



Kunal Jha

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Computer Science Engineering(CS)

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## FULL SYLLABUS TEST-3 (BASIC LEVEL) GATE 2020 - REPORTS

OVERALL ANALYSIS

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ALL(65)

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Q. 1

Solution Video

Have any Doubt ?



Pick out the most effective word from the given words to fill in the blank to make the sentence meaningfully complete.  
 Catching the earlier train will give us the \_\_\_\_\_ to do some shopping.

 A Chance

Correct Option

Solution :

(a)

 B Luck C Possibility D Occasion

## QUESTION ANALYTICS



Q. 2

Solution Video

Have any Doubt ?



Out of four alternatives, choose the one which can be substituted for the given phrase.  
 "Murder of a king"

 A Infanticide B Matricide C Genocide D Regicide

Correct Option

Solution :

(d)

## QUESTION ANALYTICS



Q. 3

Solution Video

Have any Doubt ?



If a portion of a half water/half alcohol mix is replaced with 25% alcohol solution, resulting in a 30% alcohol solution, what percentage of the original mix was replaced?

 A 3% B 20% C 66% D 80%

Correct Option

Solution :  
(d)

Initial solution is "half water/half alcohol mix" means it's 50% (0.5) alcohol solution.

Let the portion replaced be  $x$  and the volume of initial solution be 1 unit.Then the amount of alcohol after removal of a portion will be  $0.5(1-x)$  and the amount of alcohol added will be  $0.25x$ , so total amount of alcohol will be  $0.5(1-x) + 0.25x$ . On the other hand as in the end 30% alcohol solution was obtained then the amount of alcohol in the end was  $0.3 \times 1$ .So  $0.5(1-x) + 0.25x = 0.3 \Rightarrow x = 0.8$ , or 80%.

## QUESTION ANALYTICS



Q. 4

Solution Video

Have any Doubt ?



Two positions of a dice are shown. When 4 is at the bottom, what number will be on the top?





A 1

Correct Option

Solution :

(a) From figures, we conclude that 2, 3, 5 and 6 are adjacent to 1. Therefore, 4 lies opposite 1. Hence, when 4 is at the bottom, then 1 must be on the top.

B 2

C 5

D 6

QUESTION ANALYTICS

+

Q. 5

▶ Solution Video

Have any Doubt ?

Bookmark

Twenty-four men can complete a work in sixteen days. Thirty-two women can complete the same work in twenty-four days. Sixteen men and sixteen women started working for twelve days. The number of extra men to be added to complete the remaining work in 2 days is\_\_\_\_\_

A 24

Correct Option

Solution :

24

24 men complete the work in 16 days.

32 women can complete the same work in 24 days.

So 24 women will take  $24 \times \frac{32}{24} = 32$  days to complete the work

Same number of women take twice the time (16 days vs 32 days) so their rate of work is half.

So 16 women are equivalent to 8 men work-wise.

So  $16 + 8 = 24$  men start working and work for 12 days. They complete the work in 16 days so they need another 4 days to complete. But if we want them to complete the work in half the time (2 days), we will need twice the work force. So we need another 24 men.

QUESTION ANALYTICS

+

Q. 6

▶ Solution Video

Have any Doubt ?

Bookmark

A train after traveling for 50 km meets with an accident and then proceeds at  $\frac{3}{4}$  of its former speed and arrives at its destination 35 minutes late. Had the accident occurred 24 km farther, it would have reached the destination only 25 minutes late. What is the speed of the train in km/hr.

A 45

B 33

C 48

Correct Option

Solution :

(c)

let  $d$  = total distance

divide each case into 3 segments:

1. first 50 km
2. next 24 km
3. last  $d - 74$  km

let  $s$  = speed of train

for segment 1, in each case, time =  $\frac{50}{s}$

for segment 3, in each case, time =  $\frac{d-74}{\left(\frac{3s}{4}\right)}$

Therefore, segment 2 must account for the 10 minute total time difference between the two cases

$$\frac{24}{\left(\frac{3s}{4}\right)} - \frac{24}{s} = \frac{1}{6}$$

$$\Rightarrow s = 48 \text{ km/hr}$$

D 55

QUESTION ANALYTICS

+

Q. 7

▶ Solution Video

Have any Doubt ?

Bookmark

An orange vendor makes a profit of 20% by selling orange at a certain price. If he charges ₹1.2 higher per orange he would gain 40%. Find the original price at which he sold an orange.

**Solution :**

(a) Let cost price be  $c$  and selling price be  $s$

$$\begin{aligned}s &= 1.2c \\ \Rightarrow s + 1.2 &= 1.4c \\ \Rightarrow 1.2c + 1.2 &= 1.4c \\ \Rightarrow c &= 6 \\ \Rightarrow s &= 7.2\end{aligned}$$

**B** ₹6**C** ₹5**D** ₹4

QUESTION ANALYTICS



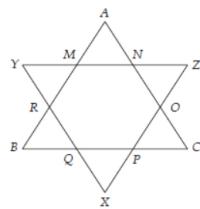
Q. 8

▶ Solution Video

⌚ Have any Doubt ?



$\triangle ABC$  and  $\triangle XYZ$  are equilateral triangles of 54 cm sides. All smaller triangles like  $\triangle ANM$ ,  $\triangle OCP$ ,  $\triangle QPX$  etc. are also equilateral triangles. Find the area of the shape MNOPQR.

**A**  $243\sqrt{3}$  sq.cm.**B**  $486\sqrt{3}$  sq.cm.

Correct Option

**Solution :**

(b)

$AB = 54$  cm and  $\triangle ANM$ ,  $\triangle OCP$ ,  $\triangle QPX$  are equilateral triangles.

$$\Rightarrow MN = MR = NO = OP = PQ = QR = \frac{54}{3} = 18 \text{ cm}$$

Thus, MNOPQR is regular hexagon with side 18 cm

$$\therefore \text{Area of MNOPQR} = \frac{3\sqrt{3}}{2}(\text{side})^2$$

$$\frac{3\sqrt{3}}{2}(18)^2 = 486\sqrt{3} \text{ sq.cm.}$$

**C**  $729\sqrt{3}$  sq.cm.**D**  $4374\sqrt{3}$  sq.cm.

QUESTION ANALYTICS



Q. 9

▶ Solution Video

⌚ Have any Doubt ?



What is the sum of the following series?  
-64, -66, -68, ..., -100

**A** -1458**B** -1558

Correct Option

**Solution :**

(b)

The series is an A.P. with common difference,  $d = -66 - (-64) = -2$

First term,  $a = -64$  and last terms  $a_n = -100$

$n^{\text{th}}$  term of the series,  $a_n = a + (n-1)d$

$$\Rightarrow -100 = -64 + (n-1)(-2)$$

$$\Rightarrow n-1 = \frac{-36}{-2} = 18$$

$$\Rightarrow n = 18 + 1 = 19$$

$$\therefore \text{Sum} = \frac{n}{2}(a + a_n)$$

$$= \frac{19}{2} \times (-64 - 100) = \frac{19}{2} \times (-164)$$

$$= 19 \times (-82) = -1558$$

**C** -1568**D** -1664

Q. 10

Solution Video

Have any Doubt ?



The perimeter of a certain isosceles right triangle is  $16 + 16\sqrt{2}$  units. What is the length of the hypotenuse of the triangle?

16

Correct Option

Solution :

16

As mentioned in the subject, this is a 45 : 45 : 90 isosceles triangle. As per properties of 45 : 45 : 90 triangle, the sides are in the ratio of 1 : 1 :  $\sqrt{2}$

So, let the sides be  $x$ ,  $x$ , and  $x\sqrt{2}$  (where  $x$  is the length of legs and  $x\sqrt{2}$  is hypotenuse). We are supposed to find length of hypotenuse, i.e.  $x\sqrt{2}$

$$\text{Perimeter} = 2x + x\sqrt{2} = 16 + 16\sqrt{2}$$

$$\text{or, } x\sqrt{2}(\sqrt{2} + 1) = 16(1 + \sqrt{2})$$

$$\text{or, } x\sqrt{2} = 16$$

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**Q. 11**
[▶ Solution Video](#)
[Have any Doubt ?](#)

 Let  $A = \{(a^*b^*)\}$  and  $B = \{bb, ba, bbb\}$ . Then  $A/B$  represents of the following language when/when is quotient operation.

 A  $\emptyset$ 
 B  $\{b^*\}$ 
 C  $\{a^*b^*\}$ 
Correct Option
**Solution :**

(c)

$$\begin{aligned} A &= \{a^*b^*\}, B = \{bb, ba, bbb\} \\ A/B &= \{a^*b^*\}/\{bb, ba, bbb\} \\ &= \{(a^*b^*)/bb\} \cup \{(a^*b^*)/ba\} \cup \{(a^*b^*)/bbb\} \\ &= \{a^*b^*\} \cup \emptyset \cup \{a^*b^*\} \\ &= \{a^*b^*\} \end{aligned}$$

 D None of these


QUESTION ANALYTICS

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

 Assume  $i$  and  $j$  are small integers. Which of the following code snippets swaps  $i$  and  $j$  without third variable? ( $\wedge$  is a XOR operation bitwise).

 A  $i = i + j$   
 $j = i - j$   
 $i = i - j$ 
 B  $i = i * j;$   
 $j = i / j;$   
 $i = i / j;$ 
 C  $i = i \wedge j;$   
 $j = i \wedge j;$   
 $i = i \wedge j;$ 
 D All of these
Correct Option
**Solution :**

(d)

 All the three code snippets do the same work. They swap  $i$  and  $j$  without 3<sup>rd</sup> variable.  
 Option (d) is correct.


QUESTION ANALYTICS

**Q. 13**
[▶ Solution Video](#)
[Have any Doubt ?](#)

 If given two Turing decidable languages  $L_1$  and  $L_2$  then  $L_1 - L_2$  will be

 A Recursive language
Correct Option
**Solution :**

(a)

 Recursive languages are closed under  $L_1 - L_2$ .

 As  $L_1 - L_2 = L_1 \cap \bar{L}_2$  and recursive languages closed under intersection [ $\cap$ ] and complement.

 B Recursive enumerable language

 C Regular language

 D CFL


QUESTION ANALYTICS


Q. 14

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

How many times does the processor need to access the memory when it executes an indirect address instruction to fetch the data when single operand is used?

**A** 1**B** 2

Correct Option

**C** 3**D** 4

QUESTION ANALYTICS



Q. 15

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

Consider the following statement:

- I. Level order traversal is not based on depth first search.
  - II. Worst case deletion and insertion in an AVL tree has different time complexity.
- Which of the above statement(s) is/are true?

**A** I only

Correct Option

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

QUESTION ANALYTICS



Q. 16

[Have any Doubt ?](#)

The number of binary strings with  $m$  zeroes and  $n$  ones, such that no two zeroes are consecutive, is equal to

**A**  ${}^n C_m$ **B**  ${}^{n+1} C_{n-m+1}$ 

Correct Option

**C**  ${}^{m+1} C_n$ **D** None of these

QUESTION ANALYTICS



Q. 17

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

Consider the following segment table:

Segment	Base	Length
0	200	180
1	540	400
2	1135	65
3	2084	300

Which of the following logical address generate trap to operating system?

- I. 0, 210
- II. 1, 340
- III. 2, 1140
- IV. 3, 140

**A** I and II only

**B** II and III only

**C** I and III only

Correct Option

Solution :

- (c)  
I. Length (0, 210) 210 > 180 so generate trap.
- II. (1, 340) 490 > 340 no trap.
- III. (2, 1140) length 65 < 1140 so there is trap.
- IV. (4, 140) (300 > 140) so no trap.

**D** I and IV only

QUESTION ANALYTICS



**Q. 18**

Solution Video

Have any Doubt ?



For the circuit given below. If  $A = 10101010$  and  $B = 11111111$



What is the decimal equivalent of the output ?

**A** 251

**B** 253

**C** 254

**D** 255

Correct Option

Solution :

(d)

$$A = 10\ 10\ 10\ 10$$

$$B = \underline{11\ 11\ 11\ 11}$$

$$\text{Ex-NOR : } 10\ 10\ 10\ 10$$

Gray code of 10 10 10 10 is 11 11 11 11

Decimal equivalent of (11111111) = 255

QUESTION ANALYTICS



**Q. 19**

Solution Video

Have any Doubt ?



Which of the following is true?

**A** In IPv<sub>4</sub> checksum is used as error detecting technique where in IPv<sub>4</sub> CRC is used.

**B** In congestion avoidance state, sender increase its window size by one packet for each acknowledgment.

**C** When an IP router between two ethernet segments forward an IP packet, it does not modify the destination IP address.

Correct Option

Solution :

(c)

IPv<sub>4</sub> uses checksum and IPv<sub>6</sub> does not use any technique because it assumes that the layer above and below will perform error detection.

Window size is increase by 1 MSS.

When an IP router between two ethernet segment forward a IP packet it does not modify the destination IP.

**D** None of these

QUESTION ANALYTICS



**Q. 20**

Have any Doubt ?



Consider the following structure for creating nodes of a double linked list.  
struct node  
{

```

        int data;
        struct node * x1; /* left pointer */
        struct node * y1; /* right pointer */
    };

```

Let us assume  $P$  be the node in the existing linked list. Which of the following is true about the following code  $C_1$ ?

Code  $C_1$  :

$(P \rightarrow x_1) \rightarrow y_1 = P \rightarrow y_1$
$(P \rightarrow y_1) \rightarrow x_1 = P \rightarrow x_1$

Assume memory is made free automatically by the compiler after deletion.

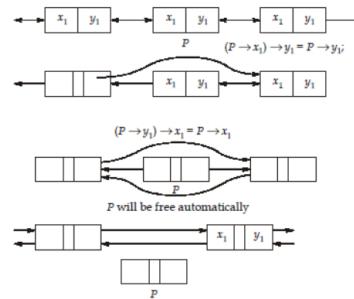
**A** It deletes the node to the right of  $P$

-

**B** It deletes the node to the left of  $P$

Correct Option

**C** It deletes the node  $P$  from the linked list  
(c)



**D** None of the above

QUESTION ANALYTICS

+

Item 11-20 of 65 « previous 1 2 3 4 5 6 7 next »



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**Q. 21**
[Solution Video](#)
[Have any Doubt ?](#)


Let  $A = \begin{bmatrix} -1 & 0 & 1 \\ 0 & 1 & 1 \end{bmatrix}$  and  $B = \begin{bmatrix} a & b \\ c & d \\ e & f \end{bmatrix}_{3 \times 2}$ . If  $AB = I$  then element  $f = \underline{\hspace{2cm}}$ .

**A**  $a$ 
**B**  $a + 1$ 
**C**  $b$ 

Correct Option

**Solution :**  
 (C)

$$A = \begin{bmatrix} -1 & 0 & 1 \\ 0 & 1 & 0 \end{bmatrix} \text{ and } B = \begin{bmatrix} a & b \\ c & d \\ e & f \end{bmatrix}$$

 Given       $AB = I$ 

$$\therefore \begin{bmatrix} -1 & 0 & 1 \\ 0 & 1 & 0 \end{bmatrix} \begin{bmatrix} a & b \\ c & d \\ e & f \end{bmatrix} = \begin{bmatrix} 1 & 0 \\ 0 & 1 \end{bmatrix}$$

$$\Rightarrow \begin{bmatrix} -a+e & -b+f \\ c & d \end{bmatrix} = \begin{bmatrix} 1 & 0 \\ 0 & 1 \end{bmatrix}$$

$$-b+f=0 \Rightarrow f=b$$

**D**  $1 - b$ 
[QUESTION ANALYTICS](#)

**Q. 22**
[Solution Video](#)
[Have any Doubt ?](#)


Let  $a_n$  denote the number of ternary strings of length  $n$  in which no two 0's are consecutive. Then The recurrence relation for  $a_n$  is equal to

**A**  $a_n = a_{n-1} + a_{n-2}; a_1 = 3, a_2 = 8$ 
**B**  $a_n = 2(a_{n-1} + a_{n-2}); a_1 = 3, a_2 = 8$ 

Correct Option

**Solution :**  
 (b)  
 We can easily employ option elimination to solve such questions. We can check that  $a_3$  equals 22. And this is enough to eliminate a, c and d - as plugging in the base cases does not give 22 in each of these 3 choices.  
 Therefore (b) is the correct answer.

**C**  $a_n = 2a_{n-1} + 3a_{n-2}; a_1 = 3, a_2 = 8$ 
**D**  $a_n = a_{n-2} + 2a_{n-3}; a_1 = 3, a_2 = 8$ 
[QUESTION ANALYTICS](#)

**Q. 23**
[Solution Video](#)
[Have any Doubt ?](#)


Which of the following is correct?

**A** Secondary index over key may not be dense.

**B** Relation with every attribute is prime always be in BCNF.

**C** A theta join is a natural join followed by relation operator.

**D** None of these

Correct Option

**Solution :**  
 (d)  
 (a) Secondary index over key must be dense.  
 (b) Relation with every attribute is prime always be in 3NF but may not be in BCNF.  
 (c) A theta join is Cartesian product followed by relation operator.

Q. 24

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

Let  $G$  be a graph having 3 components, such that the components can be coloured sufficiently with 3, 4, and 5 colours respectively in such a way that no two adjacent vertices have the same colour. Then the chromatic number of  $G$  is equal to

 A 3 B 4 C 5

Correct Option

**Solution :**

(c)

Chromatic number of  $G = \max(3, 4, 5) = 5$ .  
Therefore (c) will be the answer.

 D None of these

Q. 25

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

A modulo-16 ripple counter uses J-K flip-flops. If the propagation delay of each flip-flop is  $p$  ns and the maximum clock frequency that can be used is 5 MHz, then which of the following represents value of  $p$ ?

 A 30 B 40 C 50

Correct Option

**Solution :**

(c)

Number of flip-flops for mod-16 ripple counter = 4  
 $\text{Maximum clock frequency} = \frac{10^9}{4p} \text{ Hz} = 5 \text{ MHz}$   
 $p = \frac{10^9}{4 \times 5 \times 10^6} = \frac{1000}{20}$   
 $p = 50$

 D 55

Q. 26

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

How many  $32 \text{ K} \times 8$  RAM chips are needed to provide a memory capacity of 1 M byte \_\_\_\_\_.

 C 32

Correct Option

**Solution :**

32

$$\text{Number of RAM chips needed} = \frac{1 \text{ M bytes}}{32 \text{ K} \times 8 \text{ RAM}} = 32$$

Q. 27

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

Consider a IPv4 network system in which each host can generate packet with a rate of 300 packet per second, if each host in network is identified by unique identification number of 48 bits, then the host wrap around time for generating packet will be (in sec) \_\_\_\_\_ (Closest integer value)

 B 218 [218 - 219]

Correct Option

**Solution :**

218 [218 - 219]

IPv4 address size is 32 bits

Number of host present =  $2^{32}$ 

Each host generate 300 packet in 1 sec

Total =  $2^{32} \times 300$ 

Unique identification number of 48 bits

C 218 [218 - 219] = 2<sup>48</sup>

so, number of packets possible =

$$\text{Time to generate host wrap around} = \frac{2^{48}}{2^{32} \times 300} = 218.45 = 218$$

### QUESTION ANALYTICS

Q. 28

Solution Video

Have any Doubt?



What is the value of the following limit \_\_\_\_\_ (Upto 2 decimal places)

$$\lim_{x \rightarrow 4} \frac{3 - \sqrt{x+5}}{x - 4}$$

-0.16 [-0.16 - -0.17]

Correct Option

Solution :

-0.16 [-0.16 - -0.17]

$$\begin{aligned} & \lim_{x \rightarrow 4} \frac{3 - \sqrt{x+5}}{x - 4} \\ &= \lim_{x \rightarrow 4} \frac{3 - \sqrt{x+5}}{x - 4} \times \frac{3 + \sqrt{x+5}}{3 + \sqrt{x+5}} \\ &= \lim_{x \rightarrow 4} \frac{9 - (x+5)}{(x-4)(3 + \sqrt{x+5})} \\ &= \frac{-(x-4)}{(x-4) \cdot (3 + \sqrt{x+5})} \\ &= -\frac{1}{3 + \sqrt{9}} = -\frac{1}{6} = -0.16 \end{aligned}$$

### QUESTION ANALYTICS

Q. 29

Have any Doubt?



Let P and V are usual semaphore operation, a counting semaphore variable S initialized to 3, if the following operations are performed in the given order, value of S is \_\_\_\_\_.  
P, V, P, P, V, V, P, V, V, P, P, V

3

Correct Option

Solution :

3

P decrement the semaphore value  
V increment the semaphore value  
P, V, P, P, V, V, P, V, V, P, P, V  
6 P operations and 6 V operation

$$\begin{array}{l} \text{Value of } S = 3 + 6 - 6 \\ | \\ \text{initial} \end{array}$$

Final value = 3

### QUESTION ANALYTICS

Q. 30

Have any Doubt?



The ratio of chromatic number to the diameter of Wheel graph  $W_7$  is equal to \_\_\_\_\_ (Upto 1 decimal place)

1.5 [1.5 - 1.5]

Correct Option

Solution :

1.5 [1.5 - 1.5]

Chromatic number of Wheel Graph is 3 when  $n$  is odd, and 4 when  $n$  is even.

Hence,  $k(W_7) = 3$

And diameter of Wheel Graph is equal to 2.

$$\text{Therefore the ratio will be} = \frac{3}{2} = 1.5$$

### QUESTION ANALYTICS



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


Consider the following function.

```
int fun (int m, int n)
{
    if (n == 0) return m;
    else return (m + fun (m, n - 1));
}
```

What is the return value of function fun(18, 28)?

522
[Correct Option](#)
**Solution :**

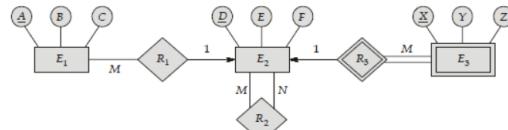
522

The given program multiply m and (n + 1) = 18 × 29 = 522

[QUESTION ANALYTICS](#)

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


Consider the following ER diagram:



The minimum number of relations table required for above ER diagram are \_\_\_\_\_.

4
[Correct Option](#)
**Solution :**

4

$E_1R_1(A B C D)$   
 $R_2(A D)$   
 $E_2(D E F)$   
 $E_3(X Y Z)$  candidate key

So minimum 4 relational tables are required.

[QUESTION ANALYTICS](#)

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


Consider the following C code:

```
int main ()
{
    int a = 25;
    int b;
    b = ++a;
    b = a++;
    b -=;
    b -= a;
    printf("%d", b);
    return 0;
}
```

Number of tokens in the above C code \_\_\_\_\_.

42
[Correct Option](#)
**Solution :**

42

```

1   2   3   4
int main ( )
5
{
6   7   8   9   10
int a = 25 ;
11 12 13
int b ;
14 15 16 17 18
b = ++ a ;
19 20 21 22 23
b = a ++ ;
24 25 26
b -- ;

```

```

27 28 29 30 31
b = a ;
32 33 34 35 36 37 38
printf ("% d", b) ;
39 40 41
return 0 ;
}
42

```

Total 42 tokens.

### QUESTION ANALYTICS

Q. 34

Solution Video

Have any Doubt ?



The number of distinct BFS traversal possible on complete graph of 4 vertices are \_\_\_\_\_.  
(Vertices are labelled)

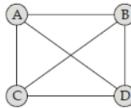
24

Correct Option

Solution :

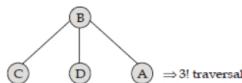
24

Complete graph on 4 vertices



We have 4 choice to select A, B, C, D.

With B as initial vertex.



$$\begin{aligned} \text{Total number of traversal} &= 4 \times 3! \\ &= 4 \times 6 = 24 \end{aligned}$$

### QUESTION ANALYTICS

Q. 35

Have any Doubt ?



Consider 3 dimensional Array A[90][30][40] stored in linear array in column major order. If the base address starts at 10, what is the location of A[20][20][30]? Assume the first element is stored at A[1][1][1].

23699

Correct Option

Solution :

23699

<i>i</i>	<i>j</i>	<i>k</i>
Let A[r <sub>1</sub> ]      [r <sub>2</sub> ]      [r <sub>3</sub> ]		
90	30	40
(planes)	(rows)	(columns)

For column major order

$$\begin{aligned} \text{loc}(A(i, j, k)) &= \text{Base Address} + (i - 1)r_2r_3 + (k - 1)r_2 + (j - 1) \\ &= 10 + 19 \times (30)(40) + 29 \times (30) + 19 \\ &= 23699 \end{aligned}$$

### QUESTION ANALYTICS

Q. 36

Solution Video

Have any Doubt ?



We are given two strings: String S of length n and string T of length m for the LCS problem, we have produced the following exponential time recursive program.

```

LCS (S, n, T, m)
{
    if (n == 0 || m == 0) return 0;
    if (S[n] == T[m]) result t = 1 + LCS (S, n - 1, T, m - 1);
    else result = max (LCS (S, n - 1, T, m), LCS (S, n, T, m - 1));
    return result;
}

```

Then the number of times that LCS (S, 1, T, 1) is recursively called equals \_\_\_\_\_.

A  $\binom{n+m-2}{m-1}$

Correct Option

Solution :

(a)

B  $\binom{n+m+1}{m-2}$

**C**  $\binom{n+m+2}{m}$

**D**  $\binom{n+m}{m-1}$

QUESTION ANALYTICS



Q. 37

Solution Video

Have any Doubt ?



Consider the following statements:

- I. A secure hash function will not produce any collisions.
  - II. Bind () used on the client side and assigns a free local port number to the socket.
- Which of the above statement(s) is/are true?

**A** I only

**B** II only

**C** Both I and II

**D** Neither I nor II

Correct Option

Solution :

(d)

- I. A secure hash function may produce any number of collisions.
  - II. Bind () associates a socket with socket address structure.
- Both statement is not correct.

QUESTION ANALYTICS



Q. 38

Solution Video

Have any Doubt ?



Let  $(Z, +)$  be a group where  $Z$  represents the set of all integers. Then which of the following is a subgroup of  $G$ ?

**A**  $(\{2k + 1 \mid k \in Z\}, +)$

**B**  $(\{3k + 2 \mid k \in Z\}, +)$

**C**  $(\{5k \mid k \in Z\} \cup \{5k + 2 \mid k \in Z\} \cup \{5k + 4 \mid k \in Z\}, +)$

**D** None of these

Correct Option

Solution :

(d)

None of the given options are subgroup of  $G$ . All of them violate the closure property. Option (a) contains all odd numbers, and as we know that adding 2 odd numbers results in an even number, it violates the closure property. Talking about (b), adding 2 integers of the form  $3k + 2$  gives us  $3m + 1$ , thus disobeying the closure property once again. And yet again, adding  $5k + 2$  and  $5k + 4$  gives us  $5n + 1$ , which doesn't belong to the set either, hence (c) suffers the same fate as well. So the appropriate choice will be (d).

QUESTION ANALYTICS



Q. 39

Solution Video

Have any Doubt ?



A single processor system has three resource types X, Y and Z, which are shared by four processes. There are 12 units of each resource type. Consider the following scenario, where the column allocation denotes the units of each resource type allocated to each process, and the column request denotes the remaining needs of every process for each resource type in order to complete their execution.

Process	Allocation			Request		
	X	Y	Z	X	Y	Z
$P_0$	2	3	2	5	5	8
$P_1$	3	1	2	1	2	3
$P_2$	3	3	2	5	8	1
$P_3$	3	2	3	2	2	4

Which of the following is correct?

**A**  $P_1$  is the first process to execute

Correct Option

Solution :

(a)

$$\begin{aligned}\text{Available} &= \text{Total resources} - \text{Total of } (X, Y, Z) \\ &= (12, 12, 12) - (11, 9, 9) = (1, 3, 3)\end{aligned}$$

Process	Allocation			Request			Current Available		
	X	Y	Z	X	Y	Z	X	Y	Z
$P_0$	2	3	2	5	5	8	1	3	3
$P_1$	3	1	2	1	2	3	9	9	10
$P_2$	3	3	2	5	8	1	4	4	5
$P_3$	3	2	3	2	2	4	12	12	12

So,  $P_1$  is the first process to execute.

**B**  $P_2$  execute at 2<sup>nd</sup> position

C  $P_0$  executed at 4<sup>th</sup> position

D All of these

 QUESTION ANALYTICS



Q. 40

 Solution Video

 Have any Doubt ?



Consider a relation R(A, B, C, D) and two sets of functional dependencies  $F_1$  and  $F_2$ :

$F_1 = \{CA \rightarrow B, BA \rightarrow D, B \rightarrow D, DB \rightarrow C\}$

$F_2 = \{A \rightarrow B, B \rightarrow A, AB \rightarrow C, AC \rightarrow D, B \rightarrow C\}$

Which of the following is true?

A  $F_2$  covers  $F_1$

Correct Option

Solution :

(a)

- I. Checking  $F_2$  covers  $F_1$   
 $CA \rightarrow B$  can be derived from  $F_2$   $A \rightarrow B$  then  $CA \rightarrow CB$ ,  $CA \rightarrow B$   
 $A \rightarrow D$  can be derived  $A \rightarrow B$ ,  $B \rightarrow AC$ ,  $AC \rightarrow D$  then  $B \rightarrow D$ ,  $AB \rightarrow D$   
 $B \rightarrow D$  can be also derived.  
 $DB \rightarrow C$  can be derived by  $B \rightarrow C$  then  $DB \rightarrow DC$   
So  $F_2$  covers  $F_1$
- II. Check  $F_1$  covers  $F_2$   
 $A \rightarrow B$  can not be derived by  $F_1$   
So not cover

B  $F_1$  covers  $F_2$

C  $F_1$  covers  $F_2$

D None of these

 QUESTION ANALYTICS



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



Kunal Jha

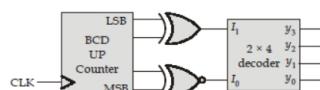
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### FULL SYLLABUS TEST-3 (BASIC LEVEL) GATE 2020 - REPORTS

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**Q. 41**
[Solution Video](#)
[Have any Doubt?](#)


For the circuit shown below:


 For how many number of clock pulses for which  $y_2$  is '1'?

 A 2 clock pulses

 B 3 clock pulses

Correct Option

**Solution:**

(b)

$$I_1 = Q_1 \oplus Q_0$$

$$I_0 = Q_3 \odot Q_2$$

Clock	$Q_3$	$Q_2$	$Q_1$	$Q_0$	$I_1$	$I_0$	$y_2$
1	0	0	0	0	0	0	1
2	0	0	0	1	1	1	0
3	0	0	1	0	1	1	0
4	0	1	0	0	0	0	0
5	0	1	0	1	1	0	1
6	0	1	1	0	1	0	1
7	0	1	1	1	0	0	0
8	1	0	0	0	0	0	0
9	1	0	0	1	1	0	1
10	0	0	0	0	0	1	0

 Since, in 10 clock cycle  $y_2$  is 1 for 3 clock cycles.

 C 10 clock pulses

 D 6 clock pulses

[QUESTION ANALYTICS](#)

**Q. 42**
[Solution Video](#)
[Have any Doubt?](#)


Consider a system with N stations share 80 Kbps of slotted aloha channel, size of the frame is 256 B which are sent at every 50 seconds what is the value of N?

 A 728.25

 B 835.19

 C 718.75

Correct Option

**Solution:**

(c)

 Throughput of slotted aloha =  $G \times e^{-G}$ 

Maximum throughput is achieved when value of G = 1

$$N \times L = 0.368 \times 80 \times 10^3$$

$$\frac{256 \times 8}{50} \times N = 0.368 \times 80 \times 10^3$$

$$N = \frac{0.368 \times 50 \times 80 \times 10^3}{256 \times 8} = 718.75$$

Value of N = 718.75

 D None of these

[QUESTION ANALYTICS](#)

**Q. 43**
[Solution Video](#)
[Have any Doubt?](#)


Consider the following grammar G with productions

S → aaA

A → aA | B

B → bbbC

C → bC | λ

The language generated by G is

A  $\{a^{2n} b^{3m} : n \geq 2, m \geq 3\}$

B  $\{a^n b^m : n \geq 2, m \geq 3\}$

Correct Option

Solution :

(b)  
As from  $S \rightarrow aaA$  we have two a's and number of a's can further increased from  $A \rightarrow aA$   
 $B \rightarrow bbbC$  give three b's and # b's can be increased from  $C \rightarrow bC$ .

C  $\{a^n b^m : n = m - 1\}$

D  $\{a^{2n} b^{3n} : n \geq 2, m \geq 3\}$

QUESTION ANALYTICS



Q. 44

Solution Video

Have any Doubt ?



Consider a degree sequence for  $n$  vertices, what is the worst case time complexity to determine if a simple graph is possible with the given degree sequence?

A  $O(n^2)$

B  $O(n \log n)$

C  $O(n)$

D  $O(n^2 \log n)$

Correct Option

Solution :

(d)  
On a given degree sequence Havali-Hakimi algorithm can be applied. Initially, we sort the given degree sequence  $a[ ]$  in decreasing order and then decrement first  $k$  terms of degree sequence starting from  $a[1]$ , where  $k = a[0]$  and will make first term  $a[0] = 0$ .  
This step repeats until all entries becomes 0 or only one entry remains.  
The algorithm will take  $O(n^2 \log n)$  time to compute.

QUESTION ANALYTICS



Q. 45

Have any Doubt ?



Consider the following function.  
int BSR (int arr [], int k)

```
[  
    int value = 0, i, last;  
    for (i = 0; i < k; i++)  
        value += arr[i];  
    last = (k * (k - 1)) / 2;  
    return (value - last );  
]
```

Assume that the array contains list of all the numbers from 1 to  $k-1$ . What is the return value of function BSR?

A Sum of all numbers

B Repeated number in the list

Correct Option

Solution :

(b)  
This program finds a repeated number (duplicate) in the list. This program adds all the values in the variable "value" and subtract " $k(k - 1)/2$ " from it. Array has 0 to  $(k - 1)$  locations and numbers are from 1 to  $(k - 1)$ . So one number will be repeated in the array.

C Average of all the numbers

D None of these

QUESTION ANALYTICS



Q. 46

Solution Video

Have any Doubt ?



Consider the following table:

Supplier (sid, name)

Parts (pid, pname, color)

Catalog (sid, pid, cost)

Which of the following query gives ID's of supplier who supplied every red part.

Q1: Select sid from Catalog C<sub>1</sub>

where NOT EXISTS (select pid from Parts P

Catalog C<sub>2</sub> where color = 'Red' and C<sub>1</sub>.sid = C<sub>2</sub>.sid)

$Q_2$ : Select sid from Catalog where  
 $\text{pid} = \text{ALL} (\text{select pid from Parts where color = 'Red'})$

- A  $Q_1$  only
- B  $Q_2$  only
- C Both  $Q_1$  and  $Q_2$
- D None of these

Correct Option

Solution :

(d)

$Q_1$ : It does not give the names of suppliers who supplied every red parts.

$Q_2$ : Query will fail, if two or more parts are red then ( $= \text{ALL}$ ) false for every records.

QUESTION ANALYTICS

Q. 47

Solution Video

Have any Doubt ?



Consider a system such that the number of clock cycles for a polling operation (including transferring to the polling routine, accessing the device and restarting the user program) is 400 cycles and that the processor executes with a 500 MHz clock. Determine the fraction of CPU consumed when the mouse must be polled 30 times per second.

- A 0.002%
- B 0.02%
- C 0.2%
- D None of these

Correct Option

Solution :

(a)

Clock cycle for polling 30 times =  $30 \times 400 = 12000$  cycles per second

$$1 \text{ processor cycle time} = \frac{1}{500 \times 10^6}$$

$$\therefore \text{Total poll time} = 12000 \times 1 \text{ processor cycle time}$$

$$= 12000 \times \frac{1}{500 \times 10^6} = 2.4 \times 10^{-5}$$

$$\therefore \text{Fractions} = \frac{2.4 \times 10^{-5}}{1} \times 100 = 0.0024\%$$

- B 0.02%
- C 0.2%
- D None of these

QUESTION ANALYTICS

Q. 48

Have any Doubt ?



Consider the following grammar:

$S \rightarrow aPbSQ \mid a$

$Q \rightarrow tS$

$P \rightarrow r$

Which of the following option is true with respect to the grammar?

- A Grammar is LL(1)
- B Grammar is LR(0)
- C Grammar is not LR(0) but SLR (1)

Correct Option

Solution :

(c)

Considering LL(1) first:

$\text{FIRST}(aPbSQ)$  will be  $\{a\}$  and  $\text{FIRST}(a)$  will be  $\{a\}$ .

Hence both the production  $[S \rightarrow aPbSQ; S \rightarrow a]$  will be placed in  $(S, a)$ .

Hence grammar is not LL(1).

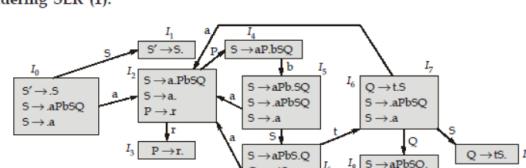
For LR(0) and SLR (1):

Considering LR (0) :

Consider the canonical item  $I_2$  in this there is an entry for both reduce as well as shift. Hence, it will result S-R conflict.

So, the grammar is not LR(0) grammar.

Considering SLR (1):



Again, If we check all the canonical item, there can not be conflict in any item except  $I_2$ . So, checking for  $I_2$ :

$S \rightarrow a.PbSQ \Rightarrow$  Its entry will be in  $(I_2, P)$

$S \rightarrow a. \Rightarrow$  Its entry will be in follow of  $S$  i.e.  $(I_2, \$)$  ( $I_2, t$ )

$P \rightarrow . r \Rightarrow$  It's entry will be in  $(I_2, r)$   
 which shows there will be no conflict because of any of the three production.  
 Hence, the grammar is SLR (1) but not LR (0).

D Grammar is not SLR (1)

QUESTION ANALYTICS



Q. 49

Solution Video

Have any Doubt ?



Consider the following function.

$$f(x) = \sqrt{36 - 4x^2}$$

Find the points at which  $f$  has absolute minimum and absolute maximum respectively.

A  $x = 0, x = 6$

B  $x = 6, x = 0$

C  $x = 0, x = 3$

D  $x = 3, x = 0$

Correct Option

Solution :

(d)

$$f(x) = \sqrt{36 - 4x^2}$$

At  $x = 0, f(x) = 6$   
 If  $x \neq 0 \Rightarrow f(x) < 6$   
 $\therefore f$  has absolute maximum at  $x = 0$   
 At  $x = 3, f(x) = 0$   
 $\therefore f$  has absolute minimum at  $x = 3$ .

QUESTION ANALYTICS



Q. 50

Have any Doubt ?



Consider the following code segment:

```
struct node
{
    struct node *left;
    int data;
    struct node *right;
};
struct node *fun (struct node *P)
{
    If (P → right → right == NULL)
        P → right = P → right → left;
    else
        P = fun (P → right);
    return (P);
}
```

What does the function fun do if root of a binary search tree is passed to the function? Assume left subtree and right subtree of Binary search tree is not NULL.

A Finds the largest node in the binary search tree

B Finds the largest node in the binary search tree and deletes it

Correct Option

Solution :

(b)

The given code will delete the largest element of the Binary search tree, since the largest element is always found at right.

C Finds the smallest node in Binary search tree

D Finds the smallest node in binary search tree and deletes it

QUESTION ANALYTICS





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OVERALL ANALYSIS    COMPARISON REPORT    **SOLUTION REPORT**

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

Q. 51

Solution Video

Have any Doubt?



Which of the following language is not a deterministic context free language?

- A** Set of all binary strings where every string not contain an equal number of zeros and one
- B** Set of all binary strings where every string starts and ends with the same symbol, and have the same number of zeros as ones.
- C**  $\{10^n 1^n | n > 0\} \cup \{11 0^k 1^{2k} | k > 0\}$
- D** None of these

Correct Option

Solution:

(d)

All given languages are DCFL.

(a)  $\{w | \#_0(w) = \#_1(w), w \in (0+1)^*\}$  is DCFL

(b)  $\{xw.x | x \in (0+1)^*, w \in (0+1)^*, \#_0(w) = \#_1(w)\}$  is DCFL

(c) If string starts with 1 then it accepts  $0^n 1^n$  as next symbols of the string. If string starts with 11 then it accepts  $0^k 1^{2k}$  as next symbols of the string, which is also DCFL.

QUESTION ANALYTICS



Q. 52

Solution Video

Have any Doubt?



A 5 stage pipelined processor has IF, ID, EXE, MEM and WB. WB stage operation is divided into two parts. In the first part register write operation and in the second part register read operation is performed. The latencies of all those stages are 300, 400, 500, 500 and 300 (in nano second) respectively. Consider the following code is executed on this processor

$I_1 : ADD R_3, R_2, R_4; R_3 \leftarrow R_2 + R_4$

$I_2 : SUB R_6, R_4, R_3; R_6 \leftarrow R_4 - R_3$

$I_3 : ADD R_7, R_5, R_3; R_7 \leftarrow R_5 + R_3$

$I_4 : SUB R_1, R_7, R_4; R_1 \leftarrow R_7 - R_4$

What will be the execution time for the above code? (Assume each instruction takes one cycle to complete its operation in every stage).

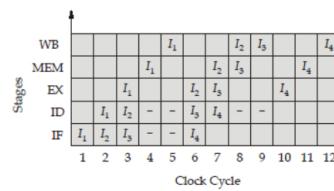
**A** 6500 ns

**B** 5500 ns

**C** 6000 ns

Correct Option

Solution:  
 (c)



Execution time will be  $12 \times 500 \text{ ns} = 6000 \text{ ns}$

**D** 5000 ns

QUESTION ANALYTICS



Q. 53

Solution Video

Have any Doubt?



Consider the following statements with respect to networking devices  
 $S_1$  : They transmit the data to all the ports on the devices.

$S_2$  : They build the connection with the similar networks which use the simila LANs.

$S_3$  : They transmit the data only to that port which is connected to the destination device.

$S_4$  : By checking the header of the packet, it forwards the packet to the higher hop on the path to destination.

Which of the following is true?

- |            |         |        |         |
|------------|---------|--------|---------|
| $S_1$      | $S_2$   | $S_3$  | $S_4$   |
| (a) Switch | Router  | Hub    | Gateway |
| (b) Switch | Gateway | Hub    | Bridge  |
| (c) Hub    | Bridge  | Switch | Gateway |
| (d) Hub    | Bridge  | Switch | Router  |

**A** a

**B** b

**C** c

**D** d

Correct Option

Solution :

- (d) Hubs are designed to transmit the packet to other appended devices regardless of the fact if data packets is destined for the device connected or not.
- Bridge connects two LAN; two physical LANs into larger logical LAN or two segments of the same LAN, that uses the same protocol.
- Just as hub, devices in switches are connected to them through twisted pair cabling. But difference is unlike hub, switch forwards the packets just to the destination device.
- When a router receives a packet, it determines the destination address by reading the header of the packet, then search the routing table to search the route and forward the packet to higher hop.

QUESTION ANALYTICS



Q. 54

Solution Video

Have any Doubt ?



Consider the partially ordered set  $(P(S), \supseteq)$  where  $S = \{1, 2, 3, 4, \dots, 256\}$ . Let A, B, C and D be subsets of S such that A contains all multiples of 8, and B contains multiples of 12, C consists of multiples of 18 and D consists of all perfect squares respectively. We define a subroutine op(a) equal to an element  $a'$ , such that  $\text{GLB}(a, a') = 0$  and  $\text{LUB}(a, a') = 1$ , where 0 and 1 denote the least and the greatest element respectively. Given that  $\text{op}(D)$  results in a set X, then the cardinality of X is equal to \_\_\_\_\_.

**240**

Correct Option

Solution :

240

If we observe carefully,  $\text{op}(A)$  is actually representing the complement of A. And we know that in case of the superset relation, the complement of A is simply the complement of the set A, that is,  $A'$ . We know that 256 is the largest perfect square belonging to S. Thus we have 16 perfect squares from 1 to 256, and hence  $|D| = 16$ . Hence we can conclude that the complement of D will contain  $256 - 16 = 240$  elements. So  $\text{op}(D) = |D'| = 240$ .

Therefore 240 is the correct answer.

QUESTION ANALYTICS



Q. 55

Solution Video

Have any Doubt ?



The number of state in a DFA to accept the language  $L = \{w \mid n_a(w) \bmod 4 = 2 \text{ and } n_b(w) \bmod 5 = 4\}$ . ( $n_a(w)$  denotes the number of a's in string w) are \_\_\_\_\_.

**20**

Correct Option

Solution :

20

Number of states =  $m \times n = 4 \times 5 = 20$

QUESTION ANALYTICS



Q. 56

Solution Video

Have any Doubt ?



Consider two nodes X and Y connected with a cable of 1500 meter and signal propagation speed is  $6 \times 10^8$  m/sec, frame size used by both nodes is 128 B including header and preambles, transmission rate is 80 Mbps and there are 4 switch between X and Y each insert 40 bit delay as a processing time in addition to store and forward delay. If only X send a packet to Y the time taken to reach at Y is \_\_\_\_\_ (usec). (Upto 1 decimal place)

**68.5 [68.4 - 68.6]**

Correct Option

Solution :

68.5 [68.4 - 68.6]

$$\text{Transmission Time} = \frac{128 \times 8}{80 \text{ Mbps}} = 12.8 \text{ usec}$$

$$\text{Propagation Time} = \frac{1500}{6 \times 10^8} = 2.5 \text{ usec}$$

$$\text{Processing Time} = \frac{40 \text{ bits}}{80 \text{ Mbps}} = 0.5 \text{ usec}$$

Cable is divided in 5 parts so propagation delay between entry point =  $\frac{2.5}{5} = 0.5 \text{ usec}$

Time taken of first switch =  $12.8 + 0.5 + 0.5 = 13.8$

4 switch =  $13.8 \times 4 = 55.2 \text{ us}$

$$\text{Total Time} = \text{Time at switches} + \text{Time at nodes} \\ = 55.2 + 12.8 + 0.5 = 68.5 \text{ usec}$$

QUESTION ANALYTICS



Q. 57

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

Consider the following statements:

- I. Bounded waiting is always satisfied if there are only two process in synchronization mechanism.
  - II. Test and set is used to implement lock/unlock to avoid busy waiting.
  - III. The CPU utilization always increases with the degree of multiprogramming increases.
- Number of correct statement(s) is/are \_\_\_\_\_.

0

Correct Option

**Solution :**

0

- I. Bounded waiting does not always satisfied with two process.
- II. Test and set is special hardware instruction that does two operations atomically but does not used to avoid busy waiting.
- III. The CPU utilization increases as the degree of multiprogramming increases up to the threshold after that it decreases.

QUESTION ANALYTICS



Q. 58

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

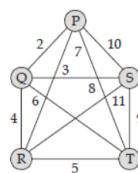
Consider a complete graph G with 5 vertices and with edges having weight 2, 3, 4, 5, 6, 7, 8, 9, 10, 11 then maximum possible weight of minimum spanning tree of G is \_\_\_\_\_.

18

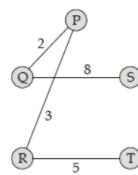
Correct Option

**Solution :**

18



MST of G:



In worst case cost of MST will be

$$\begin{aligned} &= 2 + 3 + 5 + 8 \\ &= 18 \end{aligned}$$

QUESTION ANALYTICS



Q. 59

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

Consider a memory system, with a single level paging where a memory reference takes 180 ns, TLB access time 30 ns and the hit rate of TLB is 70%, we use memory system with TLB and without TLB, the difference between effective access time without TLB and with TLB technique is \_\_\_\_\_ (ns).

96

Correct Option

**Solution :**

96

Effective access time without TLB =  $2 \times 180 = 360$  ns

$$\begin{aligned} \text{EAT with TLB} &= x(\text{TLB} + \text{Ma}) + (1 - x)(\text{TLB} + 2\text{Ma}) \\ &= 0.7(30 + 180) + 0.3(30 + 360) \\ &= 0.7 \times 210 + 0.3(390) \\ &= 147 + 117 = 264 \text{ ns} \end{aligned}$$

$$\text{Difference} = 360 - 264 = 96 \text{ ns}$$

QUESTION ANALYTICS



Q. 60

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

If a fair coin is tossed until the same result turns up in succession (both head or both tail) then find the probability when the number of tosses are even \_\_\_\_\_.  
(Upto 2 decimal places)

0.66 [0.65 - 0.67]

Correct Option

**Solution :**

0.66 [0.65 - 0.67]

The probability computed for the last two tosses are either head or tail

$$P(n = \text{even}) = 2[P(n = 2) + P(n = 4) + P(n = 6) + \dots]$$

$$\Gamma = \frac{1}{2} + \frac{1}{2^2} + \frac{1}{2^4} + \frac{1}{2^6} + \dots$$

$$\begin{aligned}
&= 2 \left[ \frac{1}{2} \cdot \frac{1}{2} + \left( \frac{1}{2} \right)^2 + \left( \frac{1}{2} \right)^3 + \dots \right] \\
&= 2 \left[ \frac{1}{2^2} \left[ 1 + \frac{1}{4} + \frac{1}{4^2} + \dots \right] \right] \\
&= \frac{1}{2} \left[ \frac{1}{1 - \frac{1}{4}} \right] \quad (\because \text{use geometric progression}) \\
&= \frac{1}{2} \cdot \left( \frac{4}{3} \right) = \frac{2}{3}
\end{aligned}$$

 QUESTION ANALYTICS



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## FULL SYLLABUS TEST-3 (BASIC LEVEL) GATE 2020 - REPORTS

[OVERALL ANALYSIS](#)   [COMPARISON REPORT](#)   **SOLUTION REPORT**
[ALL\(65\)](#)   [CORRECT\(0\)](#)   [INCORRECT\(0\)](#)   [SKIPPED\(65\)](#)
**Q. 61**
[Have any Doubt ?](#)

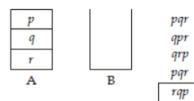

Assume stack A has the entries  $p, q$  and  $r$  (with  $p$  on top and  $r$  on bottom). Initially stack B is empty. An entry popped out of stack A can be printed immediately or pushed to stack B. A entry popped out of stack B can only be printed. What is the least number of stack permutations of input sequence that start with a particular letter?

1

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

1

The following are possible stack permutations



Total stack permutations possible with the given sequence is 5. Here the least number of permutations starting with particular letter is 1 (Starting with  $r$ ).

[QUESTION ANALYTICS](#)

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


Consider the following schedules:

 $S_1 : r_1(x), r_2(z), r_1(z), r_3(x), r_3(y), w_1(x), c_1, w_3(y), c_3, r_2(y), w_2(y), w_2(z), c_2$   
 $S_2 : r_1(x), r_2(z), r_1(z), r_3(x), r_3(y), w_1(x), w_3(y), r_2(y), w_2(y), w_2(z), c_1, c_2, c_3$   
 $S_3 : r_1(x), r_2(z), r_3(x), r_1(z), r_2(y), r_3(y), w_1(x), c_1, w_2(z), w_3(y), w_2(y), c_3, c_2$ 

The number of above schedules recoverable are \_\_\_\_\_.

2

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

2

 In  $S_2$ :  $w_3(y)$  is first and  $r_2(y)$  appears second

 Hence,  $c_2$  should appear after  $c_3$ .

 In recoverable [If  $T_j$  is reads a value written by  $T_j'$ , the  $T_i$  must commit after  $T_j$  commits]

 Schedules  $S_1$  and  $S_3$  are recoverable.


[QUESTION ANALYTICS](#)

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


Two binary counters are cascaded, where first counter has  $n$ -flip-flop and second counter has  $m$ -flip-flop. If the input signal has frequency of 30 MHz and  $n = 6, m = 4$ , then the output frequency of output signal will be \_\_\_\_\_ (kHz). (Upto 2 decimal places)

29.29 [29.20 - 29.30]

[Correct Option](#)
**Solution :**
 $29.29 [29.20 - 29.30]$ 

 MOD of ' $n$ ' FF counter =  $2^n = 2^6 = 64 = M$ 

 MOD of ' $m$ ' FF counter =  $2^m = 2^4 = 16 = N$ 

 Overall states of combined counter =  $M \times N$ 

$$= 64 \times 16$$

$$\text{Output frequency} = \frac{f}{M \times N} = \frac{30 \text{ MHz}}{64 \times 16} = 29.29 \text{ kHz}$$

[QUESTION ANALYTICS](#)

**Q. 64**
[Have any Doubt ?](#)


Consider the following statements:

- Debugger is a program that allows to examine and modify the contents of registers.
- Canonical LR parser is LR(1) parser with single look ahead terminal

- In a two pass assembler symbol table is generated in second pass.

Number of correct statement(s) is/are \_\_\_\_\_.

1

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

(1)

- i. A debugger is a program that allows to test and debug other programs.  
 ii. Canonical LR parser is an LR( $k$ ) parser,  $k = 1$  with a single look head terminal.  
 iii. In a two pass assembler symbol table is generated in first pass always.  
 So only 1 statement is correct.

 QUESTION ANALYTICS



Q. 65

Solution Video

Have any Doubt?



Consider a CPU that executes at a clock rate of 200 MHz (5 ns per cycle) with a single level of cache. CPI<sub>execution</sub> i.e. CPI with ideal memory is 1.1. Instruction mix are 50% arithmetic/logical, 30% load/store, 20% control instruction. Assume the cache miss rate is 15% and a miss penalty of 5 cycles. The number of times cpu with ideal memory is faster when no miss occurs \_\_\_\_\_.  
 (Upto 2 decimal places)

1.88 [1.80 - 1.90]

Correct Option

Solution :

1.88 [1.80 - 1.90]

$$CPI = CPI_{\text{execution}} + \text{Memory stall per instruction} \quad \dots(i)$$

$$\text{Memory stall per instruction} = \text{Memory access/Instruction} \times \text{Miss rate} \times \text{Miss penalty} \quad \dots(ii)$$

$$\text{Memory access/Instruction} = \text{Instruction fetch} + \text{Load/store} = 1 + 0.3 = 1.3 \quad \dots(iii)$$

from (ii) and (iii)

$$\text{Memory stall/Instruction} = 1.3 \times 0.15 \times 5 = 0.975 \quad \dots(iv)$$

from (i) and (iv)

$$CPI = 1.1 + 0.975 = 2.075$$

$$\text{The ideal memory CPU with no misses} = \frac{2.075}{1.1} = 1.88 \text{ time faster}$$

 QUESTION ANALYTICS



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