Kunal Jha
Course: GATE
Computer Science Engineering(CS)

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FULL SYLLABUS TEST-7 (ADVANCE LEVEL) (GATE - 2021) - REPORTS

OVERALL ANALYSIS | COMPARISON REPORT | SOLUTION REPORT

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

Q. 1 Solution Video | Have any Doubt ?

Select the word that is most similar in meaning to the bold word in capital letters.
DISDAIN

A Admiration

B Respect

C Contempt — Correct Option

Solution :
(c)

D Flattery

QUESTION ANALYTICS +

Q. 2 Solution Video | Have any Doubt ?

Select the word that is NEAREST in meaning to the bold word in capital letters.
VILIFY

A Malign — Correct Option

Solution :
(a)

B Commend

C Pray

D Worship

QUESTION ANALYTICS +

Q. 3 Solution Video | Have any Doubt ?

Find the missing number in the given series:
12, 25, 49, 99, 197, 395 _____.

A 789 — Correct Option

Solution :
(a)
$12 \times 2 + 1 = 25$
$25 \times 2 - 1 = 49$
$49 \times 2 + 1 = 99$
$99 \times 2 - 1 = 197$
$197 \times 2 + 1 = 395$
$395 \times 2 - 1 = 789$

B 1579

C 722

D 812

QUESTION ANALYTICS +

Q. 4 Solution Video | Have any Doubt ?

$x, 17, 3x - y - 2$ and $3x + y - 30$ are 4 consecutive terms of an arithmetic progression. The value of $x + y$ is _____

A 29 — Correct Option

Solution :
(a)
Since these are in arithmetic progression.

$$2b = a + c$$
$$2 \times 17 = x + 3x - y - 2$$
$$4x - y = 36$$

...(i)

$$2(3x - y - 2) = 17 + 3x + y - 30$$
$$3x - 3y = -9$$

...(ii)

By equation (i) and (ii)

$$x = 13,\ y = 16$$
$$x + y = 29$$

B 13

C 16

D 3

QUESTION ANALYTICS +

Q. 5 Solution Video | Have any Doubt ?

Out of 120 musicians in a club, 5% can play three instruments Guitar, Violin and Flute. If so happen then the number of musician who can play exactly two of the above instrument is 30. The number of musician who can play the Guitar alone is 40. Each person plays at least one of the music instrument then the sum of those who can play Violin alone or Flute alone are _____.

44 Correct Option

Solution :
44

$$a = 40,\ g = 6$$
$$d + e + f = 30$$
$$a + b + c + d + e + f + g = 120$$
$$a + b + c + 30 + 6 = 120$$
$$a + b + c = 84$$
$$b + c = 44$$

QUESTION ANALYTICS +

Q. 6 Solution Video | Have any Doubt ?

If $a_1, a_2, a_3, \_\_\_\_\_ a_n$ are in AP. Where $a_i > 0$ for all i, then the value of

$$\frac{1}{\sqrt{a_1}+\sqrt{a_2}} + \frac{1}{\sqrt{a_2}+\sqrt{a_3}} + \ldots\ldots\ldots + \frac{1}{\sqrt{a_{n-1}}+\sqrt{a_n}}$$

A $\frac{n-1}{\sqrt{a_1}+\sqrt{a_n}}$ Correct Option

Solution :
(a)

$$\frac{1}{\sqrt{a_1}+\sqrt{a_2}} + \frac{1}{\sqrt{a_2}+\sqrt{a_3}} + \ldots\ldots\ldots + \frac{1}{\sqrt{a_{n-1}}+\sqrt{a_n}}$$
$$= \frac{\sqrt{a_1}-\sqrt{a_2}}{a_1-a_2} + \frac{\sqrt{a_2}-\sqrt{a_3}}{a_2-a_3} + \ldots\ldots\ldots + \frac{\sqrt{a_{n-1}}-\sqrt{a_n}}{a_{n-1}-a_n}$$
$$= \frac{\sqrt{a_2}-\sqrt{a_1}}{d} + \frac{\sqrt{a_3}-\sqrt{a_2}}{d} + \ldots\ldots\ldots + \frac{\sqrt{a_n}-\sqrt{a_{n-1}}}{d}$$
$$= \frac{1}{d}\left[\sqrt{a_n}-\sqrt{a_1}\right]$$
$$= \frac{1}{d}\frac{(a_n-a_1)}{\sqrt{a_n}+\sqrt{a_1}} = \frac{(n-1)d}{d\left(\sqrt{a_n}+\sqrt{a_1}\right)}$$

$\because\ a_n = a_1 + (n-1)d$

$$= \frac{n-1}{\sqrt{a_1}+\sqrt{a_n}}$$

B $\frac{n+1}{\sqrt{a_1}-\sqrt{a_n}}$

C $\frac{n}{\sqrt{a_1}-\sqrt{a_n}}$

D None of these

QUESTION ANALYTICS +

Q. 7

Solution Video | Have any Doubt ?

If $\frac{x}{(b-c)(b+c-2a)}=\frac{y}{(c-a)(c+a-2b)}=\frac{z}{(a-b)(a+b-2c)}$ then value of $(x+y+z)$ is _____.

A $a+b+c$

B 0 — Correct Option

Solution :
(b)

$$\frac{x}{(b-c)(b+c-2a)} = \frac{y}{(c-a)(c+a-2b)}=\frac{z}{(a-b)(a+b-2c)}=k$$

$$x = k[(b-c)(b+c-2a)]$$
$$y = k[(c-a)(c+a-2b)]$$
$$z = k[(a-b)(a+b-2c)]$$
$$= k[b^2-c^2+c^2-a^2+a^2-b^2]$$
$$= -2k[a(b-c)+b(c-a)+c(a-b)] = 0$$

C $a^2+b^2+c^2$

D None of these

QUESTION ANALYTICS +

Q. 8

Solution Video | Have any Doubt ?

Karan and Arjun runs a 100 m race, where Karan beats Arjun by 10 m. To do a favour to Arjun, Karan starts 10 m behind the starting line in a second 100 m race. They both run at earlier speeds. Which of the following is true in connection with the second race?

A Karan and Arjun reach the finishing line simultaneously.

B Arjun beats Karan by 1 m.

C Arjun beats Karan by 1.1 m.

D Karan beats Arjun by 1 m. — Correct Option

Solution :
(d)
Since time is constant.

$$\therefore \quad \frac{\text{Karan's speed}}{\text{Arjun's speed}} = \frac{100}{90}=\frac{110}{x}$$

$$x = 99 \text{ m}$$

$\therefore$ Arjun completes 99 m.
So, Karan beats Arjun by 1 m.

QUESTION ANALYTICS +

Q. 9

Solution Video | Have any Doubt ?

At what time between 4 and 5 O'clock hands are opposite to each other?

A $4:30\frac{6}{11}$

B $4:24\frac{6}{11}$

C $4:5\frac{6}{11}$

D $4:54\frac{6}{11}$ — Correct Option

Solution :
(d)
At 4 O'clock there is a gap of 120° in between both the hands.
So to achieve 180° gap the minute hand have to obtain a relative gain of 120° + 180° = 300°

$\because \frac{11^\circ}{2}$ relative gain is obtain in 6 minute

$\therefore$ 300° relative gain will be obtained in $\left(\frac{12}{11}\times 300^\circ\right) = \frac{3600^\circ}{11}$

Time taken by minute hand to obtain this relative gain = $\frac{1}{6}\times\frac{3600}{11} = \frac{600}{11} = 54\frac{6}{11}$

So the time will be $4:54\frac{6}{11}$

So the time will be $4:54\frac{6}{11}$.

Alternate method:

Time required between 4 and 5 O'clock when both hands will be opposite

$$= \left(5x + \frac{D^\circ}{6}\right) \times \frac{12}{11}$$

$$= \left(5 \times 4 + \frac{180^\circ}{6}\right) \times \frac{12}{11}$$

$$= \frac{600}{11} = 54\frac{6}{11} \text{ minutes}$$

So the time will be $4:54\frac{6}{11}$.

QUESTION ANALYTICS +

Q. 10

Solution Video | Have any Doubt ?

In a sport academy 400 players are there. Among them 200 plays Cricket, 220 plays Hockey and 120 plays Basketball, 100 players who play Hockey as well as Cricket but not Basketball. There are 10 players who plays Basketball, Cricket and Hockey also. There are 50 players who only plays Cricket and 40 player who only plays Basketball. Then

A. 80 players only play Hockey. — Correct Option

B. 170 players play exactly one type of sports. — Correct Option

C. 30 players play Hockey and Basketball but not Cricket. — Correct Option

D. 60 players play neither Cricket nor Hockey not Basketball.

YOUR ANSWER - NA | CORRECT ANSWER - a,b,c | STATUS - SKIPPED

Solution :

(a, b, c)

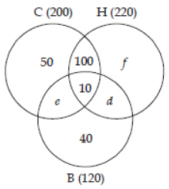
$$160 + e = 200$$
$$e = 40$$

...(i)

$$90 + d = 120$$
$$d = 30$$

...(ii)

$$110 + 30 + f = 220$$
$$f = 80$$



(a) Players who only plays Hockey = $f = 80$.

(b) Players who exactly play one type of sport = 50 + 80 + 40 = 170.

(c) Players who play Hockey and Basketball but not Cricket = $d = 30$.

(d) Players play neither Cricket nor Hockey not Basketball

$= 400 - (200 + 80 + 30 + 40) = 50$

QUESTION ANALYTICS +

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Q. 11 Solution Video | Have any Doubt ?

Given the function $f(x) = x^3 - 4x^2 + 5x$, find the open interval(s) where f is concave down, i.e., where the second derivative $f''(x) < 0$.

A $\left(\frac{4}{3}, +\infty\right)$

B $\left(-\infty, \frac{4}{3}\right)$ Correct Option

Solution :
(b)

$$f'(x) = 3x^2 - 8x + 5$$
$$f''(x) = 6x - 8$$
$$f''(x) < 0 \text{ iff } \quad 6x - 8 < 0 \text{ iff}$$
$$x < \frac{8}{6}$$
or
$$x < \frac{4}{3}$$

$\Rightarrow$ f is concave down on the interval $\left(-\infty, \frac{4}{3}\right)$.

C $\left(-\infty, \frac{4}{3}\right]$

D $\left[\frac{4}{3}, +\infty\right)$

QUESTION ANALYTICS +

Q. 12 FAQ | Solution Video | Have any Doubt ?

The Karnaugh map shown below represents a switching function Y(A, B, C, D). The total number of prime implicants of the function Y is _____.

Y: CD \ AB	00	01	11	10
00	1	0	0	1
01	0	1	0	1
11	1	1	0	0
10	1	1	0	1

4 Correct Option

Solution :
4
For prime implicants, we have two 4-size subcubes (2, 3, 6, 7) and (0, 2, 8, 10). Also we have two 2-size subcubes (5, 7) and (8, 9).

QUESTION ANALYTICS +

Q. 13 Have any Doubt ?

What is the output of the following program?

```
#include <stdio.h>
int main( )
{
struct node
{
    int a;
    int b;
    int c;
};
    struct node s = {12, 11, 10};
    struct node *pt = &s;
    printf("%d\n", *((int*)pt + 1));
    return 0;
}
```

A 12

B 11 Correct Option

Solution :
(b)
The struct node s is created.
a, b, c assigned with 12, 11, 10 respectively.
pt is the struct node assigned with address of s.
(int*)pt // we are typecasting pt to the pointer of int type.
((int) pt + 1)// accessing the second value.

C 10

D 13

QUESTION ANALYTICS +

Q. 14 Have any Doubt ?

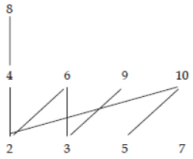
Consider the divides relation, m|n, on the set A = {2, 3, 4, 5, 6, 7, 8, 9, 10}. Which of the following permutations of A is not a topological sort of this partial order relation?

A 7, 2, 3, 6, 9, 5, 4, 10, 8

B 2, 3, 7, 6, 9, 5, 4, 10, 8

C 2, 6, 3, 9, 5, 7, 4, 10, 8 Correct Option

Solution :
(c)
The Hasse diagram is as follows:



In option (c), 6 is occurring before 3, so, that's incorrect.

D 3, 7, 2, 9, 5, 4, 10, 8, 6

QUESTION ANALYTICS +

Q. 15 FAQ Solution Video Have any Doubt ?

Let R and S be binary relations on a set A. Suppose that R is reflexive, symmetric and transitive and that S is symmetric, and transitive but is not reflexive. Which statement is always true for any such R and S?

A R ∪ S is symmetric but not reflexive and not transitive.

B R ∪ S is symmetric, reflexive, transitive.

C R ∪ S is transitive and symmetric but not reflexive.

D R ∪ S is reflexive and symmetric but may not be transitive. Correct Option

Solution :
(d)
Since R is reflexive so R ∪ S will also be reflexive. Since R, S are symmetric, so R ∪ S also will be symmetric. But R ∪ S may not be transitive.
Consider this: A = {1, 2, 3}, R = {(1, 1), (2, 2), (3, 3), (2, 3)} and S = {(3, 1), (1, 3)}
R ∪ S is not transitive.

QUESTION ANALYTICS +

Q. 16 FAQ Have any Doubt ?

Find the derivative of $f(x) = \left(1+x^4-\frac{1}{x}\right)^{5/3}$.

A $\frac{20}{3}x^{17/3}+\frac{5}{3x^{8/3}}$

B $\frac{5}{3}\left(1+x^4+\frac{1}{x}\right)^{2/3}$

C $\frac{5}{3}\left(1+x^4-\frac{1}{x}\right)^{2/3}\left(4x^3+\frac{1}{x^2}\right)$ Correct Option

Solution :
(c)

$$f'(x) = \frac{5}{3}\left(1+x^4-\frac{1}{x}\right)^{\frac{5}{3}-1}\cdot\left(1+x^4-\frac{1}{x}\right)^1$$
$$= \frac{5}{3}\left(1+x^4-\frac{1}{x}\right)^{2/3}\left(4x^3+\frac{1}{x^2}\right)$$

D $\frac{5}{3}x^{2/3}\left(4x^3+\frac{1}{x^2}\right)$

QUESTION ANALYTICS +

Q. 17 FAQ Have any Doubt ?

If L is language accepted by some automaton M, which of the following is/are true?
I. If M is a non-deterministic finite automaton, then L is accepted by some deterministic finite automaton.
II. IF M is a deterministic pushdown automaton, then L is accepted by some non-deterministic pushdown automaton.
III. If M is a non-deterministic pushdown automaton, then L is accepted by some deterministic Turing Machine.

A I and III Correct Option

B Only I and II

C Only II and III

D All of these Correct Option

YOUR ANSWER - NA | CORRECT ANSWER - a,d | STATUS - SKIPPED

Solution :
(a, d)
FA, DPDA, PDA, TM
All statements are correct
So, answer is option (a) and (d).

QUESTION ANALYTICS +

Q. 18 Have any Doubt ?

Here is an INCORRECT pseudocode for the algorithm which is supposed to determine whether a sequence of parentheses is balanced:

```
declare a character stack
while (more input is available)
 {
     read a character
     if (the character is a '('  )
         push it on the stack
     else if (the character is a ')' and the stack is not empty)
         pop a character off the stack
     else
         print "unbalanced" and exit
 }
     print "balanced"
```

Which of these unbalanced sequences does the above code think is balanced?

A ((( )) Correct Option

Solution :
(a)
For the sequence ((( )), this algorithm will push (((on the stack and then pop ((from the stack. Now the stack is not empty but the algorithm will incorrectly say that it is balanced.

B ( ))(( )

C (( )( ))

D (( ))( )

QUESTION ANALYTICS +

Q. 19 FAQ Solution Video Have any Doubt ?

If it is assumed all $^{52}C_5$ poker hands are equally likely, what is the probability of being dealt a flush? (Hint: Flush consists of cards of the same suit. There are 4 suits in a standard deck, consisting of 13 cards each.

A 0.423

B 0.002 Correct Option

Solution :
(b)
First, of the 4 suits in a standard deck, we choose 1 of them for use in the flush. In each suit, there 13 cards. Of these 13 cards, we must choose 5 to make a full poker hand. Therefore, the probability of being dealt a flush is

$$P(\text{flush}) = \frac{\binom{4}{1}\binom{13}{5}}{\binom{52}{5}} \approx 0.002$$

C 0.047

D 0.021

QUESTION ANALYTICS +

Q. 20 ? FAQ ▶ Solution Video Have any Doubt ?

Consider the following statements regarding the Kruskal and Prim's algorithms for finding minimum spanning tree of a connected undirected weighted graph.
I. There is no need of any cycle checking algorithm in Kruskal's algorithm.
II. There is no need of any cycle checking algorithm in Prim's algorithm.
Which of the above is/are correct statements?

A Only I

B Only II Correct Option

Solution :
(b)
In Prim's algo, we never get a cycle because we are adding a new vertex into a tree which can never bring cycle.

C Both I and II

D None of these

QUESTION ANALYTICS +

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OVERALL ANALYSIS | COMPARISON REPORT | SOLUTION REPORT

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

Q. 21 Have any Doubt ?

In a certain land on a planet in a galaxy far away the alphabet contains only 5 letters which are A, I, L, S and T. All names are 6 letters long, begin and end with consonants and contain atleast one vowels. How many such possible names are there?

4896 — Correct Option

Solution :
4896
Hint: Use complementary counting
• All strings starting and ending with constants, so number of ways possible
$= 3 \times 5^4 \times 3$.
• Now find all strings which contains 0 vowels = 3^6.
• Now if we subtract we will get atleast 1 vowel = $9 \times 5^4 - 3^6 = 4896$.

QUESTION ANALYTICS +

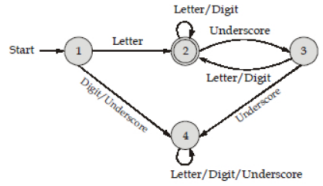
Q. 22 Have any Doubt ?

In Ada, an identifier consists of a letter followed by any number of letters, digits and underscores. However, the identifier may not end in an underscore or have two underscores in a row. Minimum number of states required for a DFA to accept all valid ADA identifiers?

4 — Correct Option

Solution :
4

$$\begin{aligned} \text{Letter} &= [a - zA - Z] \\ \text{Digit} &= [0 - 9] \\ \text{Underscore} &= [\_] \\ \text{Identifier} &= \text{letter (letter} \mid \text{digit)}^* \end{aligned}$$



Minimum number of states = 4

QUESTION ANALYTICS +

Q. 23 Solution Video Have any Doubt ?

Consider the following statements:
I. Threads in a process have separate stacks.
II. Threads in a process have separate copies of the program executable.
Which of the above are true?

A Only I — Correct Option

Solution :
(a)
(a) Yes, threads in a process have separate stacks so that they can have separate execution state, and run independently. (b) No, threads share the program executable and data.

B Only II

C Both I and II

D None of these

QUESTION ANALYTICS +

Q. 24 Have any Doubt ?

Which one of the following expressions represents exclusive NOR of x and y?

A $xy + x'y'$ — Correct Option

Solution :
(a)
A satisfies the truth table of EX-NOR. If both inputs are same, output should be 1. So, if x and y are 1, option (a) evaluates to 1 because of xy term and if x and y are 0, option (a) evaluates to 1 because of the second term.

B $xy' + yx'$

C x' XOR y'

D $xy + xy'$

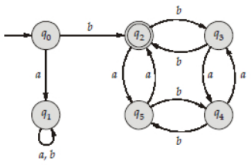
QUESTION ANALYTICS +

Q. 25 — FAQ — Have any Doubt ?

Let D = $\{w \mid w$ contains an even number of a's and an odd number of b's and does not starts with $a\}$ from the alphabet = $\{a, b\}$. The minimum number of states in a DFA that accepts the given language D _____.

6 — Correct Option

Solution :
6



Total 6 states required.

QUESTION ANALYTICS +

Q. 26 — FAQ — Have any Doubt ?

Consider the IP address 10.16.3.65/23. Where 23 represents the subnet mask of classfull addressing.
Which of the following is true?

A The subnet address is 10.16.3.0

B The lowest host address in the subnet is 10.16.2.1 — Correct Option

C The last valid host address in the subnet is 10.16.2.254

D The broadcast address of the subnet is 10.16.3.255 — Correct Option

YOUR ANSWER - NA | CORRECT ANSWER - b,d | STATUS - SKIPPED

Solution :
(b, d)
The address of class A so subnet mask is 255.255.254.0.
Subnet bits = 15, host bits = 9
Subnet address = AND operation between 10.16.3.65 AND 255.255.254.0
Subnet address = 10.16.2.0
Lowest host address = 10.16.2.1
Last host = 10.16.3.254
Broadcast address = 10.16.3.255

QUESTION ANALYTICS +

Q. 27 — FAQ — Solution Video — Have any Doubt ?

In a 16 bit instruction the size of address field is 7 bits. The computer uses expanding opcode technique. It has 2, two address instructions and 250 one address instruction.
How many zero address instructions can be formulated?

768 — Correct Option

Solution :
768
Two address has 2 address fields, one address has 1, zero address has 0
Total encodings = 2^{16}
2 address instruction encodings = $2 \times 2^7 \times 2^7$
1 address instruction encodings = 250×2^7
Zero address instructions = $2^{16} - (2 \times 2^7 \times 2^7 + 250 \times 2^7) = 768$

QUESTION ANALYTICS +

Q. 28 FAQ | Have any Doubt ?

Let *A* be a one dimensional array declared as follows:
A : array [−10, ..., 5] of integer;
Assuming that each integer takes 64 bytes, the first element of the array is stored at location 200, what is the address of the element *A*[−1]?

776 — Correct Option

Solution :
776
If array $[a_1, ..., a_2]$ and each array element takes n memory address locations then

$$\text{Address of } A[i] = \text{Base address} + (i - a_1)^* n$$

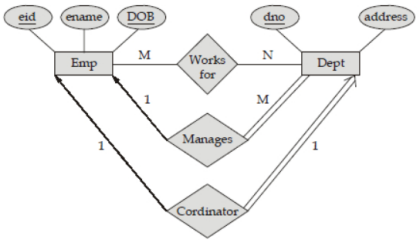
Since memory is word addressable and each array element takes one word, so, each array element takes one memory address location.

$$200 + (-1 + 10) \times 64 = 776$$

QUESTION ANALYTICS +

Q. 29 FAQ | Solution Video | Have any Doubt ?

How many minimum relational tables required for given ERD?



A 2

B 3 — Correct Option

Solution :
(b)

C 4

D 5

QUESTION ANALYTICS +

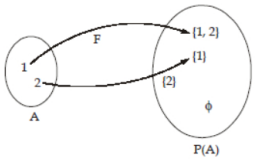
Q. 30 FAQ | Have any Doubt ?

For a set A define P(A) to be the set of all subsets of A. Let F : A → P(A) be a function and A is not empty. Which of the following must be true?

A F cannot be one-to-one (injective).

B F cannot be onto (surjective). — Correct Option

Solution :
(b)



But, it cannot be onto, because, the number of elements in domain (A) < the number of elements in co-domain (P(A)).
For a function to be onto, the domain should be able to cover all elements of co-domain with each element of the domain having exactly one image in co-domain.
So option (b) is answer.

C F is both one-to-one and onto (bijective).

D If such a function F exists, then A is infinite.

QUESTION ANALYTICS +

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

Q. 31 FAQ | Solution Video | Have any Doubt ?

Consider the following statements:
S_1 : LALR(1) has the same number of states as SLR(1). Also goto and shift moves are identical. reduce moves may differ.
S_2 : If there is no SR conflicts in CLR(1) then there is no SR conflicts in LALR(1). And if there is no RR conflicts in CLR(1) then there is no RR conflicts in LALR(1).
S_3 : SLR(1) , LALR(1) and CLR(1) uses canonical collection of LR(1) items.
S_4 : Operator precedence parser can parse both ambiguous and unambiguous grammar.
Which of these above statements are INCORRECT?

A. S_1 only

B. S_2 only — Correct Option

C. S_3 only — Correct Option

D. S_4 only

YOUR ANSWER - NA | CORRECT ANSWER - b,c | STATUS - SKIPPED

Solution :
(b, c)
S_2 if there is no RR conflict in CLR(1) then there may be RR conflict in LALR(1). So S_2 is false. S_3 it is false.

QUESTION ANALYTICS +

Q. 32 Solution Video | Have any Doubt ?

Consider table R with attributes A, B, C, D and E. What is the largest number of candidate keys that R could have at the same time?

10 — Correct Option

Solution :
10
We can get maximum number of candidate keys by combining attributes such the no one should be the subset of others.
So we have 5 possibilities here taking 1 attribute as candidate key i.e. ${}^5C_1$(A, B, C, D, E)
Similarly for 2 attributes and 3 attributes ${}^5C_2 = {}^5C_3 = 10$
4 attributes ${}^5C_4 = 5$
5 attributes = 1
So maximum number of candidate keys that R could have at the same time is 10.

QUESTION ANALYTICS +

Q. 33 Solution Video | Have any Doubt ?

Consider the following statements:
I. A process in user mode cannot execute certain privileged hardware instructions.
II. Two processes can be concurrently executing the same program executable.
Which of the above are true?

A. Only I

B. Only II

C. Both I and II — Correct Option

Solution :
(c)
Yes, two processes can run the same program. True, some instructions in every CPU's instruction set architecture can only be executed when the CPU is running in a privileged mode.

D. None of these

QUESTION ANALYTICS +

Q. 34 Solution Video | Have any Doubt ?

Which of the following recurrence relation represent the worst case complexity of quick sort algorithm? (Note: k is constant, n is number of elements)

A $T(n) = T\left(\frac{n}{4}\right) + T\left(\frac{3n}{4}\right) + n + k$

B $T(n) = 2T\left(\frac{n}{2}\right) + n + k$

C $T(n) = T(n-1) + n + k$ Correct Option

Solution :
(c)
$T(n) = T(n-1) + n + k$ has complexity $\theta(n^2)$

D $T(n) = T(n-1) + 1 + k$

QUESTION ANALYTICS +

Q. 35 ? FAQ ▶ Solution Video Have any Doubt ?

A 2-bit binary adder sums two numbers, $A_1\ A_0$ and $B_1\ B_0$ to yield the unsigned result $Y_2Y_1Y_0$, where the zero subscript indicates the least significant bit (LSB).
Then which of the following is correct expression for Y2?

A $A_1\ B_1 + A_1\ B_0\ B_1 + B_1\ A_0\ B_0$

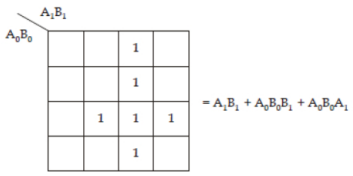
B $A_1\ B_1 + A_1\ B_0\ A_0 + B_1\ A_0\ B_0$ Correct Option

Solution :
(b)

$$\begin{array}{ccc} & A_1 & A_0 \\ & B_1 & B_0 \\ \hline Y_2 & Y_1 & Y_0 \end{array}$$

So, the following table represents the function Y_2 and its K-map.

A_1	B_1	A_0	B_0	Y_2	Y_1	Y_0
0	0	0	0	0		
0	0	0	1	0		
0	0	1	0	0		
0	0	1	1	0		
0	1	0	0	0		
0	1	0	1	0		
0	1	1	0	0		
0	1	1	1	1		
1	0	0	0	0		
1	0	0	1	0		
1	0	1	0	0		
1	0	1	1	1		
1	1	0	0	1		
1	1	0	1	1		
1	1	1	0	1		
1	1	1	1	1		



C $A_1\ B_1 + A_1\ B_0 + B_1\ A_0\ B_0$

D None of the above

QUESTION ANALYTICS +

Q. 36 ▶ Solution Video Have any Doubt ?

Consider a micro programmed control unit which has support of 256 instructions, each of which an average takes 16 micro operations. The system has support of 16 flag conditions and 52 control signals. If vertical microprogramming control is used in system then total length of control word (in bits) is _____?

22 Correct Option

Solution :
22
In order to implement each 256 instructions, 16 micro operations required (assuming each micro operations will acquire one word)
Therefore control memory needed =256 × 16 = 2^{12}
Number of bits required to address control memory = 12
Number of bits for flag = $\log_{16}$ = 4
Number of bits for control signals (vertical microprog) = ceil($\log_{52}$) = 6
Therefore number of bits required for the control word = 12 + 4 + 6 = 22
Answer is 22.

QUESTION ANALYTICS +

Q. 37 Have any Doubt ?

Suppose that queue operations are implemented using stack operation. Enqueue(x) and Dequeue( ) are queue operations whereas Pop( ) and Push(x) are stack operations. Consider the following code:

```
Enqueue(S1, x)
{
    Push(S1, x);
}
Dequeue(S1, S2)
{
    if(!IsEmptyStack(S2))
        return Pop(S2);
    else{
    while(!IsEmptyStack(S1))
        Stmt1;
    return Stmt2;
    }
}
```

Fill the missing statement Stmt1 and Stmt2 to perform Dequeue operation correctly (here S_1 and S_2 are two stacks)

A Stmt1: Push (S_2, Pop (S_1)); Stmt2: pop(S_2); Correct Option

Solution :
(a)
This is just the implementation of queue using two stacks.
Enqueue(q, x)
1. Push x to stack1

Dequeue(q)
1. If both stacks are empty then error.
2. If stack2 is empty
   While stack1 is not empty, push everything from stack1 to stack2.
3. Pop the element from stack2 and return it.

Stmt1: Push (S_2, Pop (S_1)); Stmt2: pop(S_2);
Hence option (a) is answer.

B Stmt1: Push (S_1, Pop (S_2)); Stmt2: pop(S_1);

C Stmt1: Push (S_1, Pop (S_2)); Stmt2: pop(S_2);

D Stmt1: Push (S_2, Pop (S_1)); Stmt2: pop(S_1);

QUESTION ANALYTICS +

Q. 38 Have any Doubt ?

A mineral collection contains twelve samples of Calomel, seven samples of Magnesite and N samples of Siderite. Suppose that the smallest K such that choosing K samples from the collection guarantees that you have six samples of the same type of mineral is K = 15. What is N?

4 Correct Option

Solution :
4
If N = 5 or more then we can not guarantee that you have six samples of the same type of mineral because you can pick 5 of type Calomel, 5 of type Magnesite and 5 of type Siderite. So, we have 15 samples but we do not have 6 samples of the same type. So, the answer will be N = 4.

QUESTION ANALYTICS +

Q. 39 FAQ Solution Video Have any Doubt ?

Consider the 3 processes P_0, P_1 and P_2 shown in the table.

Process ID	Arrival Time	Burst Time
P_0	0	4
P_1	0	6
P_2	0	9

CPU uses longest remaining time first scheduling algorithm. Find the average of completion times of P_0, P_1 and P_2?
(Ties are broken by giving priority to the process having lowest process ID)

18 Correct Option

Solution :
18

P_2	P_2	P_2	P_1	P_2	P_1	P_2	P_0	P_1	P_2	P_0	P_1	P_2	P_0	P_1	P_2	P_0	P_1	P_2

Here each cell is of 1 unit time.
Completion time of P_0 = 17
Completion time of P_1 = 18
Completion time of P_2 = 19
Average of completion time of P_0, P_1 and P_2 = 18.

QUESTION ANALYTICS +

Q. 40 Solution Video Have any Doubt ?

Problem in statistics is given to three students, whose chances of solving it are $\frac{1}{2}$, $\frac{1}{3}$ and $\frac{1}{4}$ respectively. What is the probability that problem will be solved? (Rounded off to two decimal places)

0.75 Correct Option

Solution :
0.75

Let P_1, P_2 and P_3 be the probability of three persons of solving the problem.

Here, $P_1 = \frac{1}{2}, P_2 = \frac{1}{3}, P_3 = \frac{1}{4}$

The problem will be solved, if at least one of them solves the problem.

P (at least one of them solves the problem) = 1 – P (None of them solves the problem)

Now, the probability that none of them solves the problem will be,

P (none of them solves the problem) = $(1 - P_1)(1 - P_2)(1 - P_3)$

$$= \frac{1}{2} \times \frac{2}{2} \times \frac{3}{4} = \frac{1}{4}$$

P (at least one of them solves the problem) = 1 – P (None of them solves the problem)

$$= 1 - \frac{1}{4} = \frac{3}{4}$$

Hence, the probability that the problem will be solved is $\frac{3}{4}$.

QUESTION ANALYTICS +

Kunal Jha
Course: GATE
Computer Science Engineering(CS)

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FULL SYLLABUS TEST-7 (ADVANCE LEVEL) (GATE - 2021) - REPORTS

OVERALL ANALYSIS | COMPARISON REPORT | SOLUTION REPORT

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

Q. 41

Have any Doubt ?

What will be the output of following program?

```
#include <stdio.h>
int main( )
{
    char* str[ ] = {"SWEAT, "SMILE", "AND", "REPEAT"};
    char** sptr[ ] = {str + 3, str + 2, str + 1, str};
    char*** pp;
        pp = sptr;
    ++pp;
    printf("%s", **++pp);
    --pp;
    printf("%s", **pp);
    --pp;
    printf("%s", **pp + 3);
    return 0;
}
```

(a) (b)
(c) (d)

A SMILE AND EAT — Correct Option

Solution :
(a)
**sptr is array pointer(double pointer) that is pointing to str strings in reverse order.
***pp also a pointer that is pointing sptr base address.
++pp will point to 1st index of sptr that contain str+2 ("AND").
in printf("%s", **++pp); ++pp will point to 2nd index of sptr that contains str+1, and **++pp, value stored @ str+1 ("SMILE") is printed
--pp will point to 1st index of sptr that contain str+2 ("AND"). printf("%s", **pp); will point to str+2 and **pp, the value stored at str+2 ("AND") is printed
--pp will point to 0th index of sptr that contain str+3 ("REPEAT"). printf("%s", **pp); will point to str+3 and **pp, the value stored at str+3 ("REPEAT") is printed and
(**++pp)+3 will point the 3rd index of "REPEAT", hence EAT will be printed.
So, SMILE AND EAT will be printed as output.

B EAT AND SMILE

C SWEAT AND EAT

D EAT AND REPEAT

QUESTION ANALYTICS +

Q. 42

FAQ | Have any Doubt ?

Consider following grammar G:

$S \rightarrow AB \mid CD$
$A \rightarrow aA \mid \epsilon$
$B \rightarrow bbB \mid \epsilon$
$C \rightarrow aC \mid \epsilon$
$D \rightarrow bbD \mid \epsilon$

Consider the following statements. Which of the following are true?
S_1 : The grammag G is ambiguous.
S_2 : The language $L(G)$ is inherently ambiguous.
S_3 : $L(G) = a^* (bb)^*$
S_4 : $L(G) = \{a^n b^{2n} \mid n \geq 0\}$
Which one of the following statements is true?

A S_1 — Correct Option

B S_3 — Correct Option

C S_1 and S_4

D S_1, S_2 and S_4

YOUR ANSWER - NA | CORRECT ANSWER - a,b | STATUS - SKIPPED

Solution :
(a, b)

QUESTION ANALYTICS +

Q. 43

Have any Doubt ?

Given the following tokens and their associated regular expressions, what output is produced when this flex scanner is run over the following string aaabccabbb? (Hint: *cbabc* will produce the output 323)
Note: 'Always choose the longest possible match at any point, then to break ties based on the priorities of the regular expressions'.
%%
a*b printf("1");
(a|b)*b printf("2");
c* printf("3");

132 — Correct Option

Solution :
132
When more then one transition rule matches:
(i) Longest match is preferred.
(ii) Among rules which matched the same number of characters , the rule given first is preferred. So, for aaab both rule 1 and 2 matches but since rule given first will be preferred so rule 1 will be used.

QUESTION ANALYTICS +

Q. 44 ? FAQ | Solution Video | Have any Doubt ?

Which of the following actions by a running process will always result in a context switch or (context modification) of the running process, even in a non-preemptive Kernel design?

A. Servicing a disk interrupt, that results in another blocked process being marked as ready/ runnable.

B. A blocking system call. — Correct Option

C. The system call exit, to terminate the current process. — Correct Option

D. When a new process arrives in the system.

YOUR ANSWER - NA | CORRECT ANSWER - b,c | STATUS - SKIPPED

Solution :
(b, c)

QUESTION ANALYTICS +

Q. 45 Solution Video | Have any Doubt ?

Consider the following relational schema:
lives (person-name, street, city)
works (person-name, company-name, salary)
located-in (company-name, city)
manages (person-name, manager-name)
The output of the following relational algebra query is

$$\Pi_{\text{lives.person-name, street, city}} (\sigma_{(\text{company-name} = \text{'CityBank'}) \wedge (\text{lives.person-name} = \text{works.person-name}) \wedge (\text{salary} > 10000))} (\text{works} \times \text{lives}))$$

A. Find the name, street and city of all employees who work for City Bank and earning $10,000.

B. Find the name, street and city of all employees who work for City Bank or earn more than $10,000.

C. Find the name, street and city of all employees who work for City Bank and earn more than $10,000. — Correct Option

Solution :
(c)
The query returns the name, street and city of all the employees who are working for City Bank and earns the salary more than 10000$.

D. Find the name, street and city of all employees who work for City Bank or earning $10,000.

QUESTION ANALYTICS +

Q. 46 Have any Doubt ?

Which of the following is/are true?
I. (01)*0 = 0(10)*
II. (0 + 1)*01 (0 + 1)* + 1*0* = (0 + 1)*
III. (0 + 1)0 (0 + 1)*1 (0 + 1)* = (0 + 1)* 01(0 + 1)*
IV. (0 + 1)* = 0* + 1*

A. I is true — Correct Option

B. II is true — Correct Option

C. III is true

D IV is true

YOUR ANSWER - NA | CORRECT ANSWER - a,b | STATUS - SKIPPED

Solution :

(a, b)

I. True: $(01)^*0 = 0(10)^*$ $(r_1r_2)^* r_1 = r_1(r_2r_1)^*$

II. True: $(0 + 1)^*01$ $(0 + 1)^* + 1^*0^* = (0 + 1)^*$ because second part (1^*0^* not containing substring 01) is complement of first part ($(0 + 1)^*01$ $(0 + 1)^*$ containing substring 01)

III. False: $(0 + 1)0$ $(0 + 1)^*1$ $(0 + 1)^* \Rightarrow \{001, 101, ...\}$
Smallest possible input is 001 or 101
$(0 + 1)^*$ $01(0 + 1)^* \Rightarrow$ generates all the strings which contain 01 as a substring.
Smallest is 01.

IV. False: $(0 + 1)^* = 0^* + 1^*$
$(0 + 1)^*$ contains all possible strings of 0's and 1's.
$0^* + 1^*$ contains any number of zeros and ones but not both.

QUESTION ANALYTICS +

Q. 47 ? FAQ | Have any Doubt ?

Which of the following are true?

A A CRC of length R is calculated over a message of length M bits. The CRC will detect all errors in the message.

B The strings 10001 and 11001 have a Hamming distance of one. Correct Option

C If a single parity bit is added to a message, the resulting code set has a minimum Hamming distance of two. Correct Option

D A larger Hamming distance is needed to detect error than to correct errors.

YOUR ANSWER - NA | CORRECT ANSWER - b,c | STATUS - SKIPPED

Solution :

(b, c)
(a) Detects only single and double bit error.
(b) Yes, only one bit change so hamming distance is only one.
(c) True, To detect d errors the minimum Hamming distance needed is d + 1.
Single parity-check codes can detect all single-bit errors.
So Hamming distance will be d + 1 =2.
(d) To detect errors d + 1 code and to correct errors 2d + 1 code.

QUESTION ANALYTICS +

Q. 48 ? FAQ | Have any Doubt ?

Consider the following:
Let $L_1 = \{a^n b^m \mid n \geq m \geq 1\}$ and $R_1 = \{(a \cup b)^* \mid$ there is an odd number of a's and an even number of b's$\}$.
Then $L_1 \cap R_1$ is

A Regular

B Not regular Correct Option

C Context free Correct Option

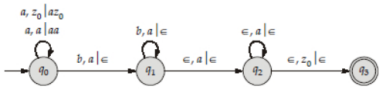
D Not context free

YOUR ANSWER - NA | CORRECT ANSWER - b,c | STATUS - SKIPPED

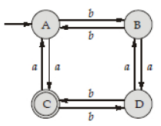
Solution :

(b, c)

$L_1 = \{a^n b^m \mid n \geq m \geq 1\}$ is context free
The possible strings in the language is {ab, aab, aabb, ...}



$R_1 = \{(a \cup b)^* \mid$ there is an odd number of a's and an even number of b's$\}$
The DFA that accepts the given language is



L_1 is context free and R_1 is regular.

QUESTION ANALYTICS +

Q. 49 FAQ Have any Doubt ?

How Long it will take if a person clicks on a link to retrieve the HTML file referring to 7 objects. We are using the Non-persistent HTTP connection with 6 parallel TCP connections. Assume the transmission time for any file is 0 ms. How many RTT between the person and the sever is required?

6 Correct Option

Solution :
6
Initial 2 RTT is required for TCP connection and other for the HTML page.
If we have to send 7 objects for without parallel connection = 14 RTT required [one for TCP and or for object]
But we have 6 parallel connection = 1 TCP + 6 objects in 6 parallel connection at a single time + 1
TCP + 1 object = 4 RTT
A total of 6 RTT will be required.

QUESTION ANALYTICS +

Q. 50 Have any Doubt ?

Which of the following is/are true?
S_1 : With the SR protocol, it is possible for the sender to receive an ACK for a packet that falls outside of its current window.
S_2 : In the SR protocol is it possible to receive out of order sequence of ACK's.
S_3 : The throughput of the SR protocol is always greater than the Go-back-N ARQ.

A S_3

B S_1 Correct Option

C S_2 Correct Option

D None of these

YOUR ANSWER - NA | CORRECT ANSWER - b,c | STATUS - SKIPPED

Solution :
(b, c)
S_1 : It is possible to receive an ACK for a packet that falls outside of its current window but you will not accept that because you must have retransmitted it already or have set up a new connection. You will simply discard that ACK.
S_2 : Yes in the SR protocol it is possible to receive the out of order sequence of ACK's because we can able to send the frames in out of order when they lost.
S_3 : No throughput of SR protocol is not always greater than Go-back-N ARQ. It depends on the type of channel. If it is a noiseless channel Go-back-N ARQ is better. If it is noisy channel than SR protocol is best.

QUESTION ANALYTICS +

Kunal Jha
Course: GATE
Computer Science Engineering(CS)

FULL SYLLABUS TEST-7 (ADVANCE LEVEL) (GATE - 2021) - REPORTS

OVERALL ANALYSIS | COMPARISON REPORT | SOLUTION REPORT

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

Q. 51

FAQ | Have any Doubt ?

What is the output of the following program?

```
#include <stdio.h>
char s1[50];
char *fun(char s[ ])
{
    static int i = 0;
    if (*s)
    {
        fun(s + 1);
        s1[i] = *s;
        i++;
    }
        return s1;
}
int main( )
{
    char s[ ] = "CRACK GATE 2021";
    printf("%s", fun(s));
    return 0;
}
```

A CRACK GATE 2021

B 2021 GATE CRACK

C 1202 ETAG KCARC — Correct Option

Solution :
(c)
The function fun basically reverses the string.
Hence, option (c) is correct.

D Nothing is printed

QUESTION ANALYTICS +

Q. 52

Have any Doubt ?

Suppose a complete binary tree of n elements is stored in an array A in the standard fashion. That is, store the root in $A[1]$ and for every node stored in $A[k]$, store its children in $A[2k]$ and $A[2k + 1]$.
Consider the following statements:
I. A list of the array elements $A[1]$, $A[2]$, $A[3]$, ... $A[n]$ forms a breadth first traversal of the complete binary tree.
II. A list of the array elements $A[1]$, $A[2]$, $A[3]$, ... $A[n]$ forms a depth first traversal of the complete binary tree.
III. A list of the array elements $A[1]$, $A[2]$, $A[3]$, ... $A[n]$ forms a pre-order traversal of the complete binary tree.
Which of the above statements are true?

A I only — Correct Option

Solution :
(a)
Complete binary tree is a binary tree in which all the levels are completely full except maybe the last level, and all the nodes in the last level are as far left as possible. So, when we store a complete binary tree in array in standard fashion as described in the question, we basically are storing elements in the breadth first traversal order.

B I and III only

C II and III only

D None of these

QUESTION ANALYTICS +

Q. 53

FAQ | Have any Doubt ?

Find the burst length in second using token bucket where the capacity is 5 Mbits and the token arrival rate is 2 Mbps and the output rate is 5 Mbps _____.
[Correct up to 2 places of decimals]

1.66 [1.65 - 1.70] — Correct Option

Solution :
1.66 [1.65 - 1.70]
The formula for calculating the burst length in a leaky bucket C + PS = MS
Where, C = Capacity, P = token rate, M = output rate, S = burst length

5×10^6 bits + 2×10^6 bits $\times$ S = $5 \times 10^6 \times$ S

$$5 + 2S = 5S$$

$$S = \frac{5}{3} = 1.66 \text{ sec}$$

QUESTION ANALYTICS +

Q. 54 Solution Video | Have any Doubt ?

Consider a table R(A, B, C, D, E) with functional dependencies as:
A → B
B → C
D → E
Table is decomposed as D = {R_1(A, B), R_2(B, C), R_3(D, E)}.
Then decomposition is

A Dependency preserving and lossless.

B Dependency preserving and lossy. Correct Option

Solution :
(b)
A decomposition is lossless if
(i) union of attributes of decomposed tables should give attributes of original table.
(ii) intersection of attributes should be non-null and should be a key in at least one table.
We can clearly see that $Attr(R_1 \cup R_2) \cap Attr(R_3) = \phi$
Hence lossy.

C Neither dependency preserving nor lossless.

D Lossless but not dependency preserving.

QUESTION ANALYTICS +

Q. 55 Solution Video | Have any Doubt ?

Consider the following snapshot of a system with five processes (P_1, P_2, P_3, P_4, P_5) and four resources (R_1, R_2, R_3, R_4). There are no current outstanding queued unsatisfied requests.

Current Available Resources

R_1	R_2	R_3	R_4
2	1	2	0

	Current allocation				Maximum need				Still needs			
Process	R_1	R_2	R_3	R_4	R_1	R_2	R_3	R_4	R_1	R_2	R_3	R_4
P_1	0	0	1	2	0	0	3	2	0	0	2	0
P_2	2	0	0	0	2	7	5	0	0	7	5	0
P_3	0	0	3	4	6	6	5	6	6	6	2	2
P_4	2	3	5	4	4	3	5	6	2	0	0	2
P_5	0	3	3	2	0	6	5	2	0	3	2	0

From the perspective of deadlock avoidance, which one of the following is true?

A The system is in safe state. Correct Option

Solution :
(a)
Using the Banker's algorithm, the system is not deadlocked and will not become deadlocked. The process finishing order is: P_1, P_4, P_5, P_2, P_3.

B The system is not in safe state, but would be if one more instance of R_1 were available.

C The system is not in safe state, but would be if one more instance of R_2 were available.

D The system is not in safe state, but would be if one more instance of R_3 were available.

QUESTION ANALYTICS +

Q. 56 FAQ | Solution Video | Have any Doubt ?

Consider a system with a 6 bit virtual address space, and 16 byte pages/frames. The mapping from virtual page numbers to physical frame numbers of a process is (0, 8), (1, 3), (2, 11) and (3, 1). Translate the virtual address 20 to physical address. Note that all addresses are in decimal. Your answer must be in decimal. What is the physical address to which virtual address 20 is mapped to?

52 Correct Option

Solution :
52
(a) 20 = 01 0100 = 11 0100 = 52

QUESTION ANALYTICS +

Q. 57 ? FAQ ▶ Solution Video Have any Doubt ?

Consider a processor where each instruction takes, on average, 2 cycles and there are 1.5 references to memory per instruction. A program with 100,000 instructions is executed on this machine using a split cache of 32 KB, obtaining a 95% hit rate, 2 ns hit time and an 18 ns miss penalty. Then, the same program is executed using a 64 KB cache, resulting in a hit rate of 97%, a hit time of 3 ns and the same miss penalty that in the previous case. The cycle time of the processor is adjusted to match the cache hit latency. The difference between Average memory access time from both the caches is _____. (Upto 2 decimal places)

0.64 [0.63 - 0.65] Correct Option

Solution :
0.64 [0.63 - 0.65]

$$\text{AMAT} = \text{Hit time} + \text{Miss rate} \times \text{Miss penalty}$$

For the smaller cache, $\text{AMAT} = 2 + 0.05 \times 18 = 2.9$ ns

For the larger cache, $\text{AMAT} = 3 + 0.03 \times 18 = 3.54$ ns

$\text{Difference} = 3.54 - 2.9 = 0.64$ ns

QUESTION ANALYTICS +

Q. 58 Have any Doubt ?

Consider two threads that concurrently execute a line of code:
count = count + 1.
The variable count starts out with a value 1. Count ends up with a value of X after both threads have incremented it once each. How many different values can X have?

2 Correct Option

Solution :
2
If we execute two processes in serial manner then value 3 will be possible.
If First threads reads count into CPU register and increments. CPU switches to second thread. Second thread reads old value of count and increments. Both threads then write a value of 2 one after the other.

QUESTION ANALYTICS +

Q. 59 ? FAQ Have any Doubt ?

If a committee of n people where n ≥ 1 is selected from 10 males and 5 females then how many such committee will have equal number of males and females?

3002 Correct Option

Solution :
3002
Count all possibilities:

- For 1 males and 1 females = ${}^{10}C_1 \times {}^{5}C_1$.
- For 2 males and 2 females = ${}^{10}C_2 \times {}^{5}C_2$.
- For 3 males and 3 females = ${}^{10}C_3 \times {}^{5}C_3$.
- For 4 males and 4 females = ${}^{10}C_4 \times {}^{5}C_4$.
- For 5 males and 5 females = ${}^{10}C_5 \times {}^{5}C_5$.

If you add all these combination then you will get 3002.

QUESTION ANALYTICS +

Q. 60 ? FAQ ▶ Solution Video Have any Doubt ?

We can sort a given set of n numbers by first building a binary search tree containing these numbers (using TREE-INSERT repeatedly to insert the numbers one by one) and then printing the numbers by an inorder tree walk.
What are the worst- case and best-case running times for this sorting algorithm, respectively?

A $\Theta(n^2), \Theta(n^2)$

B $\Theta(n^2), \Theta(n)$

C $\Theta(n\log n), \Theta(n\log n)$

D $\Theta(n^2), \Theta(n\log n)$ Correct Option

Solution :
(d)
Best case occurs when the BST is balanced after insertion of the elements, which will take nlogn time to construct BST and then additional O(n) time for writing in-order.
Worst case occurs when the BST is skewed after insertion of the elements, which will take n^2 time to construct BST and then additional O(n) time for writing in-order.

QUESTION ANALYTICS +

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Course: GATE
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FULL SYLLABUS TEST-7 (ADVANCE LEVEL) (GATE - 2021) - REPORTS

OVERALL ANALYSIS | COMPARISON REPORT | SOLUTION REPORT

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

Q. 61 Have any Doubt ?

Suppose you have a hash table that can hold 100 elements. It currently stores 30 elements (in one of 30 possible different locations in the hash table). What is the probability that your next two inserts will cause at least one collision (assuming a totally random hash function)? (Choose the closest match) _____.
(Upto 2 decimal places)

0.52 [0.51 - 0.52] — Correct Option

Solution :
0.52 [0.51 - 0.52]
Cases are possible when we insert 2 elements in hash table.
Case-1: Collision on first insertion and not collision on second insertion.

$$P(\text{case-1}) = \left(\frac{30}{100}\right)\times\left(\frac{69}{100}\right) = 0.207$$

Case-2: Not collision on first insertion and collision on second insertion.

$$P(\text{case-2}) = \left(\frac{70}{100}\right)\times\left(\frac{31}{100}\right) = 0.217$$

Case-3: Collision on both first insertion and second insertion.

$$P(\text{case-3}) = \left(\frac{30}{100}\right)\times\left(\frac{31}{100}\right) = 0.093$$

Finally,

$$\text{Required probability} = P(\text{Case-1}) \text{ or } P(\text{Case-2}) \text{ or } P(\text{Case-3})$$
$$= 0.207 + 0.217 + 0.093 = 0.517$$

QUESTION ANALYTICS +

Q. 62 FAQ | Solution Video | Have any Doubt ?

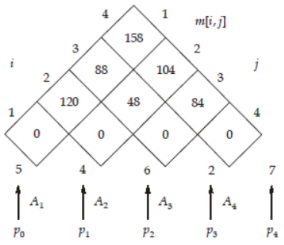
Given dimensions $p_0, p_1, \ldots p_n$ corresponding to matrix sequence $A_1, A_2, \ldots A_n$, where A_i has dimension $p_{i-1} \times p_i$, determine the multiplication sequence that minimizes the number of scalar multiplications in computing $A_1\ A_2\ A_3\ A_4$ such that $p_0 = 5, p_1 = 4, p_2 = 6, p_3 = 2, p_4 = 7$. Determine how to parenthesize the multiplications.

A $(((A_1\ A_2)A_3)A_4)$

B $(A_1((A_2A_3)A_4))$

C $((A_1(A_2A_3))A_4)$ — Correct Option

Solution :
(c)



The parenthesization that minimizes the number of scalar multiplications is $((A_1(A_2A_3))A_4)$:
$(48 + 40) + 70 = 158$

D $A_1(A_2(A_3A_4))$

QUESTION ANALYTICS +

Q. 63 Solution Video | Have any Doubt ?

The 8 to 3 encoder or octal to binary encoder consists of 8 inputs : O_7 to O_0 and 3 outputs : B_2, B_1 and B_0. Each input line corresponds to each octal digit and three outputs generate corresponding binary code. (Ex : If input line O_5 is set, output should be $B_2 = 1$, $B_1 = 0$, $B_0 = 1$). Consider following logical expression for B_2, B_1 and B_0.
$B_2 = O_7 + O_6 + O_5 + O_4$
$B_1 = O_7 + O_6 + O_3 + O_2$
$B_0 = O_7 + O_5 + O_3 + O_2$
Which of the above logical expression(s) is/are correct?

A Only B_2 is correct

B B_1 and B_2 are correct — Correct Option

Solution :
(b)
B is correct one B_1 and B_2.
Why not B_3: because O_1 is missing and O_2 is extra.

C B_0 and B_1 are correct

D All of them are correct

QUESTION ANALYTICS +

Q. 64 ? FAQ ▶ Solution Video Have any Doubt ?

In the ethernet, station A and station B have the queues of the frames. A and B transmits their first frame and suffers the collision. B wins the back off race and transmitted frame successfully. What is the probability that A transmits again and B transmits the second frame and both suffers from collision.

A 0.25 Correct Option

Solution :
(a)
For the first time as B wins and A lost so,

$K = 1$ for B, $(0 \text{ to } 2^1 - 1)PT$
$K = 2$ for A, $(0 \text{ to } 2^2 - 2)PT$
$A = (0, 1, 2, 3)\ PT = (0, 1)PT$

A	B
0	0 ⇒ collided
0	1
1	0
1	1 ⇒ collided
2	0
2	1
3	0
3	1

So, $\text{Probability} = \frac{2}{8} = 0.25$

B 0.625

C 0.5

D 0.125

QUESTION ANALYTICS +

Q. 65 ? FAQ ▶ Solution Video Have any Doubt ?

Which of the following statement about IEEE 754 single precision floating point numbers are correct?

A The exponent is represented in two's complement.

B The word $(00000001)_{16}$ is the largest denormalized number.

C The word $(80000000)_{16}$ represents the number −0. Correct Option

Solution :
(c)
When E = 0, M = 0, S = 1 than answers is −0.....

D The number $(1.111)_{10} * 10^2$ can be represented exactly.

QUESTION ANALYTICS +