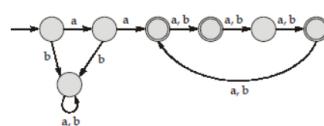
The number of final states in minimal DFA, where $\Sigma = \{a, b\}$, every string starts with "aa" and length of string is not congruent to 0 (mod 4) are _____.

3

Correct Option

Solution :

3



QUESTION ANALYTICS



Q. 56

Have any Doubt ?



In synchronous transmission, 5 eight bit characters are included in 30 eight bit information characters. If bit rate of sender is 4200 bits/sec, what is the bit rate of receiver (in bits per sec)?

3500

Correct Option

Solution :

3500

Synchronous bits are not taken by receiver.

They are sent by sender just to alert the receiver about the incoming data.

5 eight bit character = 40 bits

30 eight bit character information = 240 bits

40 synchronous bits \rightarrow 240 info bits

X Synchronous bits \rightarrow 4200 info bits

$$X = \frac{40 \times 4200}{240} = 700 \text{ synchronous bits}$$

Total data bits = 4200 - 700 = 3500 bits/sec

QUESTION ANALYTICS



Q. 57

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

Consider the following set of processes that need to be scheduled on a single CPU.

Process Name	Arrival Time	Burst Time
P_1	0	6
P_2	3	3
P_3	7	6
P_4	10	3

Assume all times are given in milliseconds and round robin CPU scheduling is used with time quantum 2 msec. The average turn around time is _____ (in msec). (Upto 2 decimal places)

7.75 [7.70 - 7.78]

Correct Option

Solution :
 7.75 [7.70 - 7.78]

P_1	P_1	P_2	P_1	P_2	P_3	P_4	P_3	P_4	P_3
0	2	4	6	8	9	11	13	15	16

Process Name	Arrival Time	Exection Time	Completion Time	TAT
P_1	0	6	8	8
P_2	3	3	9	6
P_3	7	6	18	11
P_4	10	3	16	6

$$\text{Average} = \frac{31}{4} = 7.75 \text{ msec}$$

QUESTION ANALYTICS



Q. 58

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

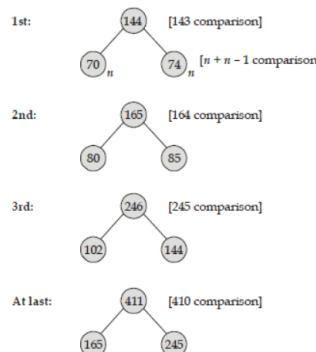
Let A, B, C, D, E are sorted sequences having length 70, 74, 80, 85, 102 respectively. They are merged into a single sequence by merging together two sequences at a time. The maximum number of comparison that will be needed by best algorithm for doing merging is _____

962

Correct Option

Solution :
 962

Given file size: 70, 74, 80, 85, 102 create min heap.

Algorithm: Take 1st 2 min element, merge it, and put back result into heap, again find next two min element, merge them, repeat until one element left.

So, total comparison = [143 + 164 + 245 + 410] = 962

QUESTION ANALYTICS



Q. 59

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

Considering the exponential average behaviour used to predict the next CPU burst. If $\alpha = 0.80$ and $\tau_0 = 25$ ms and previous (T_0, T_1, T_2, T_3) runs were as 10, 12, 15, 20. The predicted value of τ_4 is _____ (Upto 1 decimal places)

18.9 [18.8 - 19.0]

Correct Option

Solution :
 18.9 [18.8 - 19.0]

$$\tau_{n+1} = \alpha \tau_n + (1 - \alpha)\tau_n$$

$$\tau_1 = 0.8 (10) + (0.2) (25) = 13$$

$$\tau_2 = 0.8 (12) + (0.2) (13) = 12.2$$

$$\tau_3 = 0.8 (15) + (0.2) (12.2) = 14.44$$

$$\tau_4 = 0.8 (20) + (0.2) (14.44) = 18.888$$

QUESTION ANALYTICS



Two dice are thrown simultaneously. The expected sum of the numbers show up is_____.

7

Correct Option

Solution :

7

Let the numbers appeared on dices are X_1 and X_2 .

$$\begin{aligned}\text{Expectation of the sum} &= E[X_1 + X_2] = E[X_1] + E[X_2] \\ &= 2E[X]\end{aligned}$$

$$\begin{aligned}E[X] &= \sum_{i=1}^6 x_i p(x_i) = \frac{1}{6}(1+2+3+\dots+6) \\ &= \frac{1}{6} \times \frac{6 \times 7}{2} = \frac{7}{2}\end{aligned}$$

$$\text{So, } \text{Expected sum} = 2E[X] = 2 \times \frac{7}{2} = 7$$

QUESTION ANALYTICS

+

Item 51-60 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)

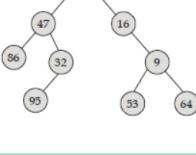
Q. 61

Consider the following C program:

```
struct treenode
{
    int data;
    struct treenode *left;
    struct treenode *right;
};

void f (struct treenode *root)
{
    If (root ==NULL) return;
    f (root -> right);
    f (root -> left);
    if (root -> data %2 = 0) root -> data / = 2;
    else
    {
        int Sum = 0;
        if (root -> left != NULL) Sum + = root -> left -> data;
        if (root -> right != NULL) Sum + = root -> right -> data;
        root -> data + = Sum;
    }
    printf ("%d", root -> data);
}
```

If root of the following tree is passed as a parameter to the above function then what is the sum of even output values produced by the above code?

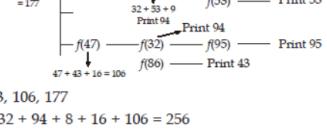


256

Correct Option

Solution :

256



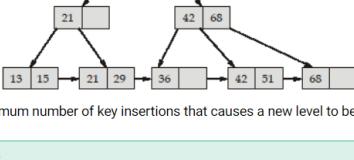
32, 53, 94, 8, 95, 16, 43, 106, 177

Sum of even values: $32 + 94 + 8 + 16 + 106 = 256$

QUESTION ANALYTICS

Q. 62

Consider the following B^* tree with the order of internal and leaf nodes as 3 and 2 respectively:



The minimum number of key insertions that causes a new level to be introduced in the above B^* tree _____ (Assume key redistribution is not allowed)

3

Correct Option

Solution :

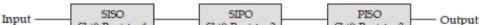
3

If we insert keys 45, 48, 55 in same order, then on insertion of key 55, root will be overflow and new level will be created.

QUESTION ANALYTICS

Q. 63

Three 4 bit shift registers are connected in cascade as shown in figure below:





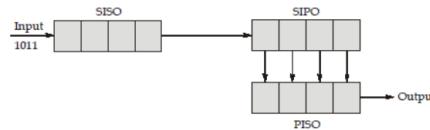
A 4 bit data 1011 is applied to the shift register 1. The minimum number of clock pulses required to get same input data at the output is _____.

12

Correct Option

Solution :

12



	SISO	SIPO	PISO
Initially	0 0 0 0	0 0 0 0	0 0 0 0
1.	1 0 0 0	0 0 0 0	0 0 0 0
2.	1 1 0 0	0 0 0 0	0 0 0 0
3.	0 1 1 0	0 0 0 0	0 0 0 0
4.	1 0 1 1	0 0 0 0	0 0 0 0
5.		1 0 0 0	0 0 0 0
6.		1 1 0 0	0 0 0 0
7.		0 1 1 0	0 0 0 0
8.		1 0 1 1	0 0 0 0
9.			1 0 1 1
10.			x 1 0 1
11.			x x 1 0
12.			x x x 1

Minimum number of clock pulses required = 12

QUESTION ANALYTICS



Q. 64

Have any Doubt ?



Consider the following statements:

$$S \rightarrow aaA$$

$$A \rightarrow aA \mid B$$

$$B \rightarrow bbbC$$

$$C \rightarrow bC \in$$

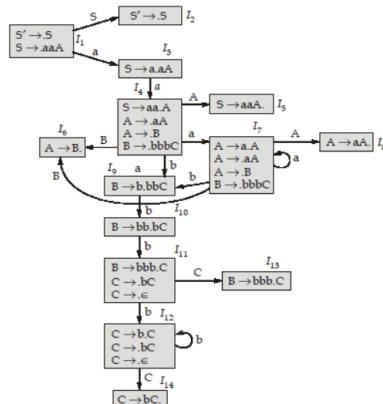
The total number of states in SLR (1) construction which do not have any type of conflict are _____.

14

Correct Option

Solution :

14



QUESTION ANALYTICS



Q. 65

Solution Video

Have any Doubt ?



A DMA module is transferring characters to memory using cycle stealing mode, from a device which is transmitting at a rate of 19200 bps. The rate at which processor is fetching the instruction is 2 million instructions per second (2 MIPS). Due to DMA, CPU slowed down by _____ (in %, upto 2 decimal places).

0.11 [0.10 - 0.13]

Correct Option

Solution :

0.11 [0.10 - 0.13]

X : 19200 bits 1 sec

8 bit ?

$$\Rightarrow \frac{8}{19200} \text{ sec} = 416.66 \mu\text{sec}$$

Y : 2 M instruction 1 sec

1 instruction ?

$$\Rightarrow \frac{1 \text{ instruction}}{2 \times 10^6} \text{ sec} = 0.5 \mu\text{sec}$$

$$\left(\frac{Y}{X+Y} \right) 100 = \frac{0.5}{417.16} 100 = 0.11\%$$

