



Ashima Garg

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## FULL SYLLABUS TEST-8 (ADVANCE LEVEL) GATE 2019 - REPORTS

OVERALL ANALYSIS

COMPARISON REPORT

**SOLUTION REPORT**

ALL(65)

CORRECT(30)

INCORRECT(22)

SKIPPED(13)

**Q. 1**

A part has been omitted from the sentence given below and it is to be filled with idiom(s), to make the sentences grammatically meaningfully correct. Mark the answer accordingly.

Although Mr. Naipaul was \_\_\_\_\_, he never boasted about anything or try to use the resources available to him in an unethical way.

1. An armchair traveller
2. Born with a silver spoon
3. A big fish in a small pond

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A

Only 2

B

Both 2 and 3

Your answer is **Correct****Solution :**

(b)

'Armchair traveller' = Someone who reads books or watches TV programmes about other places and countries, but doesn't actually travel anywhere. "Born with a silver spoon" = born into a very rich family. "A big fish in a small pond" = an important or highly-ranked person in a small group or organisation. Since, the sentence does not contain any reference about travelling, (1) cannot be true here.

C

Both 1 and 3

D

None of these

**QUESTION ANALYTICS****Q. 2**

In the following question four words are given, of which two words are most nearly the same or opposite in meaning. Find these words.

- |              |             |
|--------------|-------------|
| 1. terse     | 2. languid  |
| 3. energetic | 4. didactic |

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A

2 – 4

Your answer is **Wrong**

B

2 – 1

C

3 – 2

**Correct Option****Solution :**

(c)

'Terse' means brief/concise. 'Didactic' means instructional. Languid means 'weak or faint from illness or fatigue'. 'Energetic' means active/lively. Hence, 2 and 3 are the antonyms.



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## QUESTION ANALYTICS

**Q. 3**

A paragraph is given that has a blank in it. Four sentences (a), (b), (c), (d) are suggested. Out of these, only one fits the blank in the context of the paragraph. Pick that as the answer. The disciplined outlays for individual financial goals and systematic investing to achieve them can save us from many financial dilemmas. They define a format to deal with a financial situation by taking a 360° view of the future impact of our decision. For example, an impulsive foreign holiday on credit can give way to a local vacation within our cash means while investing systematically for other important financial goals. Similarly, saving money to purchase a depreciating electronic gadget is much preferable to buying the same instantly on a costly personal loan. \_\_\_\_\_. It is good to allocate our earned income to important life goals first and then spend the remaining amount. Regular savings towards goals help us in minimizing costly debt and other dilemmas when we are nearing those goals.

[Have any Doubt ?](#)

A

It is best to repay such loans whenever we have excess money

B

This helps us escaping the dilemma between protecting capital and generating the required return

C

This may lead to lopsided investments that may not generate optimal returns

D

It is thus a play between instant indulgence and delayed gratification

**Correct Option**
**Solution :**

(d)

Option A talks about repaying such a loan, now sentence before blank mentions a personal loan but not in a sense where option A can follow it. Option B mentions escaping a dilemma between protecting capital and generating the required return, which is not mentioned here, paragraph just states the future impact of our decision. Option C does not fit into the context. Option D is the correct choice; instant indulgence is an impulsive foreign holiday on credit or buying something on a costly personal loan and delayed gratification is giving way to a local vacation or saving money to purchase a depreciating electronic gadget.

## QUESTION ANALYTICS

**Q. 4**

In the given question, a set of conclusions is given. There are four options comprising of three or more statements. You need to choose the option that contains the set of statements from which the given conclusions logically follow.

All horses cannot be cottages. No glance is a cottage.

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A

Some glances are horses. Some horses are blemishes. No blemish is a cottage.

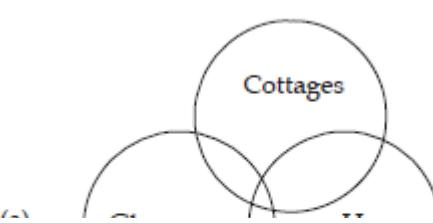
B

No horse is a blemish. All cottages are blemishes. All glance are horses.

**Correct Option**
**Solution :**

(b)

The statements given in option (b) lead to the required conclusions.





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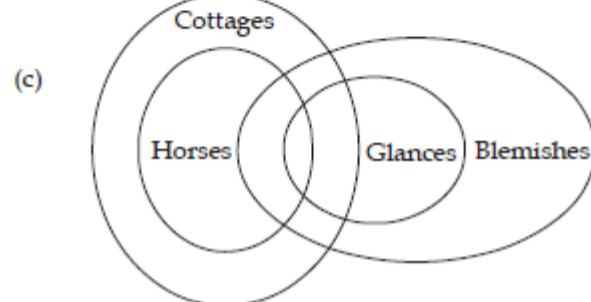
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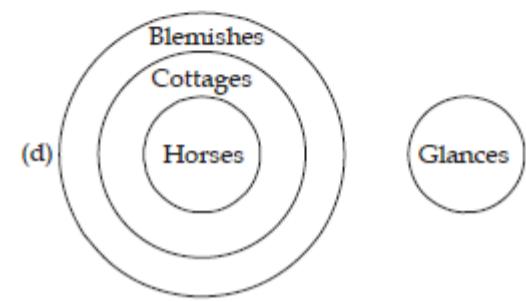
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In this scenario conclusion II does not follow



In this case we see that neither of the conclusions is true

In this scenario both the conclusions are true



In this scenario conclusion I does not follow

C

Some horses are blemishes. All glances are blemishes. Some cottages are not blemishes.

D

All horses are blemishes. Some blemishes are not cottages. No blemish is a glance.

## QUESTION ANALYTICS

## Q. 5

Mr. Phogat has three daughters namely Geeta, Babita and Vinesh. He gave some amount of money to each of them such that Babita got  $\frac{4}{3}$  times the amount that Geeta got, while Vinesh got  $\frac{5}{4}$  times the amount

that Babita got. If every one of them spent ₹100 then the ratio of remaining money with Geeta, Babita and Vinesh would be in the ratio 1 : 2 : 3 respectively. The average amount per person after all three receive another ₹700 each from their father is ₹\_\_\_\_\_.

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900

Your answer is Correct

## Solution :

900

Let the amount with Geeta be ₹x

$$\text{Amount with Babita} = \frac{4x}{3}$$

$$\text{Amount with Vinesh} = \frac{4x}{3} \times \frac{5}{4} = \frac{5x}{3}$$

$$x - 100 : \frac{4x}{3} - 100 : \frac{5x}{3} - 100 = 1 : 2 : 3$$

$$\frac{3(x - 100)}{(4x - 300)} = \frac{1}{2}$$

$$x = 150$$

Amount with Geeta, Babita and Vinesh will be ₹150, ₹200 and ₹250

Total amount received from father =  $700 \times 3 = ₹2100$ Total amount with the 3 sisters =  $150 + 200 + 250 + 2100 = 2700$ 

$$\text{Average amount per person} = \frac{2700}{3} = ₹900$$

## QUESTION ANALYTICS

## Q. 6

Vessel A contains six green and four red balls and vessel B contains four green and six red balls. One ball is drawn at random from vessel A and placed in vessel B. Then one ball is transferred at random from vessel B to vessel A. If one ball is now drawn at random from vessel A, the probability that it is green is

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B

$$\frac{32}{65}$$

C

$$\frac{33}{65}$$

D

$$\frac{32}{55}$$

Your answer is Correct

Solution :

(d)

The probability that a green ball is transferred from A to B and a green ball is transferred

$$\text{vessel B to vessel A, } P_{\text{green, green}} = \left(\frac{6}{10}\right) \times \left(\frac{5}{11}\right) = \frac{30}{110}.$$

$$\text{Similarly other cases, } P_{\text{green, red}} = \left(\frac{6}{10}\right) \times \left(\frac{6}{11}\right) = \frac{36}{110}.$$

$$P_{\text{red, green}} = \left(\frac{4}{10}\right) \times \left(\frac{4}{11}\right) = \frac{16}{110}$$

$$P_{\text{red, red}} = \left(\frac{4}{10}\right) \times \left(\frac{7}{11}\right) = \frac{28}{110}$$

Probability of drawing a green ball from vessel A after the transfers in these four cases

$$\frac{6}{10}, \frac{5}{10}, \frac{7}{10}, \frac{6}{10} \text{ respectively.}$$

Therefore the required probability

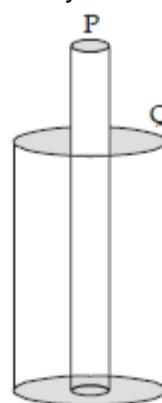
$$= \left(\frac{30}{110}\right) \times \left(\frac{6}{10}\right) + \left(\frac{5}{10}\right) \times \left(\frac{36}{110}\right) + \left(\frac{7}{10}\right) \times \left(\frac{16}{110}\right) + \left(\frac{6}{10}\right) \times \left(\frac{28}{110}\right) = \frac{32}{55}$$

QUESTION ANALYTICS

**Q. 7**

A cylinder P of radius 14 m and height 44 m pierces through another cylinder Q whose radius is thrice the radius of cylinder P and height is  $\frac{4}{11}$  times of the cylinder P as shown in the figure below. Two different

liquids are poured simultaneously in both the cylinders at the rate of  $44 \text{ m}^3/\text{minute}$  in cylinder P and at the rate of  $64 \text{ m}^3/\text{minute}$  in cylinder Q, till the cylinders are filled up to the brim. The time taken to completely fill the two cylinders is


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A

8 hours and 48 minutes

B

4 hours



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## Solution :

(c)

$$\text{Volume of cylinder P} = 44 \times 14 \times 14 \times \frac{22}{7} = 27104 \text{ m}^3$$

$$\text{Radius of cylinder Q} = 14 \times 3 = 42 \text{ m}$$

$$\text{Height of cylinder Q} = \left(\frac{4}{11}\right) \times 44 = 16 \text{ m}$$

$$\text{Volume of cylinder Q in which the liquid can be filled} = \frac{22}{7} \times 42 \times 42 \times 16 - \frac{22}{7} \times 14 \times 14$$

$$= 88704 - 9856 = 78848 \text{ m}^3$$

$$\text{Time taken to fill cylinder P} = \frac{27104}{44} = 616 \text{ minutes}$$

$$\text{Time taken to fill cylinder Q} = \frac{78848}{64} = 1232 \text{ minutes}$$

So the time taken to completely fill the 2 cylinders is 1232 minutes or 20 hours and 32 minutes.

D

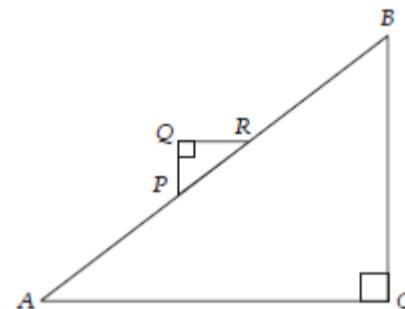
12 hours and 36 minutes

Your answer is Wrong

QUESTION ANALYTICS

## Q. 8

In the given figure, triangles  $ABC$  and  $PQR$  are right angled triangles with angle  $C$  and  $Q$  being right angles.  $QR$  is parallel to  $AC$  and  $AB = 300 \text{ cm}$ ,  $PQ = 20 \text{ cm}$  and  $QR = 100 \text{ cm}$ . The length of side  $BC$  to the nearest integer is


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A

57 cm

B

59 cm

Your answer is Correct

## Solution :

(b)

$$\begin{aligned} & \because QR \parallel AC \\ & \Rightarrow \angle QRA = \angle BAC && \text{(Parallel lines cut by transversal)} \\ & \Rightarrow \angle Q = \angle C = 90^\circ \\ & \Rightarrow \Delta PQR \cong \Delta BCA && \text{(AA similarity)} \\ & \Rightarrow \frac{BC}{AC} = \frac{PQ}{QR} = \frac{20}{100} = \frac{1}{5} \\ & \text{or} \\ & AC = 5 BC \\ & AB = \sqrt{BC^2 + AC^2} \\ & 300 = \sqrt{26 BC^2} \\ & \Rightarrow BC = \sqrt{\frac{90000}{26}} = 58.83 \end{aligned}$$

or 59 cm which is the nearest integer.



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D

63 cm

## QUESTION ANALYTICS

## Q. 9

A lizard is crawling up a minaret to reach the top. The top of the minaret is 1800 cm from its position. After every minute of crawling it halts for half a minute. In every halt it slides down by 30 cm from its position. Time the lizard will take to reach the top of the minaret if it can crawl 150 cm per minute is

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A

21 minutes 48 seconds

Your answer is Correct

## Solution :

(a)

$$\text{Number of trials} = \frac{1800}{150 - 30} = \frac{1800}{120} = 15$$

Let us take 14 trials of sliding up

For every trial of these 14 trials, its effective upward movement is  $(150 - 30) = 120$  cm

$$\text{The time taken for this} = \left( 14 \times 1 + 14 \times \frac{1}{2} \right) = 21 \text{ minutes}$$

$$\text{Total distance} = (14 \times 120) = 1680 \text{ cm}$$

$$\text{Remaining} = 1800 - 1680 = 120 \text{ cm}$$

$$\text{Remaining 120 cm it can reach in } \frac{(60 \times 120)}{150} = 48 \text{ seconds}$$

$$\text{Total time} = 21 \text{ minutes 48 seconds}$$

B

25 minutes

C

20 minutes

D

32 minutes 40 seconds

## QUESTION ANALYTICS

## Q. 10

The average number of goals scored per match by Sunil Chhetri in matches where he was in the team of starting 11 is 1.5 and the average number of goals scored by him in matches where he came on as a substitute is 0.5. He scored 390 goals more in matches where he was in the team of starting 11 than in matches in which he came on as a substitute. If he played 388 matches in total, the average number of goals scored by him per match is

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1.253 (1.2 - 1.3)

Correct Option

## Solution :

1.253 (1.2 - 1.3)

Let the number of matches in which he was in the team of starting 11 be  $x$  and the matches in which he came on as a substitute be  $y$ .Thus,  $x + y = 388$ Number of goals scored in matches in which he was in the team of starting 11 = Average number of matches =  $1.5x$



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 Therefore, average number of goals scored per match =  $486 \div 388 = 1.253$ 

## QUESTION ANALYTICS

## Q. 11

Which of the following is an incorrect statement regarding the closure properties of languages?

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A

DCFLs are closed under complementation

B

The reversal of a DCFL is always context free

Your answer is Wrong

C

Context free languages are closed under finite union

D

None of these

Correct Option

## Solution :

(d)

We know DCFLs are closed under complementation, so (a) is fine.

Note that although DCFLs are not closed under reversal, but the reversal of a DCFL will always be context free, even though the result may not be deterministic, but it's guaranteed to be context free. Why? Because every DCFL can be thought of as a CFL and we know that CFLs are closed under reversal, therefore (b) is also fine.

Also CFLs are closed under finite union, so (c) is also good. So the appropriate choice is option (d).

## QUESTION ANALYTICS

## Q. 12

Consider the following statements:

I. Over the unary alphabet, every Context Free Language is Regular.

II. Over the unary alphabet, every Context Sensitive Language is Regular.

Which of the following is the most suitable choice for the above two statements?

[Have any Doubt ?](#)

A

Both I and II are true

B

I is true, II is false

Correct Option

## Solution :

(b)

I is true. You can try to make any context free language over the unary alphabet and language you make will end up becoming regular. For example, the language of palindromes over unary is also regular. But note that II is false, because for example,  $\{a^p; p \text{ is prime}\}$  is a regular CSL.

So the correct choice is option (b).

C

I is false, II is true

D



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**Q. 13**

Consider the following statements given below:

 $S_1$  : Loading the pages before letting processes run is called pre paging. $S_2$  : The set of pages that a process is currently using is called locality of reference. $S_3$  : LRU page replacement not suffer from Belady's anomaly.

Which of the above statements are true?

[Have any Doubt ?](#)

A

 $S_2$  and  $S_3$  only

B

 $S_1$  and  $S_3$  only

Correct Option

**Solution :**

(b)

 $S_1$  : Loading the pages before letting processes run is called pre paging it is used to reduce initial page fault.  $S_1$  is true $S_2$  : The set of pages that a process is currently using is called working set.  $S_2$  is false $S_3$  : FIFO page replacement algorithm suffer from Belady's anomaly not the LRU.  $S_3$  is true

So option (b) is correct.

C

 $S_1$  and  $S_2$  only

D

 $S_1$ ,  $S_2$  and  $S_3$ 

Your answer is Wrong

QUESTION ANALYTICS

**Q. 14**

A cache contains n block and main memory contains m blocks. If k-way associative mapping is used then what will be number of TAG bits

[Have any Doubt ?](#)

A

$$\log_2 \frac{mn}{k}$$

B

$$\log_2 \frac{nk}{m}$$

C

$$\log_2 \frac{m}{n}$$

D

$$\log_2 \frac{mk}{n}$$

Your answer is Correct

**Solution :**

(d)



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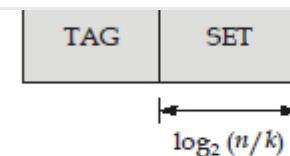
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$$\begin{aligned}\text{Number of TAG bits} &= \log_2(m) - \left( \log_2 \frac{n}{k} \right) \\ &= \log_2(m) - \log \frac{n}{k} \\ &= \log_2 \frac{mk}{n}\end{aligned}$$

## QUESTION ANALYTICS

## Q. 15

We define 3 algebraic structures over the matrix multiplication operator 'X' as described below.  
 You are required to match the items in list-I with the most suitable choices in list-II.

## List-I

- A. Set of all possible square matrices of order N
- B. Set of all possible non singular square matrices of order N
- C. Set of all possible diagonal matrices of order N

## List-II

- 1. Closed but not associative
- 2. Associative but not monoid
- 3. Monoid but not group
- 4. Group but not Abelian Group
- 5. Abelian Group

## Codes:

- |     | A             | B | C |
|-----|---------------|---|---|
| (a) | 3             | 4 | 5 |
| (b) | 3             | 5 | 5 |
| (c) | 3             | 4 | 4 |
| (d) | None of these |   |   |

Have any Doubt?

A  
aB  
bC  
c

Your answer is Wrong

D  
d

Correct Option

**Solution :**  
 (d)

Set of all possible square matrices of order N: The matrix may be singular, due to which inverse won't exist. So it won't form a group and will go only upto monoid.

Set of all possible non singular square matrices of order N: This forms a group over multiplication. But note that matrix multiplication is not commutative, therefore it is not Abelian.

Set of all possible diagonal matrices of order N: Again, a diagonal matrix need not have inverse. So it only goes upto monoid. So A - 3, B - 4, C - 3

## QUESTION ANALYTICS

## Q. 16

Consider the given grammar:

$$\begin{aligned}S &\rightarrow Bb \mid C \\ B &\rightarrow Bc \mid Bbe \mid b \mid \epsilon\end{aligned}$$



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S → Bb | C  
 B → bB'  
 B → cB' | beB' | ∈

B  
 S → Bb | C  
 B → bB' | B'  
 B' → cB' | beB' | ∈

Your answer is Correct

Solution :

(b)  
 S → Bb | C  
 B → Bc | Bbe | b | ∈

Equivalent non left recursive grammar.

S → Bb | C  
 B → bB' | B'  
 B' → cB' | beB' | ∈

So option (b) is correct.

C  
 S → Bb | C  
 B → bB'  
 B' → cB' | beB'

D  
 S → Bb | C  
 B → bB' | ∈  
 B' → cB' | beB'

QUESTION ANALYTICS

Q. 17

The number of diagonals that can be drawn in an octagon is equal to

Have any Doubt ?

A

16

B

20

Your answer is Correct

Solution :  
 (b)

In an octagon, there are 8 vertices. An edge in a  $n$ -sided polygon is called a diagonal if the edge between any 2 vertices (excluding the sides of the polygon).

So we will first count all the edges possible in a  $n$ -sided polygon, and then subtract the diagonals, in order to get the number of diagonals.

Number of edges in an  $n$ -sided polygon =  $"C_2$

Therefore number of diagonals =  $"C_2 - n = \frac{n(n-3)}{2}$

Putting  $n = 8$  for octagon, we get

$$\text{Number of diagonals} = \frac{(8.5)}{2} = 20$$

Therefore option (b) is the correct choice.

C



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## QUESTION ANALYTICS

## Q. 18

Consider the following statements:

- (i) T flip-flop can be used to generate a square wave.
  - (ii) 2 × 1 MUX can not be used to generate every circuit.
  - (iii) Maximum 2 × N state is possible in Johnson counter with N flip-flops.
- Which of the above statements are true?

Have any Doubt ?

A

Only (i)

B

Only (ii)

C

Only (ii) and (iii)

D

Only (i) and (iii)

Your answer is Correct

## QUESTION ANALYTICS

## Q. 19

Which of the following is correct?

Have any Doubt ?

A

In ring counter only one output is in high state at any point of time.

Your answer is Correct

Solution :

(a)

Option (a) is correct explanation of the ring counter.

B

More than one output can be in high state at any time in ring counter.

C

In ring counter with  $n$  flip-flops,  $2^n$  state is possible for counting

D

None of the above

## QUESTION ANALYTICS

## Q. 20

Consider the following relation with functional dependencies R{A B C D F E G}



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A

*R<sub>1</sub>(A, B, C)*

B

*R<sub>2</sub>(A, B, D, E)*

Your answer is Correct

**Solution :**

(b)

*R{A, B, C, D, E, F, G}* $F = \{AB \rightarrow C, AC \rightarrow B, AD \rightarrow E, B \rightarrow D, BC \rightarrow A, E \rightarrow G\}$ {AC, AB, BC} is keys so AD  $\rightarrow$  E, B  $\rightarrow$  D, E  $\rightarrow$  G is not in BCNF. So decompose relation R*R<sub>1</sub>(A, B, C), R<sub>2</sub>(B  $\rightarrow$  D), R<sub>3</sub>(E  $\rightarrow$  G), R<sub>4</sub>(A, D, E) R<sub>5</sub>(ABF)*AB  $\rightarrow$  CB  $\rightarrow$  DE  $\rightarrow$  GAD  $\rightarrow$  EAC  $\rightarrow$  BBC  $\rightarrow$  A

So in all options (A, B, D, E) is not a sub relation.

C

*R<sub>3</sub>(E, G)*

D

Both (b) and (c)

[QUESTION ANALYTICS](#)**Q. 21**

Consider the following statements with respect to POSETs.

- I. Every non empty, finite POSET has at least one maximal and at least one minimal element.  
 II. Every POSET has at most one greatest element and at most one least element.

Which of the above statement(s) is/are true?

[Have any Doubt ?](#)

A

I and II

Correct Option

**Solution :**

(a)

Let's see why I is true. We'll prove this for at least one maximal element and proof for min element will follow the same way. Let the POSET be Z. Let a be an element of Z. Now, if a is the maximal element, then there's an element  $a_2$  such that  $a_2 < a_1$ . If  $a_3$  is not maximal element, there must be an element  $a_4$  such that  $a_3 < a_4$ . But since Z is finite, we cannot continue arguing this forever. So at some point we have to stop and therefore every POSET will have at least one maximal element. We can use a similar logic for proving the existence of at least one element well. Therefore, I is true.

II is also true. Let's prove the first part of it (at most one greatest element) via contradiction. the second part can be proved by following the same approach.

Assume we have 2 greatest elements, say  $a$  and  $b$ . Since  $a$  is a greatest element, every element must be related to it, which includes  $b$  as well. This means,  $b \leq a$ . Similarly, since  $b$  is also greatest,  $a \leq b$ . Since a POSET is antisymmetric,  $b \leq a$  and  $a \leq b$  implies  $a = b$ . Therefore, it means there can be more than 1 greatest element. Also note that, the greatest element need not exist, as POSET need not be a lattice. Therefore, in a POSET we can have at most one greatest element. We can use similar reasoning for proving this for least element, hence II is also true.

B

Only I

C



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None of these

Your answer is Wrong

QUESTION ANALYTICS

**Q. 22**

Consider the following C declaration:

```
struct {
    short x[5];
    union {
        float y;
        long z;
    } u;
    short w[2];
} t;
```

Assume that the objects of the type short, float and long occupy 2 bytes, 4 bytes and 8 bytes, respectively. The memory requirement for variable t (ignore alignment considerations) is:

[Have any Doubt ?](#)

A

22 bytes

Your answer is Correct

**Solution :**

(a)

$$\begin{aligned} \text{Memory required} &= 2 \times 5 + \max(\text{sizeof}(y), \text{sizeof}(z)) + 2 \times 2 \\ &= 10 + 8 + 4 = 22 \end{aligned}$$

B

14 bytes

C

18 bytes

D

10 bytes

QUESTION ANALYTICS

**Q. 23**

A 5-stage IF, ID, EX, MEM and WB requires 2 clock cycles at EX stage else only one clock cycle at any other stages. Assume the below code segments has been implemented (Assume that operand forwarding used in the pipeline).

Instruction number	Instruction	Meaning
$I_1$	ADD $r_0, r_1, r_2$	$r_0 \leftarrow r_1 + r_2$
$I_2$	SUB $r_2, r_0, r_1$	$r_2 \leftarrow r_0 - r_1$
$I_3$	DIV $r_1, r_0, r_1$	$r_1 \leftarrow r_0 / r_1$

The number of clock cycles required to execute the above code is

[Have any Doubt ?](#)

A

7

B

8

C

9



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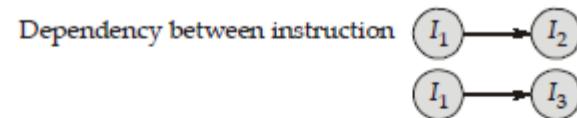
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**Solution :**  
 (d)


	1	2	3	4	5	6	7	8	9	10
I <sub>1</sub>	IF	ID	EX	EX	ME	WB				
I <sub>2</sub>		IF	ID	-	EX	EX	ME	WB		
			IF	-	ID	-	EX	EX	ME	WB

## QUESTION ANALYTICS

**Q. 24**

Consider the following matrices with dimensions.

 $A_1$  is  $4 \times 6$  $A_2$  is  $6 \times 8$  $A_3$  is  $8 \times 4$  $A_4$  is  $4 \times 5$ 

Which of the following multiplication order gives optimal solution?

A

 $((A_1 A_2) A_3) A_4$ 

B

 $(A_1 (A_2 A_3)) A_4$ Your answer is **Correct**
**Solution :**  
 (b)
(a)  $((A_1 A_2) A_3) A_4$  requires  $(4 \times 6 \times 8 + 4 \times 8 \times 4 + 4 \times 4 \times 5) = 400$  multiplications.(b)  $(A_1 (A_2 A_3)) A_4$  requires  $(6 \times 8 \times 4 + 4 \times 6 \times 4 + 4 \times 4 \times 5) = 368$  multiplications.(c)  $A_1 ((A_2 A_3) A_4)$  requires  $(6 \times 8 \times 4 + 6 \times 4 \times 5 + 4 \times 6 \times 5) = 432$  multiplications.(d)  $(A_1 A_2) (A_3 A_4)$  requires  $(4 \times 6 \times 8 + 8 \times 4 \times 5 + 4 \times 8 \times 5) = 512$  multiplications.

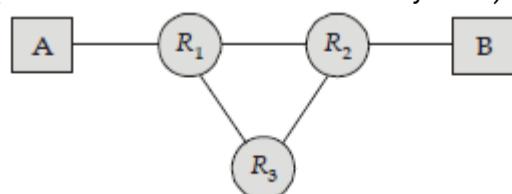
C

 $A_1 ((A_2 A_3) A_4)$ 

D

 $(A_1 A_2) (A_3 A_4)$ 

## QUESTION ANALYTICS

**Q. 25**
 Consider that host A and B are connected via routers as shown below. How many times each packet has to visit the network layer and the data link layer in worst case during transmission from A to B respectively?  
 (Assume each router is visited only once)


A

4 and 6



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C

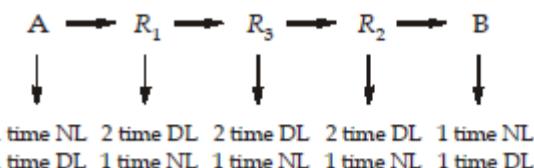
5 and 8

Your answer is Correct

**Solution :**

(c)

In worst case packet may be transferred from



Hence total 5 times network layer and 8 times data link layer.

D

6 and 8

QUESTION ANALYTICS

**Q. 26**

Assume a design of control unit is proposed by a student that supports 6 groups of mutually exclusion control signals. Group 1, Group 2, Group 3, Group 4, Group 5 and Group 6 has 2, 7, 9, 5, 12 and 17 control signals respectively. The total number of bits saved to represent control word using vertical over horizontal programming is \_\_\_\_\_.

Have any Doubt?

32

Correct Option

**Solution :**

32

By default we assume vertical micro-programming is used.

Hence, total bits required are:

$$\text{Group 1} + \text{Group 2} + \text{Group 3} + \text{Group 4} + \text{Group 5} + \text{Group 6}$$

$$= \lceil \log_2 2 \rceil + \lceil \log_2 7 \rceil + \lceil \log_2 9 \rceil + \lceil \log_2 5 \rceil + \lceil \log_2 12 \rceil + \lceil \log_2 17 \rceil \\ = 1 + 3 + 4 + 3 + 4 + 5 = 20$$

Using horizontal number of bits required = 52 bits.

Number of bits saved = 52 - 20 = 32

Your Answer is 27

QUESTION ANALYTICS

**Q. 27**

Consider the following statements given below:

S<sub>1</sub> : Leaf node of a tree always have only inherited attribute.S<sub>2</sub> : Temporary variables are one of the contents of an activation record.S<sub>3</sub> : For a given CFG, SLR(1) and LALR(1) parsing tables both will have differential shift entries.

Number of statements that are true \_\_\_\_\_.

Have any Doubt?

1

Correct Option

**Solution :**

1

S<sub>1</sub> : Leaf node of a tree have synthesized attributes as the value are taken from symbol table.



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true

QUESTION ANALYTICS

**Q. 28**

We are given two algebraic structures over an arbitrary alphabet  $\Sigma$ .

- $(\Sigma^*, .)$
- $(\Sigma^+, .)$

Where  $\Sigma^* = \Sigma^0 \cup \Sigma^1 \cup \Sigma^2 \cup \dots$ , and  $\Sigma^+ = \Sigma^* - \Sigma^0$  and  $'.'$  stands for the concatenation operation.  
 How many of the above algebraic structures is a group \_\_\_\_\_.

[Have any Doubt ?](#)

0

Correct Option

**Solution :**

0

I is a monoid, but not a group, because it doesn't have inverse.

II is not even monoid, and goes only upto semigroup, as the identity element does not belong to  $\Sigma^+$ .

Your Answer is 1

QUESTION ANALYTICS

**Q. 29**

Let X denote the minimum number of stacks required to implement a queue, and Y be the number of queues needed to implement a stack. Then the value of  $Y - X$  will be \_\_\_\_\_.

[Have any Doubt ?](#)

0

Your answer is Correct0

**Solution :**

0

Both X and Y are equal to 2

Therefore  $Y - X = 0$

Hence 0 is the answer.

QUESTION ANALYTICS

**Q. 30**

When searching for the key value 50 in a binary search tree, node containing the key values 10, 30, 40, 70, 90, 120, 150, 175 are traversed, in any order. The number of different orders possible in which these keys values can occur on the search path from the root to node containing the value 50 are \_\_\_\_\_.

[Have any Doubt ?](#)

56

Correct Option

**Solution :**

56

The answer will be  $\frac{8!}{3! * 5!} = 56$



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**Q. 31**

The maximum number of nodes in Binary Search Tree of height ' $h$ ' which have same inorder and preorder will be \_\_\_\_\_ (assume  $h = 2018$  and root is at height 0)

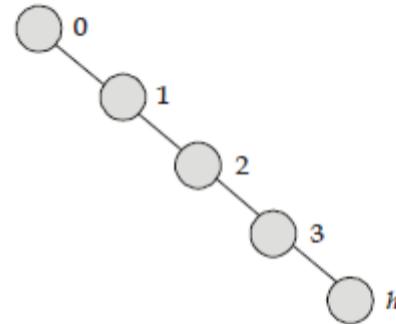
[Have any Doubt ?](#)

2019

 Your answer is **Correct2019**
**Solution :**

2019

Right Skew-Binary Search Tree will give same preorder and inorder.

So it will need  $h + 1$  nodes i.e.  $= 2018 + 1 = 2019$ .

QUESTION ANALYTICS

**Q. 32**

Let  $L_1 = 0^* 1^*$ ,  $L_2 = 1^* 0^*$ ,  $L_3 = (0 + 1)^*$  and  $L_4 = 0^* 1^* 0^*$ . the number of strings in the following language  $L = (L_1 \cap L_2) - (L_3 \cap L_4)$  are \_\_\_\_\_.

[Have any Doubt ?](#)

0

 Your answer is **Correct0**
**Solution :**

0

Given,  $L_1 = 0^* 1^*$ ,  $L_2 = 1^* 0^*$ ,  $L_3 = (0 + 1)^*$  and  $L_4 = 0^* 1^* 0^*$  $L_1$  can be simplified as,  $L_1 = 0^* + 1^* + 0^+ 1^+$ Similarly  $L_2 = 1^* + 0^* + 1^+ 0^+$ Therefore,  $L_1 \cap L_2 = 0^* + 1^*$ Since  $L_3 = (0 + 1)^*$  is a superset of  $L_4$ , so we can say that  $L_3 \cap L_4 = L_4$ So in this case  $L_3 \cap L_4 = 0^* 1^* 0^*$ 

$$\begin{aligned} \text{Hence, } L &= (L_1 \cap L_2) - (L_3 \cap L_4) \\ &= (0^* + 1^*) - (0^* 1^* 0^*) = \emptyset \end{aligned}$$

So the number of strings in the language  $L = 0$ .

QUESTION ANALYTICS

**Q. 33**

The order of an internal node in a B+ tree is the maximum number of child pointer a node can have. Suppose that a child pointer takes 10 bytes, the search field value takes 13 bytes and record pointer is 12 bytes the block size is 1024 bytes what is the order of internal node \_\_\_\_\_.

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

45

 Your answer is **Correct45**
**Solution :**

45



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$$\begin{aligned} 23n &\leq 103/ \\ n &\leq 45.08 \\ n &= 45 \end{aligned}$$

## QUESTION ANALYTICS

## Q. 34

Consider the following statements given below:

 $S_1$  : Contiguous file allocation leads to external fragmentation. $S_2$  : Continuous allocation allows both sequential and direct access. $S_3$  : Linked allocation exhibit external fragmentation.

How many number of statements are incorrect \_\_\_\_\_.

Have any Doubt ?

1

Correct Option

## Solution :

1

$S_1$  : Contiguous file allocation leads to external fragmentation because whenever a file is deleted a hole is created.  
 $S_2$  : Continuous allocation allows both sequential and direct access.  
 $S_3$  : Linked allocation does not exhibit external fragmentation.  
 Only 1 statement is incorrect.

Your Answer is 2

## QUESTION ANALYTICS

## Q. 35

Let  $L$  be a language over the alphabet {0, 1} which satisfies  $(\overline{L^*}) = (\overline{L})^*$ .

The number of languages which satisfy the above equality \_\_\_\_\_.

Have any Doubt ?

0

Correct Option

## Solution :

0

No language satisfies the above equality, because the LHS of the equality does not contain epsilon whereas the RHS does. We can see that even the empty language does not satisfy the above equality.

Therefore the answer will be 0.

## QUESTION ANALYTICS

## Q. 36

Match List-I with List-II and select the correct answer using the codes given below the lists:

## List-I

- A.  $(abb^*)^*$
- B.  $(a + ba)^* ( \in + b)$
- C.  $(a + b)^* ab^* ab^*$
- D.  $b(a + b)^* b$

## List-II

- 1. Every  $a$  is followed by atleast one  $b$ .
- 2. Contains at least 2  $a$ 's.
- 3. Contains all strings in which no two  $b$ 's are consecutive.
- 4. Contains all string starting and ending with  $b$ .
- 5. Contains strings having at least 2 length such that string starts and ends with  $b$ .



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- (b) 1 3 2 5  
 (c) 1 2 3 4  
 (d) None of these

Have any Doubt ?

A

a

Your answer is Wrong

B

b

C

c

D

d

Correct Option

**Solution :**

(d)

 $(abb^*)^* \Rightarrow$  Starts with a, and every 'a' is followed by at least one 'b'.  
 That's why (d) is the answer, as the regular expression (1) is only generating a subset of I string need not start with 'a'.  
 $(a + ba)^* ( \in + b) \Rightarrow$  No two b's are consecutive.  
 $(a + b)^* ab^*ab^* \Rightarrow$  At least two a's.  
 $b(a + b)^*b \Rightarrow$  Starts and ends with b and has atleast 2 length.

QUESTION ANALYTICS

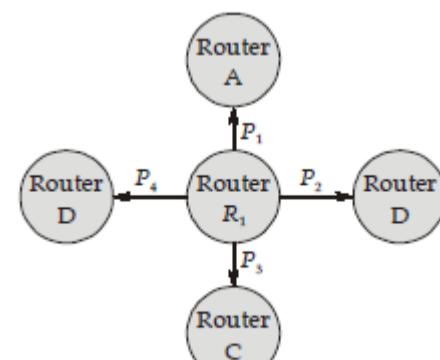
**Q. 37**A router  $R_1$  has the following entries in its routing table:

Address/Mask	Next Hop
192.53.40.0/23	Router A
135.46.56.0/22	Router B
135.46.60.0/22	Router C
Default	Router D

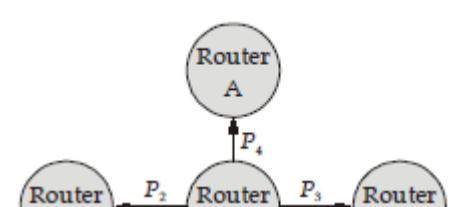
 Four packets  $P_1, P_2, P_3$  and  $P_4$  with IP addresses 135.46.63.10, 135.46.57.14, 135.46.52.2 and 192.53.40.7 respectively arrives at the  $R_1$ .  $R_1$  processed the packet and transfers it to their respective destination path. Which of the following figure displays the correct path for the packet  $P_1, P_2, P_3$  and  $P_4$ ?

Have any Doubt ?

A



B





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Correct Option

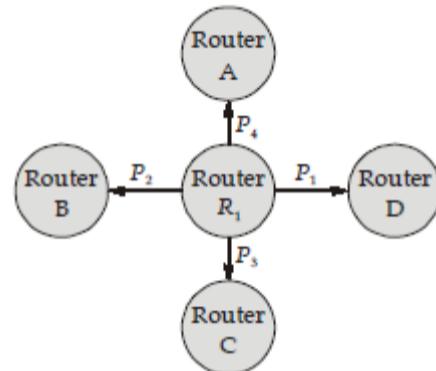
**Solution :**

(b)

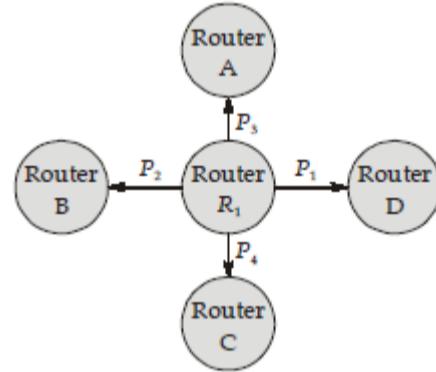
- $P_1 \rightarrow 135.46.63.10 \rightarrow \text{Router C}$   
 $P_2 \rightarrow 135.46.57.14 \rightarrow \text{Router B}$   
 $P_3 \rightarrow 135.46.52.2 \rightarrow \text{Router D}$   
 $P_3 \rightarrow 192.53.40.7 \rightarrow \text{Router A}$

So, option (b) is correct.

C



D

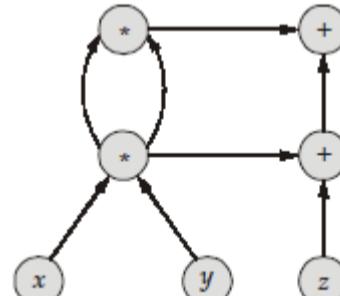


Your answer is Wrong

QUESTION ANALYTICS

**Q. 38**

Which one of the following expression represents the given Directed Acyclic Graph (DAG)?



Have any Doubt ?

A

$$((x * y + z) * (x * y) + z)$$

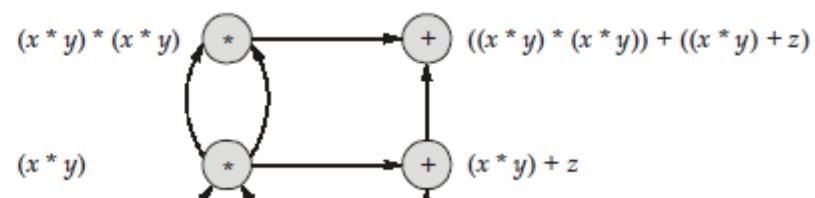
B

$$((x * y) * (x * y)) + ((x * y) + z)$$

Correct Option

**Solution :**

(b)





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$$((x * y) * (x * y)) + ((x * y) + z)$$

C

$$((x * y) + z) * (x * y)) + ((x * y)$$

D

None of the above

## QUESTION ANALYTICS

**Q. 39**

Consider the following code for synchronization of two process:

 $P_i$ :

While (True)

{

 While (get == j);  
 CRITICAL SECTION
 

get = j;

}

 $P_j$ :

While (True)

{

 While (get == i);  
 CRITICAL SECTION
 

get = i;

}

 Where get is shared variable between two process and initial value of get = *i* then which of the following is true about the above code?

Have any Doubt?

A

It satisfied mutual exclusion but does not prevent deadlock.

B

It satisfied mutual exclusion and progress.

C

It satisfied mutual exclusion but not progress.

Your answer is Correct

**Solution :**

(c)

It satisfied mutual exclusion since only one process can enter into critical section at a time. It requires the process to enter into strict alteration first  $P_i$  is executed then  $P_j$  because initial value of get = *i* then repeat the same. So it does not satisfy process.

So option (c) is correct.

D

None of the above

## QUESTION ANALYTICS

**Q. 40**

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

 $A \rightarrow B, B \rightarrow C, C \rightarrow D$ 

Which of the following decomposition is not lossless?

Have any Doubt?

A

 $R_1(A, B), R_2(B, C), R_3(C, D)$ 

B

 $R_1(A, B), R_2(A, C), R_3(A, D)$



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(c)

Consider a instance of relation R.

A	B	C	D
3	3	3	3
5	5	3	3

**R**

A	D
3	3
5	3

**R<sub>1</sub>**

B	D
3	3
5	3

**R<sub>2</sub>**

C	D
3	3

**R<sub>3</sub>**

A	B	C	D
3	3	3	3
5	3	3	3
3	5	3	3
5	5	3	3

**R<sub>1</sub> join R<sub>2</sub> join R<sub>3</sub>**

It contain some extra tuple so it is not lossless.

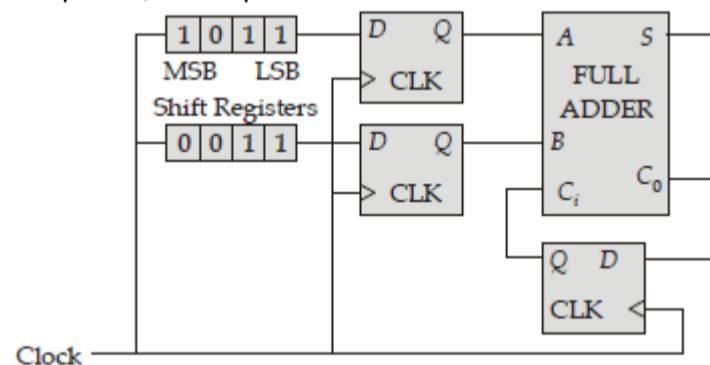
D

None of the above

QUESTION ANALYTICS

**Q. 41**

For the circuit shown in the figure below, two 4-bit parallel-in serial-out shift registers loaded with the data shown are used to feed the data to a full adder. Initially, all the flip-flops are in clear state. After applying two clock pulses, the outputs of the full adder should be



Have any Doubt ?

A

S = 0 C<sub>0</sub> = 0

B

S = 0 C<sub>0</sub> = 1

C

S = 1 C<sub>0</sub> = 0

D

S = 1 C<sub>0</sub> = 1

Your answer is Correct

**Solution :**

(d)

A	B	C <sub>i</sub>	S	C <sub>o</sub>
After 1 <sup>st</sup> CP	1	1	0	0 1
After 2 <sup>nd</sup> CP	1	1	1	1 1

QUESTION ANALYTICS



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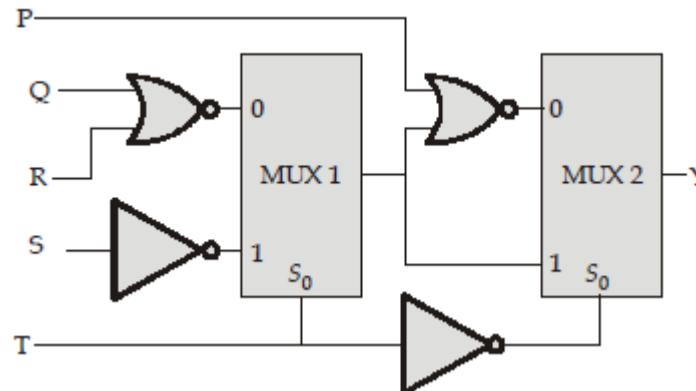
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Have any Doubt ?

A

5

B

7

Your answer is Correct

**Solution :**

(b)

When,  $T = \text{logic 0}$ , the path followed by the circuit would be,NOR gate  $\rightarrow$  MUX 1  $\rightarrow$  MUX 2 $\Rightarrow 2 \text{ ns} \rightarrow 1.5 \text{ ns} \rightarrow 1.5 \text{ ns}$  $\Rightarrow 5 \text{ ns}$ When,  $T = \text{logic 1}$ , the path followed by the circuit would be,NOR gate  $\rightarrow$  MUX 1  $\rightarrow$  NOR gate  $\rightarrow$  MUX 2 $\Rightarrow 2 \text{ ns} \rightarrow 1.5 \text{ ns} \rightarrow 2 \text{ ns} \rightarrow 1.5 \text{ ns}$  $\Rightarrow 7 \text{ ns}$  $\therefore$  Maximum propagation delay is 7 ns

C

8

D

4

## QUESTION ANALYTICS

**Q. 43**

Consider the following language:

- I.  $\{w^R x^R w^R y^R \mid w, x, y \in (0, 1)^*\}$
- II.  $\{x w x^R \mid w, x \in (0, 1)^*\}$
- III.  $\{w x^R w y^R \mid w, x, y \in (0, 1)^*\}$
- IV.  $\{w x^R w^R x \mid w, x, y \in (0, 1)^*\}$

Which of languages above are regular?

Have any Doubt ?

A

I and II

B

II and III

C

I, II, III and IV

D

I, II and III

Your answer is Correct



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IV → not regular

Try to avoid string matching by putting  $w$  as  $\epsilon$  and make  $x$  and  $y$  go to  $(0 + 1)^*$ . Therefore we can put  $x = \epsilon$  and  $y = (0 + 1)^*$ . This shows that the subset itself is  $\Sigma^*$  and thus, I is regular.

Similarly for II, we can put  $x$  as  $\epsilon$  and then put  $w$  as  $(0 + 1)^*$ . Therefore II is also regular.

Now in III, put  $w$  as  $\epsilon$  and make  $x^R$  and  $y^R$  go to  $\Sigma^*$  (note that between  $x$  and  $y$  there's no string matching). So III is also regular.

But IV is not regular let's see why.

Try getting rid of string matching by putting  $w$  as  $\epsilon$ .

But now we are left with  $xx^R$ , which is also string matching.

So if we start all over again by putting  $x$  as  $\epsilon$ , we are again left with  $ww^R$ , another string matching problem. So we cannot get rid of string matching at all here, as even if both  $w$  and  $x$  are made  $\epsilon$ , the string  $ww^R$  is  $\epsilon$ , but this proves nothing – only says that a subset of this language is regular, but that does not say anything at all about the language itself. So IV is not regular.

## QUESTION ANALYTICS

## Q. 44

Consider the following C code:

```
#include <stdio.h>
struct MadeEasy
{
    char p, q, r;
};
int main(void)
{
    struct MadeEasy a = {'d' - 2019, 'e', 5 + 'a'};
    struct MadeEasy *b = &a;
    printf("%c, %c", *((char*)b + 1) - 1, *((char*)b + 2) - 1);
    return 0;
}
```

The output of the following code will be

Have any Doubt ?

A

*d, e*

Correct Option

## Solution :

(a)

Since `%c` is being used, we will directly write the character on the RHS of each expression. Note that we don't need to evaluate ' $d$ ' - 2019 as it is not asked in the question.

$$*((\text{char}^*)b + 1) = e$$

Therefore  $*((\text{char}^*)b + 1) - 1 = d$

Similarly,  $*((\text{char}^*)b + 2) = f$

$$\Rightarrow *((\text{char}^*)b + 2) - 1 = e$$

So the output will be  $d, e$ .

Therefore choice (a) will be correct.

B

*e, f*

C

*'d, '4 + a'*

D

*'d, 'e'*

Your answer is Wrong



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Consider the following translation scheme:

$$\begin{aligned} S &\rightarrow AB \\ A &\rightarrow A * B \quad \{\text{print } ('+')\} \\ A &\rightarrow \text{id} \quad \{\text{print } (\text{id.value})\} \\ B &\rightarrow +B \quad \{\text{print } ('-+')\} \\ B &\rightarrow \text{id} \quad \{\text{print } (\text{id.value})\} \end{aligned}$$

Here id is a token which represent an integer and id.value represent the value of that integer. For an input  $2 * 4 * 8 + 3$ , this translation scheme prints.

[Have any Doubt ?](#)
 A  
 24 + 8 + - + 3 - +

 B  
 24 + 8 - + 3 - +

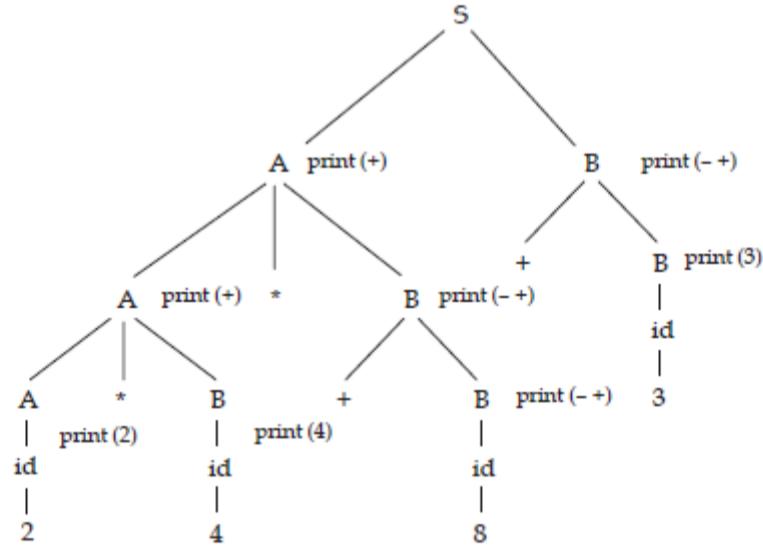
Your answer is Wrong

 C  
 24 + 8 - + + 3 - +

Correct Option

**Solution :**

(c)



It will print  $24 + 8 - + + 3 - +$   
 So option (c) is correct.

 D  
 24 + 8 + 3 - + +
[QUESTION ANALYTICS](#)**Q. 46**

Given two sequences  $A$  and  $B$ . Let  $X(A, B)$  denote the number of times that  $A$  appears as subsequence of  $B$  i.e. sequence  $ab$  appears 4 times as a subsequence of  $aebabdb$ . Let  $A_i$  denotes the first  $i$  characters of string  $A$  and  $A[i]$  denote the  $i^{\text{th}}$  character. Which of the following will computes the recurrence relation  $C(A_i, B_j)$ ?

$$C(A_i, B_j) = \begin{cases} 1; & \text{if } (i = 0) \\ 0; & \text{if } (i > 0 \text{ and } j = 0) \\ \dots & \dots \end{cases}$$

[Have any Doubt ?](#)

A

 $C(A_{i'}, B_{j-1}); \text{ if } A[i] \neq B[j]$   
 $C(A_{i'}, B_{j-1}) + C(A_{i-1}, B_{j-1}); \text{ if } A[i] = B[j]$ 

Correct Option

**Solution :**



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$$C(A_i, B_j) = \begin{cases} C(A_i, B_{j-1}); & \text{if } (A[i] \neq B[j]) \text{ when elements are not matched.} \\ C(A_i, B_{j-1}) + C(A_{i-1}, B_{j-1}); & \text{if } (A[i] = B[j]) \text{ when elements are matched.} \end{cases}$$

B

- $C(A_{i-1}, B_j)$ ; if  $A[i] = B[j]$   
 $C(A_i, B_{j-1}) + C(A_{i-1}, B_{j-1})$ ; if  $A[i] \neq B[j]$

C

- $C(A_i, B_{j-1})$ ; if  $A[i] = B[j]$   
 $C(A_i, B_{j-1}) + C(A_{i-1}, B_{j-1})$ ; if  $A[i] \neq B[j]$

Your answer is Wrong

D

- None of the above

QUESTION ANALYTICS

**Q. 47**

Consider 1 GBPS **IO** device connected to CPU using DMA module. DMA contain 24 bit address register, 8 bit count register and 64 bit data register. Word length of a CPU is 64 bit. File size which is in the disk is 4 kB. How many DMA cycles required to transfer the file?

Have any Doubt ?

A

3

B

2

Correct Option

**Solution :**

(b)

Count register size = 8 bit  
 DMA operation is controlled by the DMA module.  
 So, 8-bit count register maintains 256 counts.  
 $\therefore$  256 words data transmitted =  $256 \times 64$  bit =  $256 \times 8B = 2^{11} B$

$$\text{Number of DMA cycles} = \frac{4K}{2^{11}} = \frac{2^{12}}{2^{11}} = 2$$

C

4

D

6

QUESTION ANALYTICS

**Q. 48**

The number of 2 state DFAs possible over {a, b} with a designated (fixed) initial state such that language generated by the DFA is  $\Phi$  is equal to \_\_\_\_\_.

Have any Doubt ?

A

78



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C

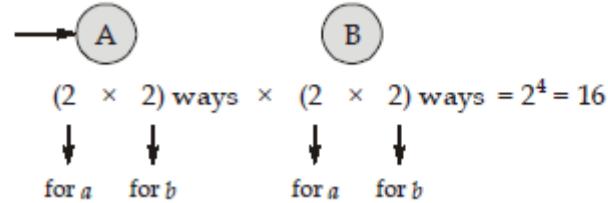
20

Correct Option

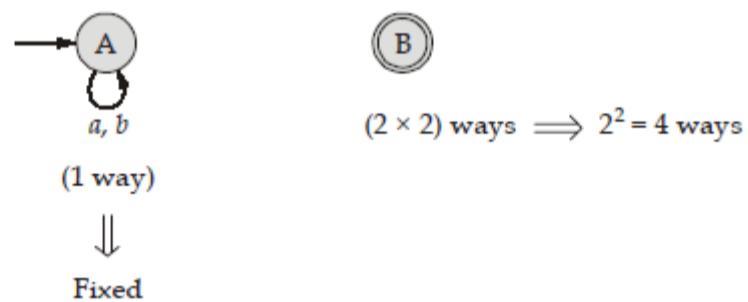
**Solution :**

(c)

To make sure that the language is empty, there are 2 cases:

**Case 1: No final state****Case 2:**

Final state not reachable from source



So total number of DFAs = (16 + 4) = 20

D

64

QUESTION ANALYTICS

**Q. 49**

Let  $f_1 = 100000n$ ,  $f_2 = \frac{1}{100!}n^2$ ,  $f_3 = (\log n)^{100!}$ ,  $f_4 = 2^n$  and  $f_5 = n \log n$ . Which of the following is the correct order of growths in ascending order.

Have any Doubt ?

A

 $f_3, f_1, f_2, f_5, f_4$ 

B

 $f_3, f_2, f_1, f_4, f_5$ 

C

 $f_3, f_1, f_5, f_2, f_4$ 

Your answer is Correct

**Solution :**

(c)

$$(\log n)^{100!} < 100000 n < n \log n < \frac{1}{100!} n^2 < 2^n$$

D

 $f_3, f_2, f_4, f_1, f_5$ 

QUESTION ANALYTICS

**Q. 50**



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$$\begin{bmatrix} 1 & 1 & 2 \end{bmatrix}$$
The matrix  $B$  is

Have any Doubt?

A

$$\begin{bmatrix} 4 & 5 & 10 \\ 0 & 5 & 6 \\ 2 & 3 & 9 \end{bmatrix}$$

B

$$\begin{bmatrix} 8 & 5 & 5 \\ 0 & 3 & 0 \\ 5 & 5 & 8 \end{bmatrix}$$

Your answer is **Correct**

Solution :

(b)

The characteristic equation of the matrix  $A$  is

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

$$\text{or, } (2-\lambda)(1-\lambda)(2-\lambda) - 1(0) + 1(\lambda - 1) = 0$$

$$\text{or, } \lambda^3 - 5\lambda^2 + 7\lambda - 3 = 0$$

According to Cayley - Hamilton theorem, we have

$$A^3 - 5A^2 + 7A - 3I = 0$$

$$\text{Now, } A^8 - 5A^7 + 7A^6 - 3A^5 + A^4 - 5A^3 + 8A^2 - 2A + I = A^5(A^3 - 5A^2 + 7A - 3I) + A(A^3 - 5A^2 + 7A - 3I) + A^2 + A + I$$

$$= A^2 + A + I$$

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

C

$$\begin{bmatrix} 8 & 9 & 5 \\ 0 & 5 & 0 \\ 5 & 6 & 2 \end{bmatrix}$$

D

$$\begin{bmatrix} 7 & 8 & 9 \\ 2 & 5 & 4 \\ 1 & 3 & 0 \end{bmatrix}$$

QUESTION ANALYTICS

**Q. 51**Find the absolute minimum value of a function  $f$  given by  $f(x) = 2x^3 - 15x^2 + 36x + 1$  in the interval  $[1, 5]$ .

Have any Doubt?

A

28

B

29

C



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(c)

We have,

$$\begin{aligned}f(x) &= 2x^3 - 15x^2 + 36x + 1 \\f'(x) &= 6x^2 - 30x + 36 \\&= 6(x - 3)(x - 2)\end{aligned}$$

Note that  $f'(x) = 0$ , gives  $x = 2$  and  $x = 3$ Also the double derivative at 2 is negative, therefore 2 is the point of maxima and so can't be a candidate for minima. But double derivative at 3 is positive, hence we shall now evaluate the value of  $f$  at these points and the end points of the interval  $[1, 5]$  i.e. at  $x = 1, x = 3$  and  $x = 5$ .

$x$	$f(x)$
1	24
3	28
5	56

Thus, we conclude that absolute minimum value of  $f$  in  $[1, 5]$  is 24, which occurs at  $x = 1$ .

D

20

QUESTION ANALYTICS

**Q. 52**The probability that a man in a group of  $n$  people will die is  $P$ . Then the probability that atleast one person dies in this group will be equal to[Have any Doubt ?](#)

A

$$(1 - (1 - P)^n)$$

Your answer is **Correct****Solution :**

(a)

$$P(\text{at least one dies}) = 1 - P(\text{none dies})$$

$$P(\text{none dies}) = (1 - P)(1 - P) \dots n \text{ times} = (1 - P)^n$$

$$\therefore P(\text{at least one dies}) = 1 - (1 - P)^n$$

 $\Rightarrow$  Option (a) is correct.

B

$$(1 - P)^n$$

C

$$P^n$$

D

None of these

QUESTION ANALYTICS

**Q. 53**

Match List-I with List-II and select the correct answer using the codes given below the lists:

**List-I**

A. FIN

**List-II**

1. Sent from the receiver to the sender when a packet is sent to a particular host that was not expecting it.
2. Process packets as they are received instead of buffering them.
3. It is used in the last packet.
4. When this flag is set then data may reach out of order.

B. URG

C. PSH

D. RST

Codes:

A B C D

(a) 1 2 4 3



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A

a

B

b

C

c

Have any Doubt ?

**Solution :**

(c)

- URG flag - It is used to notify the receiver to process the urgent packets before processing other packets. So data received may be out of order.
- PSH flag - Tells the receiver to process these packets as they are received instead of buffering them.
- RST - Send from receiver when a packet is sent to a particular host that was not expecting it.
- FIN - It is used in the last packet when sender has no more data to send.

Your answer is Correct

D

d

QUESTION ANALYTICS

**Q. 54**

A computer whose processes have 1 K pages in their address space uses single level paging and keeps its page table in memory. The overhead required for reading a word from the page table is 100 ns to reduce this overhead, computer uses a TLB, which holds 32 entries and has an access time of 1 nsec. What hit rate is needed to reduce mean overhead to 2 nsec \_\_\_\_\_. (Up to 2 decimal places)

Have any Doubt ?

0.99 (0.98 - 0.99)

Correct Option

**Solution :**

0.99 (0.98 - 0.99)

Suppose  $h$  is the hit rate of TLB

$$2 = 1 \times h + (1 - h) (100 + 1)$$

$$2 = h + 101 - 101h$$

$$2 = 101 - 100h$$

$$h = \frac{99}{100} = 0.99$$

Your Answer is 98.98

QUESTION ANALYTICS

**Q. 55**

Consider the following schedule:

 $S : r_2(A), w_1(B), w_1(C), r_3(B), r_2(B), r_1(A), \text{commit\_1}, r_2(C), \text{commit\_2}, w_3(A), \text{commit\_3}$ 

How many given statements are true about schedule(S) \_\_\_\_\_.

- Schedule(S) is conflict serializable schedule.
- Schedule(S) is allowed by 2PL.
- Schedule(S) is strict recoverable schedule.
- Schedule(S) is allowed by strict 2PL.

Have any Doubt ?



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**Solution :**

3

Your Answer is 2

QUESTION ANALYTICS

**Q. 56**

Consider the following statements:

 $S_1$  : IMAP protocol always synchronized with the mail server but not POP protocol. $S_2$  : POP protocol is used to download an e-mail from mail-box server to a mail client. $S_3$  : DNS uses TCP for its query and response messages. $S_4$  : Firewall works on application but not on network layer.

The number of correct statements are \_\_\_\_\_.

Have any Doubt ?

2

Your answer is Correct2

**Solution :**

2

- Statement  $S_1$  is correct because IMAP protocol whenever user changes anything on the client side same time it changes on the server side because of synchronized.
- Statement  $S_2$  is correct
- DNS uses UDP, so statement  $S_3$  is incorrect
- Firewalls works on network layer also called as packet filters or on application layer so statement  $S_4$  is incorrect.

QUESTION ANALYTICS

**Q. 57**

A CPU cache is organized into 2 level cache  $L_1$  and  $L_2$ . The penalty for  $L_1$  cache miss and  $L_2$  cache miss are 60 and 30 respectively for 1200 memory references. The hit time of  $L_1$  and  $L_2$  are 5 and 10 clock cycles and penalty for  $L_2$  cache miss to main memory is 70 clock cycles. The average memory access time will be \_\_\_\_\_ (In clock cycles upto 2 decimal places)

Have any Doubt ?

7.25 (7.20 - 7.30)

Correct Option

**Solution :**

7.25 (7.20 - 7.30)

Average Memory Access Time,

$$T_{avg} = \text{Hit time } L_1 + \text{Miss rate } L_1 * (\text{Hit time } L_2 + \text{Miss rate } L_2 * \text{Miss penalty})$$

$$\text{No, Miss rate } L_1 = \frac{60}{1200} = 0.05$$

$$\text{Miss rate } L_2 = \frac{30}{60} = 0.5$$

$$\text{Now, } T_{avg} = 5 + 5\% \text{ of } (10 + 50\% \text{ of } 70)$$

$$= 5 + 5\% \text{ of } 45$$

$$= 5 + 2.25$$

$$= 7.25 \text{ clock cycles}$$

Your Answer is 7.05



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**Q. 58**

Consider the following sentence:

**"Golden eggs are tasty"**Let  $G(x) : x$  is Golden $E(x) : x$  is an egg $T(x) : x$  is tasty

Now consider the following first order statements.

**I.**  $\forall x (G(x) \Rightarrow (E(x) \Rightarrow T(x)))$ **II.**  $\forall x (E(x) \Rightarrow (G(x) \Rightarrow T(x)))$ **III.**  $\forall x (\sim T(x) \Rightarrow \sim G(x) \vee \sim E(x))$ **IV.**  $\forall x (\sim T(x) \Rightarrow (G(x) \Rightarrow \sim E(x)))$ 

The number of correct predicate translations for the sentence given above is \_\_\_\_\_.

4

Correct Option

**Solution :**

4

All are correct translations:

- In (I), we first check if it is golden, then we see if it's an egg, then it will surely be tasty.
- In (II), we first check if it is an egg and then see if it is golden, so both I and II mean the same thing.
- (III) is contrapositive of  $(G(x) \wedge E(x) \Rightarrow T(x))$  and hence it also is true.
- (IV) is same as III;  $(\sim G(x) \vee \sim E(x))$  is rewritten as  $(G(x) \Rightarrow \sim E(x))$ .

QUESTION ANALYTICS

**Q. 59**

Let M, N and P be two relations on the set {1, 2, 3, ..., 100} defined as follows:

$$M = \{(a, b) \mid b = a^2\}$$

$$N = \{(a, b) \mid b = a + 5\}$$

 $P = M \cdot N$ , where  $\cdot$  is the usual composition operation.If  $\text{card}(A)$  denotes the cardinality of a relation A, then the value of  $\text{card}(P)$  is equal to \_\_\_\_\_.

5

Correct Option

**Solution :**

5

Let's first find the relation P.

$$P = M \cdot N(a) = M(N(a))$$

$$= M(a+5) = \{(a, b) \mid b = (a+5)^2\}$$

So

$$P = \{(1, 36), (2, 49), (3, 64), (4, 81), (5, 100)\}$$

Therefore  $\text{card}(P) = 5$ .

Your Answer is 950

QUESTION ANALYTICS

**Q. 60**

Consider the following relation:

Sailors (sid, sname, rating, age)

sid	sname	rating	age
1	X	11	19
2	A	4	15
-	-	-	-



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18	D	15	25
25	Y	6	21

Instance of sailors

How many number of tuples is returned by the following SQL query when executed on the given instance of Sailors?

```
Select S.sname FROM Sailors S WHERE
  NOT EXISTS (SELECT * FROM Sailors S1
    WHERE S1.age < 18 AND
      S.rating <= S1.rating)
```

[Have any Doubt ?](#)

3

Correct Option

**Solution :**

3

SQL query returns the sname of sailors with a higher rating than all sailors with age less than 18. The relation return by the SQL query:

sname
X
Y
D

Total 3 tuples returns.

Your Answer is 6

QUESTION ANALYTICS

**Q. 61**

Consider the following C code:

```
#include <stdio.h>
int fun( )
{
    static int num = 25;
    return num--;
}
int main( )
{
    for(fun(); fun(); fun())
        printf("%d", fun());
    return 0;
}
```

The sum of the values printed by the above program will be \_\_\_\_\_.

[Have any Doubt ?](#)

100

Correct Option

**Solution :**

100

The output printed by the given program will be 23, 20, 17, 14, 11, 8, 5, 2. Therefore the sum of these values will be 100.

Your Answer is 92

QUESTION ANALYTICS



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

Process	Arrival Time	Burst Time
$P_1$	0	23
$P_2$	3	14
$P_3$	6	19
$P_4$	12	22
$P_5$	15	27
$P_6$	18	17

What is average turn around time using longest job first scheduling \_\_\_\_\_. (Upto 2 decimal places)

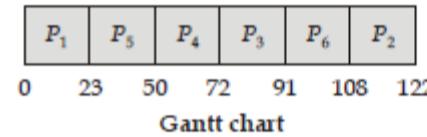
[Have any Doubt?](#)

68.66 (68.64 - 68.68)

Correct Option

**Solution :**

68.66 (68.64 - 68.68)



Process	Completion Time	Turn Around Time
$P_1$	23	23
$P_2$	122	119
$P_3$	91	85
$P_4$	72	60
$P_5$	50	35
$P_6$	108	90

$$\text{Average turn around time} = \frac{23 + 119 + 85 + 60 + 35 + 90}{6} = \frac{412}{6} = 68.66$$

Your Answer is 84.50

QUESTION ANALYTICS

**Q. 63**
 Assume that A and b are only active stations on an ethernet. Both has a steady queue of frames to send. To get the control on channel they uses binary exponential algorithm. Both are attempting to transmit the frame. The probability that both are successfully allowed to send the frame on 4<sup>th</sup> round and in earlier attempts both A and B collides is \_\_\_\_\_. (Upto 2 decimal places)

[Have any Doubt?](#)

0.11 (0.10 -0.11)

Correct Option

**Solution :**

0.11 (0.10 -0.11)

At attempt 1, both try and will results in collision.

At attempt 2, number of slots will be 2 i.e. 0, 1

At attempt 3, number of slots will be 4 i.e. 0, 1, 2, 3

At attempt  $i$ , number of slots will be  $2^{i-1}$ 

$$\text{So probability of collision at attempt } i = \frac{1}{2^{i-1}}$$

 Now, probability that both successfully transmits on 4<sup>th</sup> round = Collision in 1<sup>st</sup> round  $\times$  Coll in 2<sup>nd</sup> round  $\times$  Collision in 3<sup>rd</sup> round  $\times$  Success in 4<sup>th</sup> round

$$= \frac{1}{2^{(1-1)}} \times \frac{1}{2^{(2-1)}} \times \frac{1}{2^{(3-1)}} \times \left[ 1 - \frac{1}{2^{(4-1)}} \right]$$



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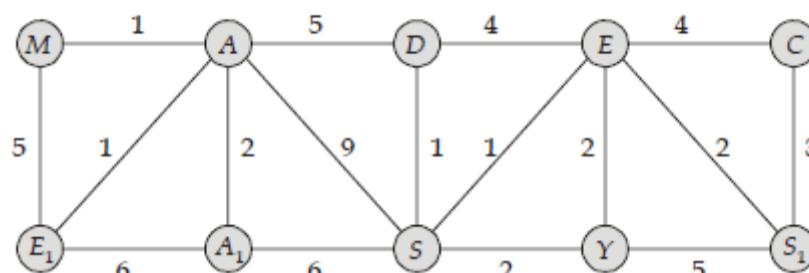
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## QUESTION ANALYTICS

**Q. 64**

Assume that  $G$  be a graph with  $(v, e)$  where  $v$  is the set of vertices and  $e$  is the set of edges in  $G$ . Assume that  $E_{sp}$  be the cost of edges of shortest path from  $M$  to  $S$ , which is computed by Dijkstra's algorithm. The graph  $G$  is given below.



Let  $E_{max}$  is the cost of all edges which show shortest path from  $M$  to every other vertices. What is the value of  $E_{max} - E_{sp}$ ?

[Have any Doubt ?](#)

51

Correct Option

**Solution :**

51

Minimum spanning tree by using Dijkstra's is

$$E_{max} = 0 + 2 + 1 + 3 + 6 + 7 + 9 + 8 + 10 + 12 = 58$$

$$E_{sp} = 1 + 5 + 1 = 7$$

$$\text{Value of } E_{max} - E_{sp} = 58 - 7 = 51$$

[Your Answer is 15](#)

## QUESTION ANALYTICS

**Q. 65**

A bag contains 40 tickets numbered 1, 2, 3 ... 40, of which four are drawn at random and arranged in ascending order ( $t_1 < t_2 < t_3 < t_4$ ). The probability of  $t_3$  being 25 is \_\_\_\_\_. (Upto 3 decimal places)

[Have any Doubt ?](#)

0.045 (0.040 - 0.050)

Correct Option

**Solution :**

0.045 (0.040 - 0.050)

Here exhaustive no of cases =  ${}^{40}C_4$ .

If  $t_3 = 25$ , then tickets  $t_1$  and  $t_2$  must come out of 24 tickets numbered 1 to 24. This can be done in  ${}^{24}C_2$  ways.

Then  $t_4$  must come out of the 15 tickets (numbered 26 to 40) which can be done in  ${}^{15}C_1$  ways.

∴ favorable number of cases =  ${}^{24}C_2 \times {}^{15}C_1$

Hence the probability of  $t_3$  being 25

$$= \frac{{}^{24}C_2 \times {}^{15}C_1}{{}^{40}C_4}$$

$$= \frac{4140}{91390} = 0.0453$$

## QUESTION ANALYTICS

