



Kunal Jha

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FULL SYLLABUS TEST-1 (BASIC LEVEL) GATE 2020 - REPORTS

OVERALL ANALYSIS

COMPARISON REPORT

SOLUTION REPORT

ALL(65)

CORRECT(0)

INCORRECT(0)

SKIPPED(65)

Q. 1

Solution Video

Have any Doubt?



A part of the sentence given is italicised and underlined. Below are given alternatives to the italicised part which may improve the sentence. Choose the correct alternative. In case no improvement is needed, option (d) is the answer. It became clear that the strangers were heading into a serious disaster.

(A) along

(B) towards

Correct Option

(C) to

(D) No improvement

QUESTION ANALYTICS



Q. 2

Solution Video

Have any Doubt?



Question consists of two words which have a certain relationship to each other followed by four pairs of related words. Select the pair which has the same relationship.
FILTER : WATER

(A) Curtail : Activity

(B) Expunge : Book

(C) Play : Sport

(D) Censor : Play

Correct Option

Solution :
(d)

QUESTION ANALYTICS



Q. 3

Solution Video

Have any Doubt?



If the positive integer N is a perfect square, which of the following must be true?

- I. The number of distinct factors of N is odd.
- II. The number of distinct prime factors of N is even.

(A) I only

Correct Option

Solution :
(a)

1. Perfect square always has even powers of its prime factors. That is why, the number of distinct factors of a perfect square is always odd.
 2. A perfect square of the form $a^{\text{even number}} \times b^{\text{even number}} \times c^{\text{even number}}$ will always have odd number of distinct prime factors.
- So, only I must be true.

(B) II only

(C) I and II both

(D) None

QUESTION ANALYTICS



Q. 4

Solution Video

Have any Doubt?



A store sells oranges in pack of 6, 9, or 20. By buying 2 packs of 6, you can get 12. But you cannot buy 13 oranges, since no combination of 6, 9, and 20 adds up to 13. What is the greatest number of oranges that you **CANNOT** buy in the store?

Solution :

(a)

Let us go option by option to check which combination cannot be formed.

Option (a) $43 = 4 \times 4 + 20$ = cannot be formed.Option (b) $44 = 6 \times 4 + 20$ = can be formed.Option (c) $45 = 9 \times 5$ = can be formed.Option (d) $46 = 20 \times 2 + 6$ = can be formed.The sum of the possible values of x in the equation $|x+7| + |x-8| = 16$ is _____**Solution :**

1

$$|x+7| + |x-8| = 16$$

Case 1 : $x < -7$

$$\Rightarrow -(x+7) - (x-8) = 16$$

$$\Rightarrow -2x + 1 = 16$$

$$\Rightarrow x = \frac{-15}{2} = -7.5$$

Case 2 : $-7 \leq x < 8$

$$\Rightarrow (x+7) - (x-8) = 16$$

 $\Rightarrow 15 = 16$, which is not possible.
Case 3 : $x \geq 8$

$$\Rightarrow (x+7) + (x-8) = 16$$

$$\Rightarrow 2x - 1 = 16$$

$$\Rightarrow x = \frac{17}{2} = 8.5$$

 \therefore Sum of all possible values of $x = 8.5 - 7.5 = 1$

What is the sum of all 3 digit numbers that leave a remainder of '2' when divided by 3?

Solution :

(b)

The series will be of the form : 101, 104, 107...., 995, 998.

It will have a total of 300 terms ($999 - 100 + 1 = 900$). Take $\frac{1}{3}$ of this, since only 1 term is there in every 3)

$$\begin{aligned} \text{Now, } \text{Sum} &= \frac{(1^{\text{st}} \text{ number} + n^{\text{th}} \text{ number}) \times n}{2} \\ &= \frac{(101 + 998) \times 300}{2} \\ &= \frac{1099 \times 300}{2} \\ &= 164,850 \end{aligned}$$

In a drawer of shirts, 8 are blue, 6 are green and 4 are magenta. If Sachin draws 2 shirts at random, what is the probability that at least one of the shirts he draws will be blue?

A $\frac{25}{153}$

B $\frac{28}{153}$

C $\frac{5}{17}$

D $\frac{12}{17}$

Correct Option

Solution :

(d)

There are a total of 18 shirts : 8 blue and 10 non blue.

P (selecting at least 1 blue shirt) = $1 - P$ (selecting no blue shirts)

Assuming no replacement

$$P \text{ (selecting first non-blue shirt)} = \frac{10}{18}$$

$$P \text{ (selecting second non-blue shirt)} = \frac{9}{17}$$

$$P \text{ (selecting no blue shirts)} = \frac{10}{18} \times \frac{9}{17} = \frac{10}{34}$$

$$\therefore P \text{ (selecting at least 1 blue shirt)} = 1 - \left(\frac{10}{34} \right) = \frac{24}{34} = \frac{12}{17}$$

QUESTION ANALYTICS



Q. 8

Solution Video

Have any Doubt ?



A dairyman pays ₹ 6.40 per litre of milk. He adds water and sells the mixture at ₹ 8 per litre, thereby making 37.5% profit. The proportion of water to milk received by the customers is

A 1 : 10

Correct Option

Solution :

(a)

Milk = m litres;

Water = w litres;

Cost of $(m + w)$ litres = $6.4 m$;

Selling price of $(m + w)$ litres = $8(m + w)$.

$$\text{Given that } 6.4 m \times 1.375 = 8(m + w) \Rightarrow \frac{w}{m} = \frac{1}{10}.$$

B 1 : 12

C 1 : 15

D 1 : 20

QUESTION ANALYTICS



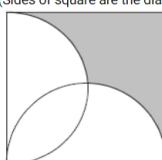
Q. 9

Solution Video

Have any Doubt ?



Two semicircles are drawn on adjacent sides of a square with side length 4 units as shown below. What is the area of the shaded region in unit²?
(Sides of square are the diameter of the two semicircles)



A $12 - \pi$

Correct Option

B $12 - 2\pi$

Solution :

(b)

Since the two semi circles are congruent, they intersect at the top of the arc.

We can divide this into 3 regions

I. A quarter circle with radius 2 (Area = $\frac{\pi \times 2 \times 2}{4} = \pi$)

II. A square with side 2 (Area = $2 \times 2 = 4$)

III. Another quarter circle with radius 2 (Area = $\frac{\pi \times 2 \times 2}{4} = \pi$)

Total = $4 \times 4 = 16$

Shaded Area = Total Area - I - II - III

\therefore Shaded Area = $16 - \pi - 4 - \pi = 12 - 2\pi$

C $12 + \pi$

D $12 + 2\pi$

QUESTION ANALYTICS

Q. 10

Solution Video

Have any Doubt?



Eight litres are drawn off from a vessel full of water and substituted by pure alcohol. Again eight litres of the mixture are drawn off and substituted by pure alcohol. If the vessel now contains water and alcohol in the ratio 9 : 40, the capacity of the vessel in litre is_____.

14

Correct Option

Solution :

14

Let the capacity of the vessel be x .

After the first removal there would be $x - 8$ litres of water left in the vessel. Note that the share of the water would be $\frac{x-8}{x}$;

After the second removal, the mixture of 8 litres will contain $8 \times \frac{x-8}{x}$ litres of water, so there will be $(x-8) - 8 \times \frac{x-8}{x} = \frac{(x-8)^2}{x}$ litres of water left.

As the ratio of water to alcohol after that is $\frac{9}{40}$, then the ratio of water to the capacity of the vessel would be $\frac{9}{40+9} = \frac{9}{49}$.

$$\text{So } \frac{\frac{(x-8)^2}{x}}{x} = \frac{9}{49}$$

$$\Rightarrow \frac{(x-8)^2}{x^2} = \frac{9}{49}$$

$$\Rightarrow \frac{x-8}{x} = \frac{3}{7}$$

$$\Rightarrow x = 14$$

QUESTION ANALYTICS



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

Q. 11

Solution Video

Have any Doubt?



Which of the following is false.

- A** Turing machine with multiple tapes has same power as of Turing machine.
- B** Mealy and Moore machines have same power.
- C** DPDA has less power than NPDA.
- D** Unidirectional TM has less power than standard TM.

Correct Option

Solution :

(d)
Unidirectional TM has same power as of standard TM

QUESTION ANALYTICS



Q. 12

Have any Doubt?



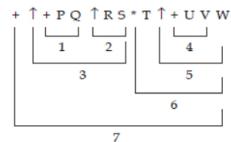
Which of the following is the correct postfix expression for the below prefix expression?

+ ↑ + PQ ↑ RS * T ↑ + UVW

- A** PQ + RS + ↑ UV + T * W ↑ T * +
- B** PQ + ↑ RS + UV + T * WT +
- C** PQ + RS ↑ TUV + W ↑ * +

Correct Option

Solution :
(c)



Postfix: PQ + RS ↑ TUV + W ↑ * +

Scan from left to right, whenever operator followed by two operands come convert it into postfix otherwise push onto stack.

- D** PQ + RS ↑ TUV + W ↑↑ * +

QUESTION ANALYTICS



Q. 13

Solution Video

Have any Doubt?



Consider the regular expression $R = (a+b)^*a(ab)^* \epsilon$. Which of the following are possible as subset of R ?

- (i) (aa)*
- (ii) (ba)*
- (iii) (aa)*(ba)*

- A** (i) and (ii) only

- B** (ii) and (iii) only

- C** (i), (ii) and (iii)

Correct Option

Solution :
(c)

$$R = (a+b)^*a(ab)^* \epsilon$$

(i) (aa)* = a(aa)*a + ε is subset

$$R = \frac{(a+b)^*}{a(aa)^*} \frac{a}{a} \frac{(ab)^*}{\epsilon} \frac{\epsilon}{\epsilon}$$

(ii) (ba)* = b(ab)*a + ε is subset of R

$$R = \frac{(a+b)^*}{a} \frac{a}{b} \frac{(ab)^*}{a} \frac{\epsilon}{\epsilon}$$

$$\begin{aligned}
 & b(ab)^* a \quad \epsilon \quad \epsilon \\
 (iii) \ (aa)^*(ba)^* &= (aa)^* + (ba)^* + (aa)^*(ba)^* \text{ is subset of } R \\
 R &= \frac{(aa)^* + (ba)^*}{R} + \frac{(ab)^* b(ab)^* a}{(a+b)^* a}
 \end{aligned}$$

$\therefore (i), (ii) \text{ and } (iii) \text{ are correct subsets of } R.$

D None of these

QUESTION ANALYTICS

Q. 14

Solution Video

Have any Doubt?



Assume a CPU bus has 16 data lines and requires 4 cycles of 250 ns each to transfer data. If the cycle time of the bus was reduced to 125 ns and number of cycles required for transfer remains the same. What would be the ratio of new to the old bandwidth of the bus?

A 1:2

B 2:1

Correct Option

Solution :
(b)

Bandwidth = Rate of data line \times Number of data lines

$$\text{Old} = \frac{1 \text{ bits}}{4 \times 250 \text{ ns}} \times 16 = 2 \text{ MBps}$$

$$\text{New} = \frac{1 \text{ bits}}{4 \times 125 \text{ ns}} \times 16 = 4 \text{ MBps}$$

Ratio of New : Old = 4 : 2 = 2 : 1

C 2:3

D 4:3

QUESTION ANALYTICS

Q. 15

Solution Video

Have any Doubt?



What is the length of longest common subsequence of "madeeasygate" and "cseonlinetest" _____.

A 3

B 4

Correct Option

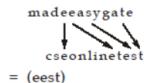
Solution :
(b)

$$x = \text{madeeasygate}$$

$$y = \text{cseonlinetest}$$

LCS (x, y) = eest

Length of LCS = 4



$$= (\text{eest})$$

C 5

D 6

QUESTION ANALYTICS

Q. 16

Solution Video

Have any Doubt?



The minimum number of colours required to sufficiently colour any planar graph is equal to _____.

A 2

B 3

C 4

Correct Option

Solution :
(c)

Four colour theorem says "Every planar graph can be coloured with at most 4 colours." But here in this question, the 'minimum' phrase is the trick - in the sense that the question wants you to think of 'minimum' in worst case, as it also uses the word 'any planar graph'. Hence the usage of 'any' signals the need to think of the worst case chromatic number, which is 4 according to the 4 colour theorem. And hence (c) is the answer.

D None of these

QUESTION ANALYTICS

Q. 17

Solution Video

Have any Doubt ?



Which of the following is true?

- A User level threads of a particular process are scheduled to run within that process time slice.

Correct Option

Solution :

- (a)
User level threads of a particular process are scheduled to run within that process time slice. Loop instructions can be interrupted. Indexed allocation can not lead to external fragmentation.

- B Loop instructions can not be interrupted till they complete.

- C Indexed allocation can lead to external fragmentation.

- D Both (a) and (c)

QUESTION ANALYTICS



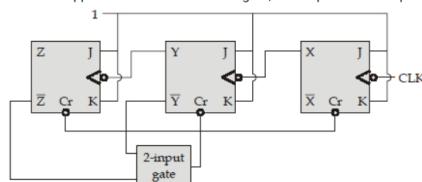
Q. 18

Solution Video

Have any Doubt ?



In the mod-6 ripple counter. Shown in the figure, the output of the 2-input gate is used to clear the J-K flip-flops.



The 2-input gate will be

- A An OR gate

Correct Option

Solution :

- (a)
After 6th pulse all flip-flops should be cleared.

$$ZYX = 110$$

$$\bar{Z}\bar{Y}x = 00x$$

↑ Dont care

Output of 2-input gate should be 0 to clear so when OR gate will be used and both input is 0 the flip-flops will be cleared.

- B A NAND gate

- C A XOR gate

- D A AND gate

QUESTION ANALYTICS



Q. 19

Solution Video

Have any Doubt ?



Which of the following is true?

- A Error control is a mandatory service of network layer.

- B Session layer in OSI model is responsible for compression and decompression of data.

- C In TCP a unique sequence number assigned to each byte.

Correct Option

Solution :

- (c)
(a) Error control is a mandatory service of transport layer.
(b) Presentation layer is responsible for compression and decompression of data.
(c) In TCP a unique sequence number assigned to each bytes.

- D Both (b) and (c)

QUESTION ANALYTICS



Q. 20

[Have any Doubt ?](#)

How much time it will take to sort n numbers by quick sort if some arbitrary algorithm takes $O(n^2)$ time to choose pivot?

A $O(n \log n)$

B $O(n^2)$

C $O(n^3)$

Correct Option

Solution :

(c)

Recurrence relation in worst case

$$T(n) = T(n - 1) + T(1) + n^2$$

On solving we get $O(n^3)$.

D $O(n^4)$

QUESTION ANALYTICS



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Q. 21

Solution Video Have any Doubt ?

The density function of repairing a machine is given by $f(x) = \frac{1}{2} e^{-\frac{x}{2}}$, where 'x' is repair time in hours. The probability that the repair time is more than 2 hours is

A 0.368

Correct Option

Solution :
 (a)

$$\begin{aligned}\text{Probability} &= \int_2^{\infty} f(x)dx \\ &= \int_2^{\infty} \frac{1}{2} e^{-\frac{x}{2}} dx \\ &= \left[-e^{-\frac{x}{2}} \right]_2^{\infty} = e^{-1} = 0.368\end{aligned}$$

B 0.482

C 0.518

D 0.632

QUESTION ANALYTICS

+

Q. 22

Solution Video Have any Doubt ?

We are given two sets namely X and Y, such that X and Y have 10 and 20 elements respectively, and X is a subset of Y. Then the cardinality of $X \cup Y$ is equal to _____.

A 10

B 20

Correct Option

Solution :
 (b)
 Since X is a subset of Y, we can write $n(X \cap Y) = n(X) = 10$.

Now we can directly say that 20 is the answer - as X is a subset of Y, the union of X and Y will be the set Y itself. Y contains 20 elements, and thus the required cardinality will be 20 itself.

C 30

D None of these

QUESTION ANALYTICS

+

Q. 23

Solution Video Have any Doubt ?

Consider the following schema and given SQL query:

Branch (name, city, assets)

Select distinct T.name FROM Branch T, Branch S

where T.assets > S.assets and

S.city = "Delhi"

Which of the following is returned by the above SQL query?

A Names of any branch that have greater assets than any branch located in Delhi.

B Names of all branches that have greater assets than any branch located in Delhi.

Correct Option

Solution :
 (b)

SQL query returns the names of all branches that have greater assets than any branch located in Delhi.

C Names of all branches that have greater assets than all branch located in Delhi.

D None of these

Q. 24

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

The number of bijections possible from the set {1, 2, 3, 4, 5} to itself is equal to

 A 2^5 B $5!$

Correct Option

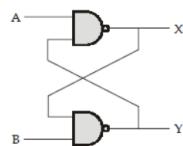
Solution :
 (b)
 The number of bijections = $5!$
 Therefore (b) is the answer.

 C 5^2 D 5

Q. 25

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

In the following figure assume A = 1. If the input B is a sequence 101010 then the output X and Y will be

 A X = 0101 ... while Y = 1010 B X = 1010 ... while Y = 0101 C Fixed at 0 and 1 respectively

Correct Option

Solution :
 (c)
 When, A = 1 and B = 1
 $X = \bar{Y}$
 $Y = \bar{X}$
 Now, A = 1 and B = 0
 $Y = 1$
 $X = 0$
 Now, A = 1 and B = 1
 $X = \bar{Y} = 0$
 $Y = \bar{X} = 1$
 So, the outputs X and Y will be fixed at 0 and 1 respectively.

 D Fixed at 1 and 0 respectively

Q. 26

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

A computer instruction set contains 200 instructions. Each instruction takes 4 cycles to complete the execution. Computer uses vertical microprogrammed control unit design. The size of control address register (in bits) is _____.

 10

Correct Option

Solution :
 10
 Number of instruction = 200
 Number of cycles/instruction = 4
 Total number of μ -operation = $200 \times 4 = 800$
 Control memory size = 800 control word
 Control address size = $\log_2(800) = 10$ bit

Q. 27

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

IP address of a computer is 58.98.53.115, subnet mask is given as 255.255.0.0, then number of 1's in subnet Id _____.

7 Correct Option

Solution :
7
IP address = 58.98.53.115
Subnet mask = 255.255.0.0
IP address and subnet mask, perform BIT WISE AND will get subnet ID
Subnet Id = 58.98.0.0
= 00111010.01100010.0.0
Number of 1's = 7

QUESTION ANALYTICS +

Q. 28 ▶ Solution Video Have any Doubt ?

Let $A = \begin{bmatrix} w & 2 & x \\ 1 & -3 & 0 \\ y & -1 & z \end{bmatrix}$, where x, y, z and w are unknown. Suppose $\begin{bmatrix} 4 \\ 4 \\ 1 \end{bmatrix}$ is an eigen vector of A , then find the corresponding eigen value.

-2 Correct Option

Solution :
-2
$$A \cdot \vec{V} = \lambda \cdot \vec{V}$$
$$\begin{bmatrix} w & 2 & x \\ 1 & -3 & 0 \\ y & -1 & z \end{bmatrix} \begin{bmatrix} 4 \\ 4 \\ 1 \end{bmatrix} = \lambda \cdot \begin{bmatrix} 4 \\ 4 \\ 1 \end{bmatrix}$$
$$\begin{bmatrix} p \\ -8 \\ q \end{bmatrix} = \lambda \cdot \begin{bmatrix} 4 \\ 4 \\ 1 \end{bmatrix} \quad (p \text{ and } q \text{ are unknown})$$
$$\Rightarrow \quad 4 \cdot \lambda = -8$$
$$\Rightarrow \quad \lambda = -2$$

QUESTION ANALYTICS +

Q. 29 ▶ Solution Video Have any Doubt ?

Consider a computer system with 36 bit logical addresses, which support upto 4 GB physical memory, page size is 8 KB, then the number of bits are required to represent number of entries in an inverted page table is _____.

19 Correct Option

Solution :
19
Physical memory size = 4 GB
Frame size = Page size = 8 KB
Number of bits for physical memory = 32 bit

32 bit

Frame Page offset

$x + 13 = 32$
 $x = 19$ bits

Number of bits for entries in inverted page table = 19

QUESTION ANALYTICS +

Q. 30 ▶ Solution Video Have any Doubt ?

The number of 3 letter words possible for the word "ESSEL" is equal to _____.

18 Correct Option

Solution :
18
Let's break it down into cases.
Case I: Two same, 1 different
$${}^2C_1 * {}^2C_1 * \frac{3!}{2!} = 12$$

Case II: All different
$$3! = 6$$

Total number of words possible = $12 + 6 = 18$



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


Consider the following function:

```
int f(int n)
{
    if (n/10 == 0)
        return (n % 10);
    else return f(n% 10 + f(n/10));
}
```

 The value returned by $f(3879)$ is _____.

9
[Correct Option](#)
Solution :

```
9
f(3879)
f(9 + f(387))
f(9 + f(7 + f(38)))
f(9 + f(7 + f(8 + 3)))
f(9 + f(7 + f(11)))
f(9 + f(7 + f(1 + 1)))
f(9 + f(7 + 2))
f(9 + 9)
f(18)
f(8 + 1) = 9
```

[QUESTION ANALYTICS](#)

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


Consider the following relation with given functional dependencies R(A, B, C, D, E)

 $F = \{A \rightarrow BC, CD \rightarrow E, B \rightarrow D, E \rightarrow A\}$

The number of candidate keys of R

4
[Correct Option](#)
Solution :

```
4
R = {A, B, C, D, E}
F = {A → BC, CD → E, B → D, E → A}
(A)+ = {ABCDE}
(E)+ = {ABCDE}
(CD)+ = {ABCDE}
(BC)+ = {ABCDE}

Total 4 candidate key.
```

[QUESTION ANALYTICS](#)

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


Consider the following statements:

I. Viable prefix can appear on only top of the stack.

II. In bottom up evaluation of a syntax directed definition, inherited attributes can be evaluated only if the definition is L-attributed.

Number of correct statement(s) _____.

0
[Correct Option](#)
Solution :

```
0
I. Viable prefix can appear on top or inside the stack.
II. In bottom up evaluation of a syntax directed definition, inherited attributes can be evaluated only if the definition is S-attributed.
```

[QUESTION ANALYTICS](#)

Q. 34
[Solution Video](#)
[Have any Doubt ?](#)

 A list of n strings each of length n is sorted into alphabetical order, using merge sorting algorithm, the upper bound on time required to sort strings is $O(n^a \log^b n + n^c)$ value of $10a + b + 2c$ is _____.

21
[Correct Option](#)

Solution :

21 By using merge sort time complexity of algorithm is = $O(n^2 \log n)$

$$a = 2$$

$$b = 1$$

$$c = 0$$

$$10a + b + 2c = 20 + 1 + 0 = 21$$

QUESTION ANALYTICS

Q. 35

Have any Doubt ?



Assume that an upper triangular matrix $A[0 \dots 30, 0 \dots 30]$ is stored in linear in a linear array C of size 4000 with row major order. If $A[0, 0]$ is stored in $C[0]$, find the value of C where $A[25, 27]$ is stored in it _____.

477

Correct Option

Solution :
477

$$\begin{aligned} \text{LOC}(A(i, j)) &= \text{Number of elements} + (j - 1) - \text{upto } (i - 1)^{\text{th}} \text{ row} \\ &= \left[\frac{\text{No. of rows}(\text{No. of rows} + 1)}{2} - \frac{(Ub_1 - i + 1)(Ub_1 - i + 1 + 1)}{2} \right] + [j - i] \\ A[25, 27] &= \frac{31 \times 32}{2} - \frac{6 \times 7}{2} + 27 - 25 \\ &= 496 - 21 + 2 = 477 \end{aligned}$$

QUESTION ANALYTICS

Q. 36

Solution Video

Have any Doubt ?



Consider the following statements:

- I. If w be the minimum weight among all edge weights in an undirected connected graph, e be a specific edge of weight w then every minimum spanning tree contain e .
II. Single source shortest path algorithm on unweighted graph runs in linear time then data structure to be used is queue.
Which of the above statement(s) is/are correct?

A I only

B II only

C Both I and II

D Neither I nor II

Correct Option

Solution :

- (d)
I. If w be the minimum weight among all edge, it may be possible that another edge of weight w had been added to MST and when add e to MST it form a cycle. So may be e will not be included always.
II. Dijkstra's on linear time complexity uses heap data structure.

QUESTION ANALYTICS

Q. 37

Solution Video

Have any Doubt ?



Consider the following statements:

- I. A layer-3 firewall can not stop incoming traffic from a specific IP address.
II. Digital signatures are verified using the receiver public key.
Which of the above statement(s) is/are correct?

A I only

B II only

C Both I and II

D Neither I nor II

Correct Option

Solution :

- (d)
I. A layer 3 firewall is a device that can look at all protocol headers upto network. So it can block a specific IP address packet.
II. Digital signatures are not verified using the receiver public key.

QUESTION ANALYTICS

Q. 38

Solution Video

Have any Doubt ?



Let D_n denote the set of all positive divisors of n . Then which of the following is not a Boolean Algebra over the divides relation?

A D_{30}

B D_{105}

C D_{97}

D D_{64}

Correct Option

Solution :

(d)

In order for $(D_n, /)$ to be a boolean algebra, n must be a square free number i.e. n should be expressible in the form of product of distinct primes, with the power of each prime not exceeding 1. It so happens that $64 = 2^6$, which violates the above theorem, and hence (d) is the answer.

QUESTION ANALYTICS +

Q. 39

Solution Video

Have any Doubt ?



Consider the following code used by the classical readers and writers.

```
int rc = 0;
semaphore mutex = 1;
semaphore db = 1;
void reader (void)
{
    while (true)
    {
        rc = rc + 1;
        down (mutex);
        if (rc == 1) down (db);
        up (mutex);
        Data Base
        down (mutex);
        rc = rc - 1;
        if (rc == 0) up (db);
        up (mutex);
    }
}
Void write (void)
{
    while (true)
    {
        down (db);
        Data Base
        up (db);
    }
}
```

Which of the below statement is true, regarding synchronizing the classical readers and writers?

A The above solution is correct, and it is properly synchronizing the readers and writers.

B Both reader and writers will enter into data base at the same time.

Correct Option

Solution :

(b)

It is possible for both reader and writer to enter into data base at the same time.
It is not possible for deadlock.
Since mutual exclusions is not there.

C It is possible for deadlock.

D Both (b) and (c) are true.

QUESTION ANALYTICS +

Q. 40

Solution Video

Have any Doubt ?



Consider the following statements:

- I. Time stamp protocol may not be cascade free.
 - II. Strict two phase locking protocol is deadlock free.
- Which of the above statement(s) is/are correct?

A I only

B II only

C Both I and II

D Neither I nor II

Correct Option

Solution :

 Both statement I and II are false.

 QUESTION ANALYTICS

+

Item 31-40 of 65 [« previous](#) [1](#) [2](#) [3](#) **4** [5](#) [6](#) [7](#) [next »](#)



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

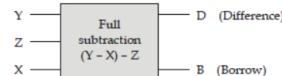
Q. 41

Solution Video

Have any Doubt ?



Find the boolean expression 'B' for the digital circuit given below:



A $XZ + \bar{Y}X + \bar{Y}Z$

Correct Option

Solution :
 (a)

Y	Z	X	D	B
0	0	0	0	0
1	0	0	1	1
2	0	1	0	1
3	0	1	1	0
4	1	0	0	1
5	1	0	1	0
6	1	1	0	0
7	1	1	1	1

Order of subtraction is $(Y - X) - Z$

$$\begin{aligned} B &= \bar{Y}\bar{X}Z + \bar{Y}X\bar{Z} + \bar{Y}XZ + YXZ \\ &= \bar{Y}\bar{X}Z + \bar{Y}XZ + \bar{Y}X\bar{Z} + \bar{Y}XZ + YXZ \\ &= \bar{Y}Z + \bar{Y}X + XZ \\ &= XZ + \bar{Y}X + \bar{Y}Z \end{aligned}$$

B $X\bar{Y} + \bar{X}Z + YZ$

C $XY + \bar{X}Z + YZ$

D $X\bar{Y} + Y\bar{Z} + \bar{Z}X$

QUESTION ANALYTICS



Q. 42

Solution Video

Have any Doubt ?



Consider the following statements:

- I. Synchronous bits are not treated as the part of data in synchronous transmission.
 - II. With absence of DHCP server using IPv6 protocol is not possible.
- Which of the above statement(s) is/are not true?

A I only

B II only

C Both I and II

Correct Option

Solution :
 (c)

- I. In synchronous transmissions, the synchronous bits are neglected by the receiver, hence not considered as part of data.
- II. IPv6 support both stateful and stateless auto configuration mode of its host devices, so absence of DHCP servers does not create problem.

D Neither I nor II

QUESTION ANALYTICS



Q. 43

Solution Video

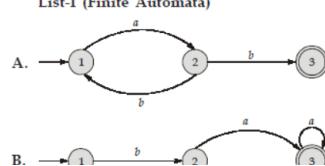
Have any Doubt ?



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

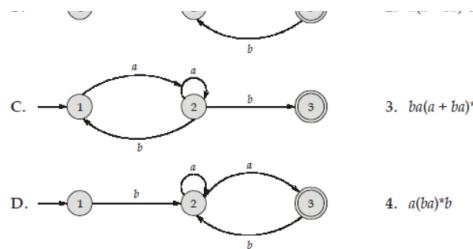
List-I (Finite Automata)

List-II (Regular Expression)



1. $b(a + ab)^*a$

2. $a(a + ba)^*b$



Codes:

	A	B	C	D
(a)	1	2	3	4
(b)	1	3	2	4
(c)	4	3	2	1
(d)	4	2	3	1

3. $ba(a + ba)^*$

4. $a(ba)^*b$

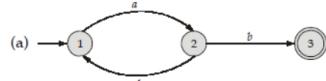
A a

B b

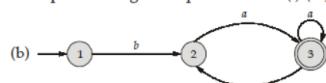
C c

Correct Option

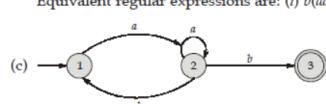
Solution:
(c)



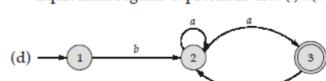
Equivalent regular expressions are: (i) $(ab)^*ab$ and (ii) $a(ba)^*b$... (4)



Equivalent regular expressions are: (i) $b(aa^*b)^*aa^*$ and (ii) $ba(a + ba)^*$... (3)



Equivalent regular expressions are: (i) $a(a + ba)^*b$ and (ii) $(aa^*b)^*aa^*b$... (2)



Equivalent regular expressions are: (i) $b(a + ab)^*a$ and (ii) $ba^*a(ba^*)^*$... (1)

D d

QUESTION ANALYTICS

+

Q. 44

Solution Video

Have any Doubt ?

□

Consider the following statements:

- I. Kruskal's algorithm over undirected graph will take $O(m + n)$ time where m is the number of vertices and n is the number of edges, if edges are sorted in $O(1)$ time.
II. A graph can have more than one shortest path between two vertices where all edges weight are distinct.

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

A I only

B II only

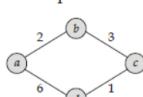
C Both I and II

Correct Option

Solution:
(c)

I is correct statement.

A graph can have more than one shortest path.



Two shortest path between (a - d)

First (a - b - c)

Second (a - d)

D Neither I nor II

QUESTION ANALYTICS

+

O. 45

Have any Doubt ?

□

Consider a square matrix of $N \times N$ in which the values are located from $A[1, 1]$ to $A(N, N)$. For all i and j , $A[i, j] = A[i - 1, j - 1]$ where $i > 1$ and $j > 1$. In order to reduce the space complexity we avoid redundant storage. All the elements of above square matrix are stored in the linear array B starting from index 0 in row major order. The following code is used to retrieve the $(i, j)^{th}$ element of a index in the array.

```
if (i ≤ j)
    return B[j - i];
else
    return (X)
```

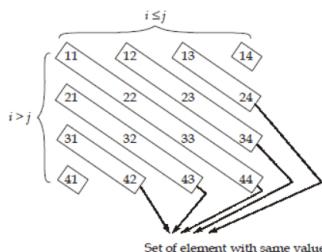
Find the correct expression for 'X'.

A B[N + i - j - 1]

Correct Option

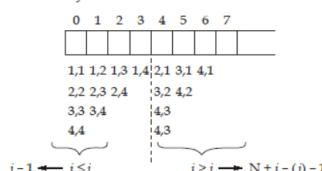
Solution :

(a) Consider on array A with an example of 4×4 size.



every $A[i, j] = A[i - 1, j - 1]$

Hence we need to store only once which can be done by storing entire first row and first column in row major order into an array B.



B B[2N + i - j - 1]

C B[2N + j - i - 1]

D B[N + j - i - 1]

QUESTION ANALYTICS

+

Q. 46

Solution Video

Have any Doubt ?

Q

Which of the following statement false is relation R is in 3NF but not BCNF?

A Relation R must consist atleast two over-lapped candidate keys.

B Relation R must consist proper subset of candidate key determines proper subset of some other candidate key.

C Relation R must consist atmost one compound candidate key and other candidate keys simple candidate key.

Correct Option

Solution :

(c)
If relation R in 3NF but not BCNF then atleast two compound keys must exists where non-trivial FD with determinant not superkey.

D Relation R must consist atleast two compound candidate keys.

QUESTION ANALYTICS

+

Q. 47

Solution Video

Have any Doubt ?

Q

Consider a 4-way set associative Cache (initially empty) with total 16 cache blocks. The main memory consist of 512 blocks and the request for memory blocks in the order which is given as:

0, 31, 17, 45, 67, 85, 213, 167, 302, 17, 31, 67, 85, 167, 37, 39, 41, 17, 7, 31
What is the number of misses in the cache when least recently policy used?

A 12

B 15

C 14

Correct Option

Solution :

(c)
TRUE: [] 0

	Set-0
17	
48 37	Set-1
85	
245 41	Set-2
302	
	Total misses in cache = 14
31 7	Set-3
67 31	
167	
39	

D 13

QUESTION ANALYTICS



Q. 48

Have any Doubt ?



Consider the following grammar:

$$S \rightarrow Aa \mid bAc \mid dc \mid bda$$

$$A \rightarrow d$$

Consider the following LR(0) items corresponding to the above grammar.

$$\text{I. } d. \quad \text{II. } b.Ac$$

$$\text{III. } d.c \quad \text{IV. } b.da$$

Which of above will appear in same set in the canonical set of items for the grammar?

A I and IV only

B III and IV only

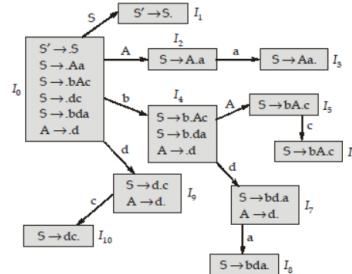
C I, II and III only

D II and IV only

Correct Option

Solution :

(d)



II and IV are present in I_4 state.

QUESTION ANALYTICS



Q. 49

Solution Video

Have any Doubt ?



The values of a and b for which the following system has no solutions are respectively

$$ax + y + 2z = 0$$

$$x + 2y + z = b$$

$$2x + y + az = 0$$

A $a = -1, b = 0$

B $a = 2, b = 0$

C $a = -1, b \neq 0$

Correct Option

Solution :

(c)

The matrix formed by the coefficients is $\begin{bmatrix} a & 1 & 2 \\ 1 & 2 & 1 \\ 2 & 1 & a \end{bmatrix}$

$$\text{Determinant} = 2a^2 - 2a - 4$$

$$\therefore D = 0 \text{ for } a = 2 \text{ or } a = -1$$

(A) If $D \neq 0$, then the system will have unique solution.

(B) If $a = 2$, the matrix formed by the coefficients is $\begin{bmatrix} 2 & 1 & 2 \\ 1 & 2 & 1 \\ 2 & 1 & 2 \end{bmatrix}$

The rank of matrix is 2.
Considering 'z' as side unknown.

The characteristic determinant will be $\begin{bmatrix} 2 & 1 & 0 \\ 1 & 2 & b \\ 2 & 1 & 0 \end{bmatrix}$

The determinant of this is 0.
The system will have infinite solutions when $a = 2$.

(C) If $a = -1$, the matrix formed by the coefficients is $\begin{bmatrix} -1 & 1 & 2 \\ 1 & 2 & 1 \\ 2 & 1 & -1 \end{bmatrix}$

Its rank is 2.
Considering 'z' as side unknown.

The characteristic matrix is $\begin{bmatrix} -1 & 1 & 0 \\ 1 & 2 & b \\ 2 & 1 & 0 \end{bmatrix}$

The determinant of this matrix is $3b$.
The system will have no solution if $b \neq 0$
 \therefore For $a = -1$ and $b \neq 0$, the system will have no solution.

D $a = 2, b \neq 0$

QUESTION ANALYTICS



Q. 50

Have any Doubt ?



Consider the following function:

```
Void Rec (int n)
{
    if (n ≤ 0)
        return;
    else
    {
        Print(n);
        Rec(n - 1);
        Print(n);
        Rec(n - 3);
    }
}
```

Let $S(n)$ be the recurrence relation which computes the sum of values printed by the $Rec(n)$. The $S(n)$ is _____.

A $S(n - 1) + S(n - 2)$

B $S(n - 1) + S(n - 3) + n + n$

Correct Option

Solution :

(b)
 $S(n - 1) + S(n - 3) + n + n$ is the recurrence for sum of values printed.

C $S(n - 1) + S(n - 3) + n$

D $S(n - 1) + S(n - 3) + n + n$

QUESTION ANALYTICS





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


If given a language

$$L : \{(aa)^n (bb)^m (aa)^n \mid m, n \geq 0\}$$

and homomorphic function

$$h(0) = aa$$

$$h(1) = bb$$

$$h(2) = aa$$

 then $h^{-1}(L)$ will be

A $\{0^n 1^m 2^n \mid m, n \geq 0\}$

B $\{2^n 1^m 0^n \mid m, n \geq 0\}$

C $\{0^n 1^m 0^n \mid m, n \geq 0\}$

D None of the above

[Correct Option](#)
Solution :

(d)

$$L : \{(aa)^n (bb)^m (aa)^n \mid m, n \geq 0\}$$

We can substitute 'aa' by '0' or '2'

$$L : \{(0)^n (1)^m (0)^n \mid m, n \geq 0\} \quad (aa = 0, bb = 1)$$

$$L : \{(2)^n (1)^m (2)^n \mid m, n \geq 0\} \quad (aa = 2, bb = 1)$$

$$L : \{(2)^n (1)^m (0)^n \mid m, n \geq 0\} \quad (aa = 2, aa = 0, bb = 1)$$

$$L : \{(0)^n (1)^m (2)^n \mid m, n \geq 0\} \quad (aa = 0, aa = 2, bb = 1)$$

[QUESTION ANALYTICS](#)

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


Consider 4-way set associative cache of a 64 KB organized into a 32B blocks. Main memory size is 4 GB. In the cache controller, each line in the set contain 1 valid, 1 modified and 2 replacement bits along with a tag. How much space is required in the cache controller to store the tag information (Meta data) (in Kb)?

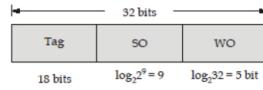
A 44

[Correct Option](#)
Solution :

(a)

$$\text{Number of lines} = \frac{64K}{32} = 2^{11}$$

$$\text{Number of sets} = \frac{2^{11}}{4} = \frac{2^{11}}{2^2} = 2^9$$



$$\begin{aligned} \text{Tag memory size} &= S \times P \times \text{number of tag bits} \\ &= 2^9 \times 4 \times (18 + 1 + 1 + 2) \\ &= 2^9 \times 2^2 \times 22 \text{ bits} \\ &= 2^{10} \times 2 \times 22 \text{ bits} \\ &= 44 \text{ K bits} \end{aligned}$$

B 22

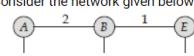
C 32

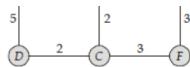
D 18

[QUESTION ANALYTICS](#)

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


Consider the network given below:





Each node in the graph represents the router. Each node maintains its routing table to send a packet to its destination with minimum cost. Initially routing table is empty. The table is filled as every node knows only the distance to the immediate neighbour. What will be the routing table 'F' after each node has twice reported the information it had in the proceeding steps in its immediate neighbours?

A	A	B	C	D	E	F
∞	∞	∞	∞	3	3	0

B	A	B	C	D	E	F
∞	∞	4	3	5	3	0

C	A	B	C	D	E	F
	6	4	3	5	3	0

Correct Option

Solution:

(c) Initially the routing table of router F.

A	B	C	D	E	F
∞	∞	∞	3	∞	0

Now on 1st exchange

A	B	C	D	E	F
∞	∞	4	3	5	0

Now on 2nd exchange

A	B	C	D	E	F
6	4	3	5	3	0

D	A	B	C	D	E	F
	6	4	5	3	5	0

QUESTION ANALYTICS



Q. 54

Solution Video

Have any Doubt ?



Consider the set $X = \{1, 2, 3, \dots, 15\}$. Two elements 'a' and 'b' are chosen at random from S. The probability that the elements chosen satisfy $a + b = 16$ is equal to _____. (Upto 2 decimal places)

0.06

Correct Option

Solution:

0.06

The favourable outcomes will be (1, 15), (2, 14), (3, 13), ..., (7, 9). So there are 7 such ordered pairs.

And there are ${}^{15}C_2 (=105)$ ways of choosing 2 elements from S.

Therefore the required probability = $\frac{7}{105} = \frac{1}{15} = 0.06$.

QUESTION ANALYTICS



Q. 55

Solution Video

Have any Doubt ?



Consider a regular language R over $\Sigma = \{0, 1\}$ which is equivalent to the regular expression $(01 + 1)^*$. The number of equivalence classes of Σ^* are present for the language R is _____.

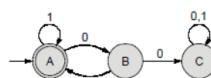
3

Correct Option

Solution:

3

Minimized DFA for the language R :



$$[A] = (01 + 1)^*$$

$$[B] = (01 + 1)^*0$$

$$[C] = (01 + 1)^*00(0 + 1)^*$$

∴ Three equivalence classes are present.

[Note: $[A] \cup [B] \cup [C] = \Sigma^*$]

QUESTION ANALYTICS



Q. 56

Solution Video

Have any Doubt ?



In a TCP connection value of rwnd is 7000 bytes and value of cwnd is 5000 bytes, the host has send 3000 bytes, which have not been acknowledged. The extra number of bytes can be sent are _____.

2000

Correct Option

Solution :
2000
Window size is smaller of two (7000, 5000) = 5000
3000 bytes are already sent so 2000 more bytes can be sent through the TCP connection.

QUESTION ANALYTICS

Q. 57

Solution Video

Have any Doubt ?



Consider the following statements:

- I. Overlays are used to increase the size of physical memory.
 - II. The size of the virtual memory depends on the size of the main memory.
 - III. Aging is keeping track of how many times a given page is referenced.
- Number of correct statement(s) _____

0

Correct Option

Solution :

- 0
- I. Overlays are not used to increase the size of physical memory.
 - II. The size of the virtual memory depends does not depends on the size of the main memory.
 - III. Aging is used to solve starvation problem.

QUESTION ANALYTICS

Q. 58

Solution Video

Have any Doubt ?



The average successful search time taken by binary search on a sorted array of 10 items is _____.
(Upto 1 decimal places)

2.9

Correct Option

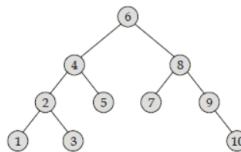
Solution :

2.9

Array is sorted.

e.g. 1, 2, 3, 4, 5, 6, 7, 8, 9, 10

Balanced binary search tree



$$\text{Average Search Time} = \frac{1+2\times2+3\times4+4\times3}{10} = \frac{29}{10} = 2.9$$

QUESTION ANALYTICS

Q. 59

Solution Video

Have any Doubt ?



Consider the following table

Process	Arrival Time	Burst Time	Priority
P_0	0	4	3
P_1	1	3	4
P_2	2	3	6 (Highest)
P_3	3	5	5

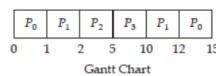
Average turn around time of the above processes if preemptive priority scheduling algorithm is used _____.
(All time in ms)

9

Correct Option

Solution :

9



Process	Turn Around Time
P_0	15
P_1	11
P_2	3
P_3	7

$$\text{Average Turn Around Time} = \frac{15+11+3+7}{4} = 9$$

QUESTION ANALYTICS



The value of $f'(1)$, if $f(x) = \begin{cases} \frac{x-1}{2x^2-7x+5}, & \text{when } x \neq 1 \\ -\frac{1}{3}, & \text{when } x=1 \end{cases}$ is _____. (Upto 2 decimal places)

-0.22 [-0.22 -0.23]

Correct Option

Solution :

-0.22 [-0.22 -0.23]

$$\begin{aligned} f'(1) &= \lim_{h \rightarrow 0} \frac{f(1+h) - f(1)}{1+h-1} \\ &= \lim_{h \rightarrow 0} \frac{1}{h} \left[\frac{1+h-1}{2(1+h)^2 - 7(1+h) + 5} - \left(-\frac{1}{3} \right) \right] \\ &= \lim_{h \rightarrow 0} \frac{1}{h} \left[\frac{h}{2h^2 - 3h} + \frac{1}{3} \right] = \lim_{h \rightarrow 0} \frac{1}{h} \left[\frac{3h + 2h^2 - 3h}{3(2h^2 - 3h)} \right] \\ &= \lim_{h \rightarrow 0} \frac{1}{h} \left[\frac{2h}{3(2h-3)} \right] = -\frac{2}{9} = -0.22 \end{aligned}$$

QUESTION ANALYTICS

+



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Q. 61
[Have any Doubt?](#)


What is the value returned by the following function when X = 2 and Y = 3? _____

```
int M(int x, int y)
{
    if (x == 1 && y >= 0)
        return y + 1;
    else if (x > 1 && y == 0)
        return M(x - 1, 1);
    else if (x > 1 && y > 0)
        return (M(x - 1, M(x, y - 1)));
}
```

5
[Correct Option](#)
Solution :

```
5
M(2, 3)
M(1, M(2, 2))
M(1, M(1, M(2, 1)))
M(1, M(1, M(1, M(2, 0))))
M(1, M(1, M(1, M(1, 1))))
M(1, M(1, M(1, 2)))
M(1, M(1, 3))
M(1, 4)
⇒ 5
```

[QUESTION ANALYTICS](#)

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


Consider the following instance of a relation schema R(A, B, C):

A	B	C
2	2	2
2	2	1
3	4	3
3	4	3

- I. A functionally determine B and B does not functionally determining C.
- II. A functionally determine B and B functionally determines C.

Number of correct statement(s) _____

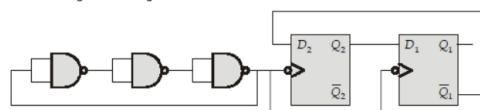
1
[Correct Option](#)
Solution :

```
1
I.          B = 2   C = 2
            C = 1
B does not functionally determine C.
II.          A = 2   B = 2
            A = 3   B = 4
A functionally determine B.
```

[QUESTION ANALYTICS](#)

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


Consider the digital circuit given below:



The average propagation delay of each NAND gate in the clock generate circuit is 5 ns. The frequency of the clock signal is _____ MHz. (Upto 2 decimal places)

33.33 [33.30 - 33.40]
[Correct Option](#)
Solution :

33.33 [33.30 - 33.40]

Here the clock generator is the ring oscillator circuit.

$$f_{CLK} = \frac{1}{2Nt_{pd}}$$

N = Number of gates

 t_{pd} = Propagation delay of each gate

$$N = 3, t_{pd} = 5 \text{ ns}$$

$$f_{CLK} = \frac{1}{2 \times 3 \times 5 \text{ ns}} = 33.33 \text{ MHz}$$

QUESTION ANALYTICS

Q. 64

Have any Doubt ?

Consider the following SDT:

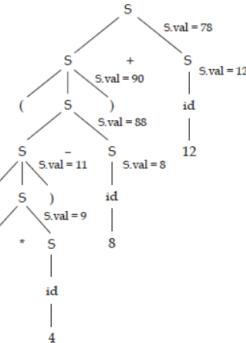
$$\begin{aligned} S \rightarrow S + S & \quad [S.val = S_1.val - S_2.val] \\ S \rightarrow S * S & \quad [S.val = S_1.val + S_2.val] \\ S \rightarrow S - S & \quad [S.val = S_1.val * S_2.val] \\ S \rightarrow (S) & \quad [S.val = S_1.val + 2] \\ S \rightarrow id & \quad [S.val = id] \end{aligned}$$

The value of attribute computed at root when the following expression is evaluated using the above SDT is _____.
 $((5 * 4) - 8) + 12$

78

Correct Option

Solution :
 78



QUESTION ANALYTICS

Q. 65

Solution Video

Have any Doubt ?

Consider a single level cache with an access time of 6 ns, line size of 64 bytes and the hit ratio of 0.8. Main memory uses a block transfer capability that has a first word (8 bytes) access time of 40 ns and 15 ns for each word thereafter. What is the access time (in ns) where there is a cache miss? (Assume that the cache waits until the line has been fetched from main memory and reexecutes for a hit) _____.

157

Correct Option

Solution :
 157

Time for cache access when there is a miss

$$\begin{aligned} &= 6 \text{ ns} + 40 \text{ ns} + \left(\frac{64}{8} - 1 \right) \times 15 \text{ ns} + 6 \text{ ns} \\ &= 6 \text{ ns} + 40 \text{ ns} + 105 \text{ ns} + 6 \text{ ns} = 157 \text{ ns} \end{aligned}$$

QUESTION ANALYTICS