



Kunal Jha

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Computer Science Engineering(CS)

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FULL SYLLABUS TEST-6 (ADVANCE 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 ?



_____ you have a doubt, why not go and verify? I shall be waiting in the shade _____ this banyan tree till you come back _____ me.
 The option that best fills the blanks in the above sentence would be:

- A if; under, on
- B as; of, for
- C as; of, at
- D if; of; to

Correct Option

Solution :

(d)

Since the first sentence is a question, 'if' is more appropriate than 'as'. Shade 'of' this tree and back 'to' me are the appropriate usages.
 Hence, option (d) is the correct answer.

QUESTION ANALYTICS



Q. 2

Solution Video

Have any Doubt ?



Business traveller are time-sensitive travellers. They know that the collection of check-in baggage is always slow and one wastes precious time waiting for it. Therefore, business travellers avoid check-in baggage.

Which of the following is an assumption on which the argument above depends?

- A Carry-on baggage is more comfortable to carry and business travellers seek comfort more than other travellers.
- B The travellers who choose to check-in their baggage are neither time-sensitive nor business travellers.
- C Carry-on baggage is similar to check-in baggage in terms of size, weight allowance, and other restrictions.
- D There are no advantages that check-in baggage allows over carry-on baggage that are of any use to business travellers.

Correct Option

Solution :

(d)

There are no advantages that check-in baggage allows over carry-on baggage that are of any use to business travellers. This is the correct assumption.

QUESTION ANALYTICS



Q. 3

Solution Video

Have any Doubt ?



Read the sentence to find out whether there is any grammatical error in it. The error, if any will be in one part of the sentence. The letter of that part is the answer. If there is no error, the answer is (d). (Ignore the errors of punctuation, if any).

- A If you lend him a book
- B he will lend it to someone else
- C and never you will get it back.
- D No error.

Correct Option

Solution :

(c)

and you will never get it back.

QUESTION ANALYTICS



Q. 4

Solution Video

Have any Doubt ?



A large watermelon weighs 20 kg with 96% of its weight being water. It is allowed to stand in the sun for a while and some of the water evaporates so that now only 95% of it is water. Its reduced weight will be

- A 16 kg

Correct Option

Solution :

(a)

Since 96% of the 20 kg watermelon is water, 4% of the 20 kg is non-water : (0.04) (20) = 0.8 kg

Since 95% of the post-evaporation watermelon is water, the remaining 5% must be composed of the 0.8 kg of non-water : $0.05x = 0.8$

$$\Rightarrow x = \frac{0.8}{0.05} = \frac{80}{5} = 16 \text{ kg}$$

B 19.2 kg**C** 18 kg**D** 19.8 kg

QUESTION ANALYTICS

**Q. 5**

Solution Video

Have any Doubt ?



A shop, which sold same marked price shirts, announced an offer : if one buys three shirts then the fourth shirt is sold at a discounted price of ₹ 100 only. Sanjay took the offer. He left the shop with 20 shirts after paying ₹ 20,000. The marked price of a shirt in ₹ is_____.

1300

Correct Option

Solution :

1300

Sanjay bought 20 shirts. He would have gotten every fourth shirt at ₹ 100. He would have paid the marked price for 15 shirts and would have gotten 5 shirts at ₹ 100 each.

$$\begin{aligned} 15x + 5 \times 100 &= 20000 \\ 15x &= 19500 \\ x &= \frac{19500}{15} = ₹1300. \end{aligned}$$

QUESTION ANALYTICS

**Q. 6**

Solution Video

Have any Doubt ?



Preeti is playing a carnival game in which she is given 4 chances to throw a ball through a hoop. If her chance of success on each throw is 1/5, what is the chance that she will succeed on at least 3 of the throws?

A $\frac{1}{5^4}$ **B** $\frac{1}{5^3}$ **C** $\frac{6}{5^5}$ **D** $\frac{17}{5^4}$

Correct Option

Solution :

(d)

At least 3 out of 4 throws means 3 or 4 throws

$$\text{So, } P = {}^4C_3 \times \left(\frac{1}{5}\right)^3 \times \frac{4}{5} + \left(\frac{1}{5}\right)^4 = \frac{17}{5^4}.$$

QUESTION ANALYTICS

**Q. 7**

Solution Video

Have any Doubt ?



In the coordinate system, the center of a circle lies at (2, 3). If point A with coordinates (-1, 7) does not lie outside the circle, which of the following points must lie inside the circle?

(i) (0, 7)

(ii) (5, -1)

(iii) (-2, 7)

A i only

Correct Option

Solution :

(a)

Point A(-1, 7) does not lie outside the circle. So, point can lie on the circle or inside the circle.

Distance of A from center = 5 units. So, for the points to lie inside the circle, the distance of given points from center has to be less than 5 units.

Point (i) - Distance between (0, 7) and (2, 3) = $\sqrt{20}$, which is less than 5

Point (ii) - Distance between (5, -1) and (2, 3) = 5

Point (iii) - Distance between (-2, 7) and (2, 3) = $4\sqrt{2}$, which is more than 5

So, option (a).

- B ii only
- C iii only
- D i and ii only

QUESTION ANALYTICS



Q. 8

Solution Video

Have any Doubt?



If $|a - 5| = 11$ and $|2b - 6| = 8$, what is the minimum possible value of $\frac{a}{b}$?

- A $-\frac{6}{7}$
- B 6
- C $\frac{16}{7}$

D None of these

Correct Option

Solution :
(d)

The expression $|c - d|$ always means "the distance between c and d on the number line". So the

equation $|a - 5| = 11$ means "the distance between a and 5 is equal to 11".

So a can be either of these two places, 11 away from 5: $-a \dots \dots \dots 5 \dots \dots \dots a$
i.e.

$$a = -6 \text{ or } a = 16.$$

Similarly, if we have (factoring out a 2 from the absolute value and cancelling it) $|b - 3| = 4$, we know that the distance between b and 3 is equal to 4:

So, $b = -1 \text{ or } b = 7.$

Since we want the minimum value of $\frac{a}{b}$, we can consider the two pairs of values that will make $\frac{a}{b}$

negative (one positive value, one negative value) :

- If $a = -6$ and $b = 7$, then $\frac{a}{b} = -\frac{6}{7}$
- If $a = 16$ and $b = -1$, then $\frac{a}{b} = \frac{16}{(-1)} = -16$

The smaller of these is -16 , so that's the minimum value of $\frac{a}{b}$.

QUESTION ANALYTICS



Q. 9

Solution Video

Have any Doubt?



If x and y are real numbers, the least possible value of the expression $4(x - 2)^2 + 4(y - 3)^2 - 2(x - 3)^2$ is :

- A -8

- B -4

Correct Option

Solution :
(b)

$$4(x - 2)^2 + 4(y - 3)^2 - 2(x - 3)^2$$

y is an independent variable. The value of y is unaffected by the value of x. Therefore, the least value that the expression $4(y - 3)^2$ can take is 0 (at $y = 3$). Let us expand the remaining terms.

$$\begin{aligned} 4(x - 2)^2 - 2(x - 3)^2 &= 4x^2 + 16 - 16x - 2x^2 - 18 + 12x \\ &= 2x^2 - 4x - 2 \\ &= 2(x^2 - 2x) - 2 \\ &= 2(x^2 - 2x + 1) - 4 \\ &= 2((x - 1)^2 - 2) \end{aligned}$$

The least value that the expression $(x - 1)^2$ can take is 0 (at $x = 1$)

Therefore, the least value that the expression $2((x - 1)^2 - 2)$ can take is $2 \times (0 - 2) = 2 \times (-2) = -4$

Therefore, option (b) is the right answer.

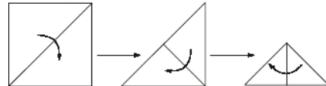
- C -2

- D 0

QUESTION ANALYTICS



As shown in the figure below, a square piece of paper is folded three times along its diagonal to get an isosceles triangle whose equal sides are 10 cm long. The area of the unfolded original piece of paper in sq.cm. is_____



400

Correct Option

Solution :
400

When a square sheet is folded in half, its area is also halved. Now an isosceles right triangle is formed after folding. For 2nd & 3rd folds, again areas halved each time and isosceles right triangle is formed.

Equal sides of last such triangle = 10 cm

$$\text{Area of last such triangle} = \frac{1}{2} \times 10 \times 10 = 50 \text{ cm}^2$$

$$\therefore \text{Area of original square} = 50 \times 2 \times 2 \times 2 = 400 \text{ cm}^2$$

QUESTION ANALYTICS

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

Q. 11

Solution Video

Have any Doubt ?



Let L_1 be the set of all languages generated by all grammars in Greibach Normal Form and L_2 be the set of all context free languages. Then

A $L_1 \subset L_2$

Correct Option

Solution :

(a)

Grammars in Greibach Normal Form can produce all epsilon free CFLs. So except epsilon, all CFLs can be generated. Hence L_1 is a proper subset of L_2 . Therefore (a) is the correct answer.

B $L_2 \subset L_1$

C $L_1 = L_2$

D None of these

QUESTION ANALYTICS



Q. 12

Have any Doubt ?



Consider a hash table of size 7 implemented using an array $A[0 \dots 6]$. A modulo function (MOD 7) is used to map the keys and open addressing is used to handle collisions. If 53, 32, 43, 51, 99 are inserted into the hash table, the contents of array A is

A EMPTY, 43, 51, 99, 32, 53 EMPTY

B EMPTY, 43, 99, 51, 32, 53 EMPTY

C EMPTY, 43, 51, 99, 53, 32 EMPTY

Correct Option

Solution :

(c)

0	
1	43
2	51
3	99
4	53
5	32
6	

Option (c) is the correct answer.

D EMPTY, 99, 43, 51, 32, 53 EMPTY

QUESTION ANALYTICS



Q. 13

Solution Video

Have any Doubt ?



Consider the languages L_1 and L_2 such that L_1 is a regular language, and L_2 is a non regular context free language. Consider the following statements.

- I. $L_1 - (L_1 - L_2)$ is context free.
- II. $L_1 - ((L_1 \cup L_2) - (L_1 \cap L_2))$ is context free.

Which of the above statements are true?

A I only

B II only

C Both I and II

Correct Option

Solution :

(c)

Let's see I first

$L_1 - (L_1 - L_2)$ is nothing but $L_1 \cap L_2$.

We know that L_1 is regular and L_2 is CFL, so we have regular \cap CFL which is always CFL by closure property, as all languages are closed under regular intersection. So I is true.

Now, II is $L_1 - ((L_1 \cup L_2) - (L_1 \cap L_2))$

$$\begin{aligned} &\equiv L_1 - (L_1 \oplus L_2) \\ &\equiv L_1 \cap L_2 \quad \text{[can be inferred by Venn diagram]} \end{aligned}$$

Therefore, we end up again with $L_1 \cap L_2$; as seen above the answer will be CFL for this one as well. So II is also context free.
So option (c) is the correct choice.

- D None of these

QUESTION ANALYTICS

Q. 14

Solution Video

Have any Doubt?



Consider a 5 stages instruction pipeline, where all stages are perfectly balanced. Assume that there is no cycle time overhead of pipelining. When application is executed on 5 stage pipeline, then how many instructions incur 3 pipeline stall cycles if the speedup achieved with respect to non pipeline is 3 _____.

- A 18.4%

- B 22.2%

Correct Option

Solution :

(b) Assume x % of instructions incur 3 stall cycles.

$$\text{Speedup} = \frac{\text{Pipeline depth}}{(1 + \text{Number of stall}/\text{Instruction})}$$

$$\begin{aligned} \text{Number of stall / Instructions} &= (\% \text{ Instruction don't incur stall} \times 0 + \% \text{ Instruction incur stall} \times 3) \\ &= (1 - x) \times 0 + x (3) = 3x \end{aligned}$$

$$\therefore 3 = \frac{5}{1+3x}$$

$$\begin{aligned} 3 + 9x &= 5 \\ 9x &= 5 - 3 = 2 \\ x &= 2/9 = 0.222 \\ \text{In \%} &= 0.222 \times 100 = 22.2 \end{aligned}$$

- C 15.7%

- D 20.42%

QUESTION ANALYTICS

Q. 15

Solution Video

Have any Doubt?



Assume priority queue in Dijkstra's algorithm is implemented using a sorted linked list and connected graph $G(V, E)$ is represented using adjacency matrix. What is the time complexity of Dijkstra algorithm?

- A $O(E \log V)$

- B $O(V^2)$

- C $O(V^3)$

Correct Option

Solution :

(c) $O(V^2)$ calls to decreases key can take $O(V)$ time.
Total complexity = $O(V^3)$

- D $O(EV)$

QUESTION ANALYTICS

Q. 16

Solution Video

Have any Doubt?



A graph G is known to have independence number and chromatic number equal to 3 and 4 respectively. Then what is the maximum number of vertices G can have?

- A 8

- B 10

- C 12

Correct Option

Solution :

(c) The answer will be 12. This follows from a theorem which says the number of vertices in G cannot exceed the product of independence number and chromatic number. Hence number of vertices can be at the very most equal to $3 \times 4 = 12$.

- D 15

Q. 17

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

Which of the following is true?

- A User level threads require memory management where Kernel level threads do not.

- B Disabling all interrupts is allowed only in Kernel mode.

Correct Option

Solution :

(b)
User level threads and Kernel threads require memory management.
Disabling all interrupts is allowed only in Kernel mode.
Kernel level threads are good for I/O bound processes.

- C Kernel level threads are not good for I/O bound processes.

- D Both (a) and (b)

Q. 18

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

What is the minimum number of 2-input NOR gates required to implement 4-variable function expressed in sum-of-minterms from as $F(A, B, C, D) = \Sigma(0, 2, 5, 7, 8, 10, 13, 15)$? [Assume that all inputs and their complements are available].

- A 2

- B 3

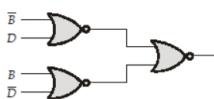
Correct Option

Solution :
(b)

$$\begin{aligned} F(A, B, C, D) &= \Sigma(0, 2, 5, 7, 8, 10, 13, 15) \\ F(A, B, C, D) &= \pi_M(1, 3, 4, 6, 9, 11, 12, 14) \end{aligned}$$

CD	00	01	11	10
AB	00	0	0	
	01	0		0
	11	0		0
	10	0	0	

$$F = (\bar{B} + D)(B + \bar{D})$$



Hence total 3 NOR gates are required.

- C 4

- D 5

Q. 19

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

Which of the following is true?

- A TCP of transport layer protocol used by TFTP.

- B UDP of transport layer protocol used by FTP.

- C Repeater occurs at both physical layer and data link layer.

- D None of these

Correct Option

Solution :

(d)
TFTP used UDP protocol.
FTP used TCP protocol.
Repeater occurs only at physical layer.

Consider the following C program:

```
#include <stdio.h>
#include <stdlib.h>
#include <unistd.h>
int main (void)
{
    pid_t pid;
    int x = 2;
    pid = fork();
    if (pid == 0);
        x = 8;
    fork();
    printf("%d ", x);
    return 0;
}
```

fork() is a system call creates new child process on successful execution.

Assuming all invocations of fork are successful, which of the following is a correct output when the program is executed on the unix OS?

A 2 2 8 8

Correct Option

Solution :

(a)

It will print 2 times 2 and 2 times 8 but order may change.

Option (a) is correct answer.

B 2 8 8 8

C 8 8 8 8

D 2 2 2 2

 QUESTION ANALYTICS

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


Number of independent variables for system of equations is:
 $x + 2y + 3z = 6$; $x + y + z = 6$; $2x + 3y + 4z = 12$

 A 0

 B 1

Correct Option

Solution :

 (b) Number of free variables = Number of variables - $\rho(A)$

 Where A is,

$$A = \begin{bmatrix} 1 & 2 & 3 \\ 1 & 1 & 1 \\ 2 & 3 & 4 \end{bmatrix}$$

 Operating $R_2 \rightarrow R_2 - R_1$, $R_3 \rightarrow R_3 - (R_1 + R_2)$ we have,

$$= \begin{bmatrix} 1 & 2 & 3 \\ 0 & -1 & -2 \\ 0 & 0 & 0 \end{bmatrix}$$

$$\Rightarrow \rho(A) = 2$$

$$\Rightarrow \text{free variables} = 3 - 2 = 1$$

 C 2

 D 3

[QUESTION ANALYTICS](#)

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


A relation R on a set A is said to be anti-transitive if and only if, for all elements a, b and c in the set A , the property: $(a, b) \in R$ and $(b, c) \in R$ implies $(a, c) \in R$ holds true. Consider the following relations on the set $\{1, 2, 3, 4\}$.

 I. $\{(1, 2), (3, 3), (4, 4)\}$

 II. $\{(2, 1)\}$

 III. $\{(2, 1), (3, 1), (3, 2), (4, 1), (4, 2), (4, 3)\}$

 IV. $\{(1, 1), (1, 2), (1, 3), (1, 4), (2, 2), (2, 3), (2, 4), (3, 3), (3, 4), (4, 4)\}$

How many of the above relations are both transitive and anti-transitive?

 A 1

 B 2

Correct Option

Solution :

(b)

I and II are both transitive and anti-transitive, which can be easily seen as they are relatively small in size. But III and IV are not. The reason is quite simple - in IV, (2, 3), (3, 4) belong to R , and according to anti-transitivity, (2, 4) must not belong to R , but it does. Hence IV is not antitansitive, and we need not see transitivity as we want those relations which satisfy both properties; if one of them is not satisfied, there's no point in checking the other. Similarly in III, (4, 2), (2, 1) implies (4, 1) shouldn't be there to begin with, but since it is a part of the relation, it ceases to be anti transitive as well. Hence only 2 relations are both transitive and anti-transitive.

 C 3

 D 4

[QUESTION ANALYTICS](#)

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


Which of the following is not true?

 A A relationship R in an ER diagram not always translate to a table in the relational model.

 B A relation $R(A, B, C, D)$ with $FD(AB \rightarrow C)$ is in BCNF.

Correct Option

Solution :

(b)

 A relationship R in an ER diagram may not translate to a table.


It has two tables $E_1(A, B)$, $E_2(C, A, D)$. R will not convert to a table.
 $R(A, B, C, D)$ $\{AB \rightarrow C\}$
 AB is not a key because not contain attribute D so not in BCNF.
Every relation which is in BCNF also in 3NF.

C Every relation which is in BCNF also in 3NF.

D Both (a) and (b)

QUESTION ANALYTICS

Q. 24

Solution Video

Have any Doubt?



If $f(x) = (3 - x^7)^{1/7}$ for all $x \in R$, then $f(f(x))$ is equal to

A x

Correct Option

Solution :

(a)

$$\begin{aligned} f(x) &= (3 - x^7)^{1/7} \\ f(f(x)) &= (3 - f(x)^7)^{1/7} \\ &= (3 - [(3 - x^7)^{1/7}]^7)^{1/7} \\ &= (3 - (3 - x^7))^{1/7} \\ &= (x^7)^{1/7} = x \end{aligned}$$

Hence option (a) will be the answer.

B x^2

C x^7

D $x - x^7$

QUESTION ANALYTICS



Q. 25

Solution Video

Have any Doubt?



Which of the following is the characteristic of Master-Slave flip-flop?

A Both the master and the slave states are affected at the same time.

B Change in the input immediately reflected in the output.

C Change in the output occurs when the state of the master is affected.

D Change in the output occurs when the state of slave is affected.

Correct Option

Solution :

(d)

Option (d) is correct for the Master-Slave flip-flop characteristic.

QUESTION ANALYTICS



Q. 26

Solution Video

Have any Doubt?



A program consist of four major types of instructions. The instruction mix and the CPI for each instruction type are given in following table:

Instruction Type	CPI	Instruction Mix
ALU	1	50%
Load / Store	2	23%
Branch	3	17%
Memory reference	4	10%

If the clock frequency of the processor is 400 MHz. The average CPI of the processor is _____.
(Upto 2 decimal places)

1.87 [1.80 - 1.90]

Correct Option

Solution :

1.87 [1.80 - 1.90]

$$\begin{aligned} \text{Average CPI} &= \sum C_i P_i \\ &= (1 * 0.5) + (2 * 0.23) + (3 * 0.17) + (4 * 0.1) \\ &= 0.5 + 0.46 + 0.51 + 0.4 = 1.87 \end{aligned}$$

QUESTION ANALYTICS



Q. 27

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

The minimum number of interfaces required for a router is/are _____.

1

Correct Option

Solution :

1

Atleast 1 interfaces required for a router to connect to the network.

 QUESTION ANALYTICS

Q. 28

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

For the function $f(x) = x^2e^{-x}$, the maximum value of $f(x)$ occurs at $x = _____$.

2

Correct Option

Solution :

2

$$\begin{aligned}f(x) &= x^2 e^{-x} \\f'(x) &= 2xe^{-x} - x^2 e^{-x} \\&= x.e^{-x}(2-x)\end{aligned}$$

For maxima or minima

$$\begin{aligned}f'(x) &= 0 \\x.e^{-x}(2-x) &= 0 \\x &= 0, 2 \\f''(x) &= (x^2 - 4x + 2)e^{-x} \\f''(0) &= 2 < 0 \text{ minima} \\f''(2) &= -2.e^{-2} < 0 \text{ maxima}\end{aligned}$$

 QUESTION ANALYTICS

Q. 29

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

Consider the following statements:

- I. Valid bit in the page table entry is used for page availability.
 - II. On per thread basis operating system does not maintain program counter.
 - III. Best fit technique for memory allocation will also suffer from internal fragmentation.
- The number of correct statement(s) is/are _____.

2

Correct Option

Solution :

2

Valid bit used to check the availability of pages in main memory, if it is valid it is directly used and if it is not valid a fresh page is loaded in memory.
On per thread basis operating system maintain program counter.
Best fit also suffers from internal fragmentation.

 QUESTION ANALYTICS

Q. 30

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

Let G be a cyclic group of order 128, and 'a' be a generator of G. Then the value of $O(a^4)$ will be _____.

32

Correct Option

Solution :

32

$$\begin{aligned}\text{We know that if } a \text{ is a generator, then } O(a^x) &= \frac{n}{\gcd(x, n)} \\&= \frac{128}{\gcd(4, 128)} = \frac{128}{4} = 32\end{aligned}$$

 QUESTION ANALYTICS



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ALL(65)

CORRECT(0)

INCORRECT(0)

SKIPPED(65)

Q. 31



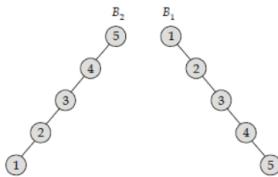
We create a binary search tree B_1 by inserting the numbers 1, 2, 3, 4, 5 into an empty binary search tree. We create another binary search tree B_2 by inserting the numbers into an empty binary search tree in the reverse order. The difference between the right most element of B_1 and the left most element of B_2 is _____.

4

Correct Option

Solution :

4



Difference between right most element of B_1 and the left most element of B_2 = 4.

QUESTION ANALYTICS



Q. 32



Consider a relation $R(a_1, a_2 \dots a_n)$, maximum number of candidate keys possible for R if the value of $n = 8$ _____.

70

Correct Option

Solution :

70

$R(a_1, a_2 \dots a_n)$ if we consider all the attribute is candidate key then total n candidate key, this is not the maximum number.

For 4 attribute maximum candidate keys will be 6.

In general maximum candidate keys possible with n attributes are ${}^nC_{\lceil \frac{n}{2} \rceil}$

$$n = 8$$

$${}^8C_4 = \frac{8 \times 7 \times 6 \times 5}{4 \times 3 \times 2 \times 1} = 70$$

QUESTION ANALYTICS



Q. 33



Consider the following C program segment:

```
#include <stdio.h>
main ()
{
    int a = 8, b = 10;
    char *y;
    y = &a = &b;
    a = 1xab;
}
```

Total number of lines in which lexical analyses produced a lexical error is _____.

1

Correct Option

Solution :

1

Line, $y = \&a = \&b;$

It generates y , $=$, $\&$, a , $=$, $\&$, b ; as token $a = 1xab$; will generate a lexical error so only in one line lexical error is produced.

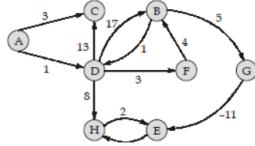
QUESTION ANALYTICS



Q. 34



For the below graph Dijkstra's algorithm does not provide correct shortest path tree.



Suppose a new graph that is different only in the weight between D-H is created. Find the number of values of edge (D-H) that ensures that Dijkstra's provide the correct shortest path tree where the value of edge (D-H) $\in [-20, 20]$ and A is the source vertex _____.

31

Correct Option

Solution :

31

Total combination of 31 weight edges for D-H edge is possible.

QUESTION ANALYTICS



Q. 35

Have any Doubt ?



Consider that N distinct elements ($N > 3$) are inserted empty Binary Search Tree (BST). Consider the following statements:

- I. The worst case height of the resulting BST is $\log_2 N$.
- II. Consider that a given order of insertion results in a BST of height N. One can always find two elements in the original order where swapping the order of insertion of the two elements can half the height of the resulting BST.
- III. Swapping the order of insertion of any two elements can always half the height of the resulting BST.

The number of the above statements true is/are _____.

1

Correct Option

Solution :

1

Only II statement is true.

QUESTION ANALYTICS



Q. 36

Solution Video

Have any Doubt ?



A young tableuar is an $m \times n$ matrix such that the entries of each row are in sorted order from left to right, and the entries of each column are in sorted order from top to bottom. What is time complexity to insert a new element into a non full $m \times n$ young tableuar.

A $O(mn)$

Correct Option

B $O(m + n)$

Solution :

(b)

The algorithm will take $O(m + n)$ to insert a new element into a young tableuar.

C $O(n^2)$

D $O(\log mn)$

QUESTION ANALYTICS



Q. 37

Solution Video

Have any Doubt ?



Consider the following statements:

- I. GBN support both individual and cumulative ACK's.
- II. Recovering lost packets between two direct connected nodes is done by transport layer.
- III. Packet switching uses more resources as compared to circuit switching.

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

A I and II only

B II and III only

C I and III only

D I only

Correct Option

Solution :

(d)

- I. GBN support both individual and cumulative ACK's.
- II. Recovering lost packets between two direct connected nodes is done by data link layer.
- III. Packet switching uses less resources as compared to circuit switching.

QUESTION ANALYTICS



Q. 38

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

Consider the following algebraic structures, over arbitrary alphabet Σ .

I. (Σ^*, \cdot)

II. $(2^{\Sigma^*}, +)$

Where the operators ' \cdot ' and ' $+$ ' represent the concatenation and union operations respectively.
Then which of the above form a group?

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

Correct Option

Solution :

(d)

Let's see where I fails.

I is closed and associative, identity also exists by the virtue of the null string ' ϵ ', but inverse doesn't exist, since concatenation can never cause a contraction in string's length which is fairly obvious. Hence I is not a group. Let's see II now.

It is closed, as union of any two language L_1 and L_2 is also a well defined language given by $L_1 \cup L_2$. Since union is associative, II is a semigroup. It is also a monoid - the identity element is \emptyset (empty language). However the inverse doesn't exist, as the union of two languages can never get us \emptyset (identity element) unless both languages are \emptyset . Hence II cases to be a group as well.



Q. 39

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

Consider the following table which has 4 processes:

Process	P ₁	P ₂	P ₃	P ₄
CPU Burst time	4	2	1	2
I/O Service time	3	2	3	1

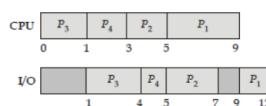
All processes arrived at time '0'. CPU scheduling uses SJF algorithm and I/O scheduling uses FCFS algorithm. Every process gets CPU service first and then only it requests I/O. CPU scheduling favours the less I/O service process whenever two or more processes have same CPU service time. What is the total time in which I/O device will not service any request from time '0' to the completion of last job? (i.e. Idle time of I/O)

- A 1
- B 2
- C 4
- D 3

Correct Option

Solution :

(d)



Duration 0 to 1 and 7 to 9, I/O is idle.

Total time = 3



Q. 40

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

Consider the following schema:

Produces (pid, name)

Parts (id, pname)

Catalog (pid, id)

Which of the following query gives pids of producer who produces every Red and Green part.

- A Select C.pid from Catalog C where
NOT EXISTS (Select p.id from Parts P
where (P.color = "Red" or P.color = "Green")
AND NOT EXISTS (Select C₁.pid from Catalog C₁
where C₁.pid = C.pid AND C₁.pid = P.id))

Correct Option

Solution :

(a)

Part color can be Red or it can be Green but not both, relational algebra query find pids for both Red and Green at same time so it is not correct.
SQL query find the pids of produces who produces every Red and Green parts.

- B $(\pi_{pid, id} \text{ Category}) / \pi_{id} (\sigma_{color = "Red"} \wedge color = "Green") \text{ (Parts)}$

- C Both (a) and (d)

D None of these

 QUESTION ANALYTICS

+

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



Kunal Jha

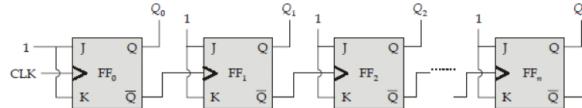
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Q. 41
[Solution Video](#)
[Have any Doubt ?](#)


Consider the following circuit:


 Assume in a similar fashion n -flip-flops are connected.

 How many clock pulses are required to change the contents of above circuit from $(A)_{10}$ to $(B)_{10}$?

(Assume A is greater than B).

A $2^n + B - A$

Correct Option

Solution :

(a)

- The counter in the circuit is binary ripple up-counter and count from 0 to $2^n - 1$.
- It is mentioned that we have to go from decimal A to B where A is greater than B.
- For reaching decimal '0' state number of clock pulses required = $2^n - (A)$.
- Later after applying $(B)_{10}$ number of clock pulses the counter will reach to state B.

 So total clock required = $[2^n - A] + B = 2^n + B - A$

Hence option (a) is correct.

B $A - B + 2^n$
C $A - B$
D $2^n - B$
[QUESTION ANALYTICS](#)

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


Which of the following are true?

- (i) In Asynchronous serial transfer extra bits are also treated as the part of data
- (ii) In synchronous serial transfer synchronous bits are treated as the part of data
- (iii) IEEE 802.3 is a contention less protocol
- (iv) IEEE 802.5 is a contention protocol

A Only (i), (iii) and (iv)

B b) Only (i), (ii) and (iv)

C Only (i)

Correct Option

Solution :

(c)

In synchronous transmission the synchronous bits are neglected by receiver hence not considered as part of data.

D Only (iii)

[QUESTION ANALYTICS](#)

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


Consider the following statements:

- I. Finite union of countable languages is always countable.
- II. Every subset of a countable set is countable.

Which of the above statements are true?

A I only

B II only

C Both I and II

Correct Option

Solution :

(c)

Both the statements are true. Finite union of countable languages is always countable, so I is true. But do note that, infinite union of countable languages is not countable. Secondly, countable languages are closed under subset operation, and hence II is true. Therefore (c) is the correct choice.

D None of these

QUESTION ANALYTICS

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Q. 44

Solution Video

Have any Doubt?

Bookmark

Consider the following statement:

- I. Suppose that average edge weight for a graph G is A_{avg} , then the MST of G will have weight atmost $(n - 1) A_{avg}$, where n is the number of vertices.
 II. Kruskal's algorithm is a greedy algorithm.
 Which of the above statement(s) is/are correct?

A I only

B II only

Correct Option

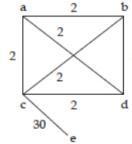
Solution :

(b)
Kruskal's algorithm is a greedy algorithm

$$\text{Average weight} = \frac{30+12}{7} = 6$$

$$\text{Expected MST weight} = 4 \times 6 = 24$$

$$\text{Actual MST weight} = 30 + 6 = 36$$



C Both I and II

D Neither I nor II

QUESTION ANALYTICS

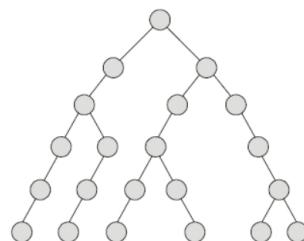
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Q. 45

Have any Doubt?

Bookmark

Assume the given binary tree having total of n nodes, then the height of the tree is



A $\Theta(n)$

B $\Theta(n)$

C $\Theta(\sqrt{n})$

Correct Option

Solution :

(c)

$$\begin{aligned} \text{Here, } n &= 1 + 2 + 3 + \dots + (h+1) \\ &= \frac{(h+1)(h+2)}{2} \end{aligned}$$

$$2n = h^2 + 2h + 2$$

Here n is number so we can rewrite as

$$= h^2 + 3h + 2 - 2n$$

$$h = \frac{-3 \pm \sqrt{3^2 - 4(2-2n)}}{2}$$

Because $h > 0$, so ignore negative height and consider positive height.

$$h = \frac{-3 + \sqrt{3n+1}}{2}$$

$$h = \Theta(\sqrt{n}) \quad \therefore (\sqrt{n+1} = \Theta(\sqrt{n}))$$

D $\Theta(\log_{1/2} n)$

QUESTION ANALYTICS

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Q. 46

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

Consider the following schedule:

 $r_1(a), r_2(a), r_3(b), w_2(a), r_4(c), r_3(b), r_1(b), r_2(b), w_1(c), w_4(a)$

The above schedule is serializable as

A T_2, T_1, T_3, T_4 B T_1, T_2, T_3, T_4 C T_1, T_3, T_2, T_4

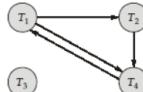
D Not serializable

Correct Option

Solution :

(d)

The precedence graph of the given schedule

Check for view serializability $[T_1 \rightarrow T_2, T_1 \rightarrow T_4, T_2 \rightarrow T_4]$ $T_1 \rightarrow T_2 \rightarrow T_4$ Read write dependency $r_4(c) \rightarrow w_1(c)$ $T_4 \rightarrow T_1$ (which is not possible)

So it is not view serializable too.

Since there is a cycle T_1, T_2, T_4, T_1 so schedule is not serializable.

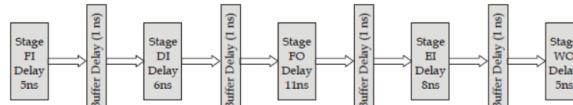
QUESTION ANALYTICS



Q. 47

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

Consider an instruction pipeline with 5 stages [Fetch Instruction (FI), Decode Instruction (DI), Fetch Operand (FO), Execute Instruction (EI) and write operand (WO)]. Delays for the stages and for the pipeline registers are as given below:

A program consisting of 9 instruction $I_1, I_2, I_3, \dots, I_9$ is executed in this pipelined processor. Instruction I_3 is the only unconditional branch instruction and its branch target is I_7 . If, the branch is taken after EI state, the time (in ns) needed to complete the program is

A 143 ns

B 150 ns

C 156 ns

Correct Option

Solution :

(c)

Instruction	1	2	3	4	5	6	7	8	9	10	11	12	13
I_1	FI	DI	FO	EI	WO								
I_2		FI	DI	FO	EI	WO							
I_3		FI	DI	FO	EI	WO							
I_4			FI	DI	FO	EI							
I_5				FI	DI	FO							
I_6					FI	FO							
I_7						FI	DI	FO	EI	WO			
I_8							FI	DI	FO	EI	WO		
I_9								FI	DI	FO	EI	WO	

Total = $13 \times 12 = 156$ ns

D 168 ns

QUESTION ANALYTICS



Q. 48

[Have any Doubt ?](#)

Which of the following could result in RR conflict in SLR(1) for the following grammar?

 $S \rightarrow A E a$ $A \rightarrow c$ $B \rightarrow b \mid \epsilon$ A $\{A \rightarrow b.a, B \rightarrow b.\}$ B $\{A \rightarrow ab., B \rightarrow b.\}$

Correct Option

Solution :

(b)

 $FOLLOW(A) = \{a, b\}$ $FOLLOW(B) = \{a\}$ $\{A \rightarrow ab, B \rightarrow b.\}$ produces RR conflict.Both items are reduced and $FOLLOW(A) \cap FOLLOW(B) = \{a, b\} \cap \{a\}$

= {a} ≠ \emptyset

C {A → b.a, B → .b}

D Both (b) and (c)

QUESTION ANALYTICS



Q. 49

Solution Video

Have any Doubt ?



Given matrices A and B such that $AB = 0$ where 0 stands for the null matrix then

A A must be zero

B B must be zero

C A and B must be zero

D Not necessary for $A = 0$ or $B = 0$

Correct Option

Solution :

(d)

In matrices $AB = 0$

Does not necessary mean that either $A = 0$ or $B = 0$

QUESTION ANALYTICS



Q. 50

Have any Doubt ?



Consider the following C program segment:

```
int test (int a [ ], int size)
{
    int min, max;
    if (a [size -1] > a[size - 2])
    {
        max = a[size -1];
        min = a[size -2];
    }
    else
    {
        max = a[size -2];
        min = a[size -1];
    }
    for (int i = size -3; i >= 0; i - -)
    {
        if (a[i] < min)
            min = a[i];
        else if (a[i] > max)
            max = a[i];
        else
            return 0;
    }
    return 1;
}
```

If preorder of a BST is passed as an argument to the above function. Function returns 1 if,

A All the leaf nodes of the tree are at same level

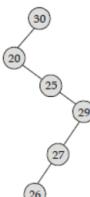
B All the nodes of the tree have atmost 1 child

Correct Option

Solution :

(b)

Consider the following tree,



Preorder of the tree will be;

30	20	25	29	27	26
0	1	2	3	4	5

max = 27

min = 26

```
for           i = 3 => a[i] > max; max = 29
for           i = 2 => a[i] < min; min = 25
for           i = 1 => a[i] < min; min = 20
for           i = 0 => a[i] > max; max = 30
```

Hence, 1 will be returned.

Above program will find if all the nodes of the tree have atmost 1 child.

If all the nodes of the tree have atmost 1 child → all the leaf nodes are at same level.
Hence, both (a) and (b) are true.

C True is a complete binary tree, where the nodes at each level are completely filled

D None of these

 QUESTION ANALYTICS

+

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

 Consider the following DFA M_1 and M_2 :

$$M_1 = (Q, \Sigma, \delta, q_0, F_1)$$

$$M_2 = (Q, \Sigma, \delta, q_0, F_2)$$

Match the items in List-I with their corresponding matches in List-II:

List-I **List-II**

P. $F_1 \cap \bar{F}_2 = \emptyset$

I. $L(M_1) = L(\bar{M}_2)$

Q. $F_2 = Q - F_1$

II. $L(M_1) = L(M_2)$

R. $F_1 = F_2$

III. $L(M_1) \subseteq L(M_2)$

Which of the following is true?

A P-II, Q-I, R-III

B P-I, Q-II, R-III

C P-III, Q-II, R-I

D P-III, Q-I, R-II

Correct Option

Solution :

(d)

P. $F_1 \cap \bar{F}_2 = \emptyset \Rightarrow F_1 \subseteq F_2$

 which means, $L(M_1) \subseteq L(M_2)$. So P matches with III.

Q. $F_2 = Q - F_1 \Rightarrow L(M_1) = L(\bar{M}_2)$. So Q \rightarrow I

R. $F_1 = F_2 \Rightarrow L(M_1) = L(M_2)$. So R \rightarrow II

Therefore option (d) is the correct answer.

[QUESTION ANALYTICS](#)

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

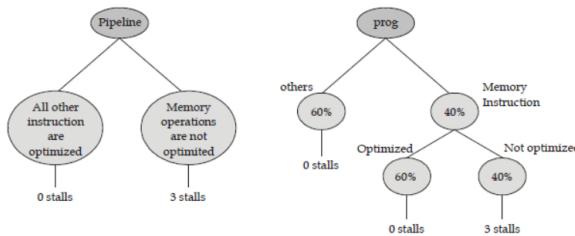
 Consider 5 stage pipeline which allows overlapping of all the instructions except memory based instructions. Penalty of the memory based instruction is 3 cycles. In the program 40% memory instructions are present, among them 60% are optimized. What is the average instruction execution?
 (Assume the pipeline cycle time as 8 ns).

A 11.84 ns

Correct Option

Solution :

(a)


 Number of stalls/Instruction $= (0.4 \times 0.4 \times 3) = 0.48$

$$\begin{aligned} \text{Average instruction ET} &= (1 + \text{Number of stalls / Instruction}) \times \text{Cycle time} \\ &= (1 + 0.48) \times 8 \text{ ns} \\ &= 11.84 \text{ ns} \end{aligned}$$

B 12.36 ns

C 9.44 ns

D 13.89 ns

[QUESTION ANALYTICS](#)

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


Which of the following IP address requires approval from ISP for obtaining them?

I. 172.20.28.27

II. 192.168.15.48

III. 16.16.16.16

IV. 192.166.10.2

A I and II only

B III and IV only

Correct Option

Solution :

(b)
Only public IP requires ISP approval to have them and for private IP's we do not need approval from ISP.

I and II are private address, private IP address range
10.0.0.0 – 10.255.255.255
172.16.0.0 – 172.31.255.255
192.168.0.0 – 192.168.255.255

C I and III only

D II and IV only

QUESTION ANALYTICS



Q. 54

Solution Video

Have any Doubt ?



We define the diameter, $d(G)$ of a graph G as the length of the 'longest shortest path' between any two vertices in G . Let G be a complete binary tree with 63 nodes. Then the value of $d(G)$ will be equal to _____.

10

Correct Option

Solution :

10
In order to get the diameter of a complete binary tree, pick a leaf node from the root's left subtree (let's call it 'a'), and then pick another leaf node from root's right subtree (say b) - the number of edges needed to be traversed to reach from vertex 'a' to vertex 'b' will give us the diameter. Therefore if ' h ' is the height of the complete binary tree, then the diameter will be equal to twice the height in this case.

So let's first find the height of this tree. We know that in case of complete binary tree, Height (h) = $\log_2(n + 1) - 1$, where n is the number of vertices in G .

We know $n = 63$, hence we get $h = 5$.
Therefore $d(G) = 2h = 2 \times 5 = 10$.

QUESTION ANALYTICS



Q. 55

Solution Video

Have any Doubt ?



The number of even palindromes over the alphabet {p, q, r} upto length n equals 121. Then the value of n is _____.

8

Correct Option

Solution :

8
Number of even palindromes
 $= |\Sigma|^{0/2} + |\Sigma|^{2/2} + |\Sigma|^{4/2} + |\Sigma|^{6/2} + \dots + |\Sigma|^{n/2}$
 $= \left\lfloor \frac{\frac{n}{2}+1}{|\Sigma|-1} \right\rfloor$

Putting $|\Sigma| = 3$

$$\frac{\left(\frac{n}{2}+1\right)}{2} = 121$$

$$\Rightarrow 3^{\frac{n}{2}+1} - 1 = 242$$

$$\text{or, } 3^{\frac{n}{2}+1} = 243$$

$$\text{or } 3^{\frac{n}{2}+1} = 3^5$$

$$\text{Therefore } \left(\frac{n}{2}+1\right) = 5$$

$$\Rightarrow n = 8$$

Hence 8 is the answer.

QUESTION ANALYTICS



Q. 56

Solution Video

Have any Doubt ?



Calculate the total time (in sec) required to transfer a 1000 Kbits file assuming an RTT of 100 ms, packet size of 1 KB and initial delay of twice of RTT for "handshaking" before data is sent. Bandwidth is 1.5 Mbps and time gap between any two consecutive packets is RTT _____.
(Upto 2 decimal places)

105.46 [105.40 - 106.50]

Correct Option

Solution :
105.46 [105.40 - 106.50]

$$\text{Time taken for transmitting 1 packet} = \frac{2^{10} \times 8 \text{ bits}}{1.5 \times 10^6 \text{ bit/sec}} = 5.36 \text{ ms}$$

$$\begin{aligned}\text{Total time for transmitting 1000 packets} &= 1000 \times 5.36 \text{ ms} = 5.36 \text{ sec} \\ \text{Total waiting delay between 2 consecutive packets} &= 999 \times 100 \text{ ms} = 99.9 \text{ sec.} \\ \text{Initial hand shaking delay} &= 200 \text{ ms} = 0.2 \text{ sec} \\ \therefore \quad \text{Total time} &= 5.36 + 99.9 \text{ sec} + 0.2 \text{ sec} \\ &= 105.46 \text{ sec}\end{aligned}$$

QUESTION ANALYTICS

Q. 57

Solution Video

Have any Doubt ?



Consider the following code for synchronization of two process:

```
P0 :  
While (True)  
{  
    While (lock = 1);  
    CRITICAL SECTION  
    lock = 1;  
}  
  
P1 :  
While (True)  
{  
    While (lock = 0);  
    CRITICAL SECTION  
    lock = 0;  
}
```

Where lock is shared variable between two process and initial value of lock = 1.

- I. It satisfies mutual exclusion.
- II. It satisfies progress.
- III. It prevents deadlock.

Number of correct statement(s) _____

2

Correct Option

Solution :

2

It satisfies mutual exclusion because only one process can enter into critical section. It requires the process to enter into strict alternation so progress is not satisfied.
It prevents deadlock.

QUESTION ANALYTICS



Q. 58

Solution Video

Have any Doubt ?



Consider an array with elements from the set {1, 2, 3 ... n}. Number of maximum inversions possible if value of n = 50 _____.

1225

Correct Option

Solution :

1225

If A[1 ... n] be an array of n distinct numbers.
If i < j and A[i] > A[j] then pair (i, j) is called an inversion of A.
For maximum inversions.

Array will be (n, n - 1, n - 2 ... 1)

$$= \frac{n(n-1)}{2} \text{ inversions}$$

For,

$$n = 50$$

$$= \frac{50 \times 49}{2} = 25 \times 49 = 1225$$

QUESTION ANALYTICS



Q. 59

Solution Video

Have any Doubt ?



Consider a machine with 36 bit virtual address space, page table entry is 4 B assume page table will fit in one page, what is the page size (KB) of machine if it uses single level page table _____.

512

Correct Option

Solution :

512

Page table = Number of pages × e

Assume page size is 2^P

Page table will fit in one page

$$2^P = \frac{2^{36}}{2^P} \times 4B$$

$$2^{2P} = 2^{36} \times 2^2 B$$

$$2P = 38$$

$$P = 19$$

$$2^P = 2^{19} = 512 KB$$

Q. 60

Solution Video

Have any Doubt?



A 2×2 Matrix A has eigen values -1 and -6 and corresponding eigen vectors are $\begin{bmatrix} 1 \\ 2 \end{bmatrix}$ & $\begin{bmatrix} 2 \\ -1 \end{bmatrix}$. Value of product of diagonal elements of matrix A is _____.

10

Correct Option

Solution :

10

$$\text{Let, } A = \begin{bmatrix} a & b \\ c & d \end{bmatrix}$$

$$\text{So, } AX_1 = \lambda_1 X_1$$

$$\Rightarrow \begin{bmatrix} a & b \\ c & d \end{bmatrix} \begin{bmatrix} 1 \\ 2 \end{bmatrix} = -1 \begin{bmatrix} 1 \\ 2 \end{bmatrix}$$

$$\Rightarrow \begin{array}{l} a + 2b = -1 \\ c + 2d = -2 \end{array} \quad \dots\dots(1)$$

$$\text{and} \quad \begin{array}{l} c + 2d = -2 \\ \dots\dots(2) \end{array}$$

$$\text{Also, } AX_2 = \lambda_2 X_2$$

$$\Rightarrow \begin{bmatrix} a & b \\ c & d \end{bmatrix} \begin{bmatrix} 2 \\ -1 \end{bmatrix} = -6 \begin{bmatrix} 2 \\ -1 \end{bmatrix} \quad \dots\dots(3)$$

$$\Rightarrow \begin{array}{l} 2a - b = -12 \\ 2c - d = 6 \end{array} \quad \dots\dots(4)$$

$$\text{Using (1) and (3),} \quad \begin{array}{l} a + 2b = -1 \\ 2a - b = -12 \Rightarrow a = -5, b = 2 \end{array}$$

$$\text{Using (2) and (4),} \quad \begin{array}{l} c + 2d = -2 \\ 2c - d = 6 \end{array}$$

$$\Rightarrow \begin{array}{l} c = 2 \text{ and } d = -2 \\ \dots\dots(2) \end{array}$$

$$\Rightarrow A = \begin{bmatrix} -5 & 2 \\ 2 & -2 \end{bmatrix}$$

$$\text{Product of diagonal elements} = -5 \times -2 = 10$$



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FULL SYLLABUS TEST-6 (ADVANCE LEVEL) GATE 2020 - REPORTS

[OVERALL ANALYSIS](#) [COMPARISON REPORT](#) **SOLUTION REPORT**
[ALL\(65\)](#) [CORRECT\(0\)](#) [INCORRECT\(0\)](#) [SKIPPED\(65\)](#)
Q. 51
[Solution Video](#)
[Have any Doubt ?](#)

 Consider the following DFA M_1 and M_2 :

$$M_1 = (Q, \Sigma, \delta, q_0, F_1)$$

$$M_2 = (Q, \Sigma, \delta, q_0, F_2)$$

Match the items in List-I with their corresponding matches in List-II:

List-I
List-II

P. $F_1 \cap \bar{F}_2 = \emptyset$

I. $L(M_1) = L(\bar{M}_2)$

Q. $F_2 = Q - F_1$

II. $L(M_1) = L(M_2)$

R. $F_1 = F_2$

III. $L(M_1) \subseteq L(M_2)$

Which of the following is true?

A P-II, Q-I, R-III

B P-I, Q-II, R-III

C P-III, Q-II, R-I

D P-III, Q-I, R-II

Correct Option

Solution :

(d)

$$P. F_1 \cap \bar{F}_2 = \emptyset \Rightarrow F_1 \subseteq F_2$$

 which means, $L(M_1) \subseteq L(M_2)$. So P matches with III.

$$Q. F_2 = Q - F_1 \Rightarrow L(M_1) = L(\bar{M}_2). \text{ So } Q \rightarrow I$$

$$R. F_1 = F_2 \Rightarrow L(M_1) = L(M_2). \text{ So } R \rightarrow II$$

Therefore option (d) is the correct answer.

QUESTION ANALYTICS

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

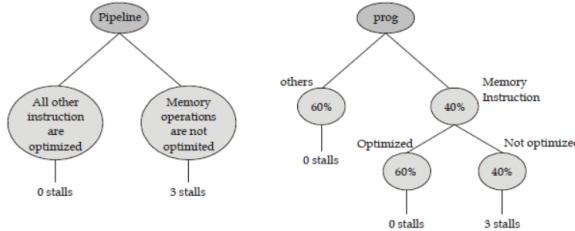
 Consider 5 stage pipeline which allows overlapping of all the instructions except memory based instructions. Penalty of the memory based instruction is 3 cycles. In the program 40% memory instructions are present, among them 60% are optimized. What is the average instruction execution?
 (Assume the pipeline cycle time as 8 ns).

A 11.84 ns

Correct Option

Solution :

(a)


 Number of stalls/Instruction $= (0.4 \times 0.4 \times 3) = 0.48$

$$\begin{aligned} \text{Average instruction ET} &= (1 + \text{Number of stalls / Instruction}) \times \text{Cycle time} \\ &= (1 + 0.48) \times 8 \text{ ns} \\ &= 11.84 \text{ ns} \end{aligned}$$

B 12.36 ns

C 9.44 ns

D 13.89 ns

 QUESTION ANALYTICS

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


Which of the following IP address requires approval from ISP for obtaining them?

I. 172.20.28.27

II. 192.168.15.48

III. 16.16.16.16

IV. 192.166.10.2

A I and II only

B III and IV only

Correct Option

Solution :

(b)
Only public IP requires ISP approval to have them and for private IP's we do not need approval from ISP.

I and II are private address, private IP address range
10.0.0.0 – 10.255.255.255
172.16.0.0 – 172.31.255.255
192.168.0.0 – 192.168.255.255

C I and III only

D II and IV only

QUESTION ANALYTICS



Q. 54

Solution Video

Have any Doubt ?



We define the diameter, $d(G)$ of a graph G as the length of the 'longest shortest path' between any two vertices in G . Let G be a complete binary tree with 63 nodes. Then the value of $d(G)$ will be equal to _____.

10

Correct Option

Solution :

10
In order to get the diameter of a complete binary tree, pick a leaf node from the root's left subtree (let's call it 'a'), and then pick another leaf node from root's right subtree (say b) - the number of edges needed to be traversed to reach from vertex 'a' to vertex 'b' will give us the diameter. Therefore if ' h ' is the height of the complete binary tree, then the diameter will be equal to twice the height in this case.

So let's first find the height of this tree. We know that in case of complete binary tree, Height (h) = $\log_2(n + 1) - 1$, where n is the number of vertices in G .

We know $n = 63$, hence we get $h = 5$.
Therefore $d(G) = 2h = 2 \times 5 = 10$.

QUESTION ANALYTICS



Q. 55

Solution Video

Have any Doubt ?



The number of even palindromes over the alphabet {p, q, r} upto length n equals 121. Then the value of n is _____.

8

Correct Option

Solution :

8
Number of even palindromes
 $= |\Sigma|^{0/2} + |\Sigma|^{2/2} + |\Sigma|^{4/2} + |\Sigma|^{6/2} + \dots + |\Sigma|^{n/2}$
 $= \left\lfloor \frac{\frac{n}{2}+1}{|\Sigma|-1} \right\rfloor$

Putting $|\Sigma| = 3$
 $\frac{\left(\frac{n}{2}+1\right)}{2} = 121$

$\Rightarrow 3^{\frac{n}{2}+1} - 1 = 242$

or, $3^{\frac{n}{2}+1} = 243$

or $3^{\frac{n}{2}+1} = 3^5$

Therefore $\left(\frac{n}{2}+1\right) = 5$
 $\Rightarrow n = 8$

Hence 8 is the answer.

QUESTION ANALYTICS



Q. 56

Solution Video

Have any Doubt ?



Calculate the total time (in sec) required to transfer a 1000 Kbits file assuming an RTT of 100 ms, packet size of 1 KB and initial delay of twice of RTT for "handshaking" before data is sent. Bandwidth is 1.5 Mbps and time gap between any two consecutive packets is RTT _____.
(Upto 2 decimal places)

105.46 [105.40 - 106.50]

Correct Option

Solution :
105.46 [105.40 - 106.50]

$$\text{Time taken for transmitting 1 packet} = \frac{2^{10} \times 8 \text{ bits}}{1.5 \times 10^6 \text{ bit/sec}} = 5.36 \text{ ms}$$

$$\begin{aligned}\text{Total time for transmitting 1000 packets} &= 1000 \times 5.36 \text{ ms} = 5.36 \text{ sec} \\ \text{Total waiting delay between 2 consecutive packets} &= 999 \times 100 \text{ ms} = 99.9 \text{ sec.} \\ \text{Initial hand shaking delay} &= 200 \text{ ms} = 0.2 \text{ sec} \\ \therefore \quad \text{Total time} &= 5.36 + 99.9 \text{ sec} + 0.2 \text{ sec} \\ &= 105.46 \text{ sec}\end{aligned}$$

QUESTION ANALYTICS

Q. 57

Solution Video

Have any Doubt ?



Consider the following code for synchronization of two process:

```
P0 :  
While (True)  
{  
    While (lock = 1);  
    CRITICAL SECTION  
    lock = 1;  
}  
  
P1 :  
While (True)  
{  
    While (lock = 0);  
    CRITICAL SECTION  
    lock = 0;  
}
```

Where lock is shared variable between two process and initial value of lock = 1.
I. It satisfy mutual exclusion.
II. It satisfy progress.
III. It prevent deadlock.

Number of correct statement(s) _____

2

Correct Option

Solution :

2

It satisfied mutual exclusion because only one process can enter into critical section. It requires the process to enter into strict alteration so progress is not satisfied.
It prevent deadlock.

QUESTION ANALYTICS



Q. 58

Solution Video

Have any Doubt ?



Consider a array with elements from the set {1, 2, 3 ... n}. Number of maximum inversions possible if value of n = 50 _____.

1225

Correct Option

Solution :

1225

If A[1 ... n] be an array of n distinct number.
If $i < j$ and $A[i] > A[j]$ then pair (i, j) is called an inversion of A.
For maximum inversions.

Array will be $(n, n - 1, n - 2 \dots 1)$

$$= \frac{n(n-1)}{2} \text{ inversions}$$

For,

$$n = 50$$

$$= \frac{50 \times 49}{2} = 25 \times 49 = 1225$$

QUESTION ANALYTICS



Q. 59

Solution Video

Have any Doubt ?



Consider a machine with 36 bit virtual address space, page table entry is 4 B assume page table will fit in one page, what is the page size (KB) of machine if it's uses single level page table _____.

512

Correct Option

Solution :

512

Page table = Number of pages \times e

Assume page size is 2^P

Page table will fit in one page

$$2^P = \frac{2^{36}}{2^P} \times 4 \text{ B}$$

$$2^{2P} = 2^{36} \times 2^2 \text{ B}$$

$$2P = 38$$

$$P = 19$$

$$2^P = 2^{19} = 512 \text{ KB}$$

Q. 60

Solution Video

Have any Doubt?



A 2×2 Matrix A has eigen values -1 and -6 and corresponding eigen vectors are $\begin{bmatrix} 1 \\ 2 \end{bmatrix}$ & $\begin{bmatrix} 2 \\ -1 \end{bmatrix}$. Value of product of diagonal elements of matrix A is _____.

10

Correct Option

Solution :

10

$$\text{Let, } A = \begin{bmatrix} a & b \\ c & d \end{bmatrix}$$

$$\text{So, } AX_1 = \lambda_1 X_1$$

$$\Rightarrow \begin{bmatrix} a & b \\ c & d \end{bmatrix} \begin{bmatrix} 1 \\ 2 \end{bmatrix} = -1 \begin{bmatrix} 1 \\ 2 \end{bmatrix}$$

$$\Rightarrow \begin{array}{l} a + 2b = -1 \\ c + 2d = -2 \end{array} \quad \dots\dots(1)$$

$$\text{and} \quad \begin{array}{l} c + 2d = -2 \\ \dots\dots(2) \end{array}$$

$$\text{Also, } AX_2 = \lambda_2 X_2$$

$$\Rightarrow \begin{bmatrix} a & b \\ c & d \end{bmatrix} \begin{bmatrix} 2 \\ -1 \end{bmatrix} = -6 \begin{bmatrix} 2 \\ -1 \end{bmatrix} \quad \dots\dots(3)$$

$$\Rightarrow \begin{array}{l} 2a - b = -12 \\ 2c - d = 6 \end{array} \quad \dots\dots(4)$$

$$\text{Using (1) and (3),} \quad \begin{array}{l} a + 2b = -1 \\ 2a - b = -12 \Rightarrow a = -5, b = 2 \end{array}$$

$$\text{Using (2) and (4),} \quad \begin{array}{l} c + 2d = -2 \\ 2c - d = 6 \end{array}$$

$$\Rightarrow \begin{array}{l} c = 2 \text{ and } d = -2 \\ \dots\dots(2) \end{array}$$

$$\Rightarrow A = \begin{bmatrix} -5 & 2 \\ 2 & -2 \end{bmatrix}$$

$$\text{Product of diagonal elements} = -5 \times -2 = 10$$



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FULL SYLLABUS TEST-6 (ADVANCE LEVEL) GATE 2020 - REPORTS

OVERALL ANALYSIS COMPARISON REPORT **SOLUTION REPORT**

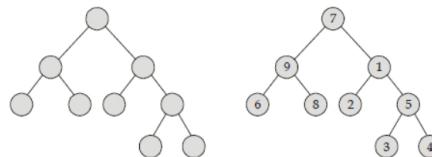
ALL(65) CORRECT(0) INCORRECT(0) SKIPPED(65)

Q. 61

Have any Doubt?



Consider the below tree:



On the right, the nine nodes of the tree have been assigned numbers from the set {1, 2, 3, ..., 9} so that for every node the number in its left subtree and right subtree lie in disjoint intervals (i.e., all numbers in one subtree are less than all numbers in the other subtree). The number of such assignments possible are _____.

6480

Correct Option

Solution :

- 6480
- Numbers in one subtree are less than all number in other subtree.
 - Total 9 elements. So root can be chosen in 9 ways and now 8 elements are left out of which 3 for left subtree and 5 for right subtree and can be chosen 3 elements in 2 ways.
 - Left subtree with 3 elements: 3 elements can be put in $3!$ ways because one subtree is always smaller than other because of distinct element.
 - Right subtree with 5 elements.
 - Same way root can be selected in 5 ways.
 - Now remaining 4 element 1 elements and 3 elements to from left sub tree and right sub tree in 2 ways to chose 1 element (either from left or right).
 - 3 elements for right subtree = $3!$ ways.
 Total arrangements = $9 \times 2 \times 3! \times 5 \times 2 \times 3! = 6480$

QUESTION ANALYTICS



Q. 62

Solution Video

Have any Doubt?



Consider the following statements:

- Strict two phase locking may have read-write conflict.
 - Unrepeatable reads is also known as write-read conflict.
 - In relational algebra join is not a basic operation.
- The number of correct statement(s) is/are _____.

2

Correct Option

Solution :

- 2
- Strict two phase locking have read write conflict. S : $r_1(A), r_2(A), w_1(A), c_1, w_2(A), c_2$
 - Unrepeatable reads is also known as read write conflict.
 - In relational algebra join is not a basic operation. Since, only 5 basic operations selection, projection, union, Cartesian product and set difference.
- Hence, statement III is correct.

QUESTION ANALYTICS



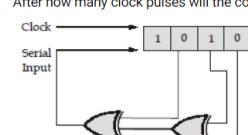
Q. 63

Solution Video

Have any Doubt?



The shift register shown in figure is initially loaded with the bit pattern 1010. Subsequently the shift register is clocked, and with each clock pulse the pattern gets shifted by one bit position to the right. With each shift, the bit at the serial input is pushed to the left most position (MSB). After how many clock pulses will the content of the shift register become 1010 again _____.



7

Correct Option

Solution :

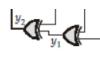
7 $\text{Serial input (SI)} = Q_2 \oplus Q_1 \oplus Q_0$

Serial Input \rightarrow

Q_3	Q_2	Q_1	Q_0
1	0	1	0

 $y_1 = Q_1 \oplus Q_0$
 $y_2 = y_1 \oplus Q_2$

CLK pulse	S.I.	Q_3	Q_2	Q_1	Q_0
0		1	0	1	0
1		1	1	1	0
2		0	0	1	1
3		0	0	0	1



4	u	u	u	1
3	1	1	0	0
2	0	0	1	0
1	1	1	0	1
7				

$$Q_3(t+1) = Q_0(t) \oplus Q_1(t) \oplus Q_2(t)$$

QUESTION ANALYTICS

Q. 64



Have any Doubt ?



Consider the following grammar:

$$S \rightarrow aA \mid aB \mid bBe \mid bAd$$

$$A \rightarrow c$$

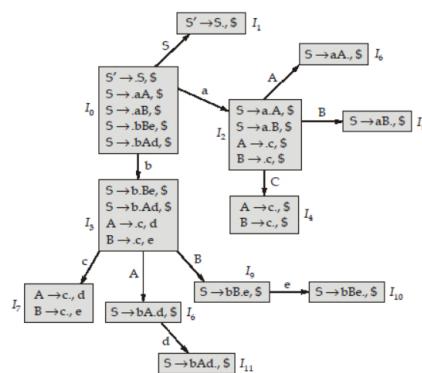
$$B \rightarrow c$$

The number of RR conflict in CLR(1) parsing table _____.

1

Correct Option

Solution :



In I_4 there is one RR conflict.

In I_7 there is no conflict because different look ahead.

QUESTION ANALYTICS



Q. 65

Solution Video

Have any Doubt ?



A byte addressable computer has a small data cache capable of holding 16 32-bit words. Each cache block consist of four 32 bit words. For the following sequence of addresses (in hexadecimal). The miss ratio if 4-way set associative LRU cache is used is _____. (Upto 1 decimal places)
100, 104, 108, 104, 107, 108, 105, 102, 108, 103

0.1

Correct Option

Solution :

0.1

$$\text{Number of blocks in cache} = \frac{\text{Cache size}}{\text{Cache block size}} = \frac{16 \times 32 \text{ bit}}{4 \times 32 \text{ bit}} = 4$$

$$\text{Number of blocks in set} = \frac{\text{Total number of blocks}}{\text{Number of way set associative}} = \frac{4}{4} = 1$$

i.e. one set contain 4 cache blocks.

Hexadecimal main memory address. 1 block contain 16 byte continuous address. When miss occur next 16 Byte load into memory.

So, when there is a miss for main memory location 100 block number 96 to 111 location load into cache.

Since, block size is 16 byte. So, for first block i.e., 100 there is miss after that all are represent in cache so, miss ratio equal to $\frac{1}{10} = 0.1$.

QUESTION ANALYTICS

