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FULL SYLLABUS TEST-7 (ADVANCE LEVEL) GATE 2019 - REPORTS

OVERALL ANALYSIS | COMPARISON REPORT | SOLUTION REPORT

ALL(65) | CORRECT(21) | INCORRECT(19) | SKIPPED(25)

Q. 1

In the question given below, two sentences are given with two blanks each. From the given answer choices, choose the option which has the correct combination of words fitting in both sentences.
Today, as non-state actors _____ India's foundational values in broad daylight, and much of a _____ media happily plays cheerleader, future historians might wonder if it did not suffer from the Stockholm syndrome.
The enemy's plan was to _____ the guards in their sleep, following which they would have _____ the army camp.

Solution Video | Have any Doubt ?

A. slay, harassed

B. haunt, troubled

C. overpower, surrounded

D. throttle, besieged — Your answer is **Correct**

Solution :
(d)
Option (c): 'overpower' fits in the second sentence only; 'surrounded' also only fits in the second sentence. Option (a) : 'slay' (kill) fits in both sentences; 'harassed' (oppressed) fits in neither. Option (b) : 'haunt' (torment) fits in neither sentence; 'troubled' also fits in neither. Option (d): 'throttle' (choke) fits in both sentences; 'besieged' (overwhelmed, surrounded) fits in both sentences as well.

QUESTION ANALYTICS +

Q. 2

In the question below, a sentence is given with a part missing. From the given options, choose the combination of idioms/phrases that fit in the sentence grammatically and contextually.
We tried to keep the birthday party a surprise, but at the last minute, Jignesh _____.
1. spilled the beans
2. let the cat out of the bag
3. cut the mustard

Solution Video | Have any Doubt ?

A. All 1, 2 and 3

B. Only 2 and 3

C. Only 1 and 2 — Correct Option

Solution :
(c)
Spill the beans/ let the cat out of the bag - to reveal a secret. Cut the mustard - to fulfil expectations. Option (c) is the right answer, as only 1 and 2 hold contextual meaning in the sentence.

D. Only 1 and 3

QUESTION ANALYTICS +

Q. 3

In the following question four words are given, of which two words are most nearly the same in meaning. Find the option with the correct pair of the same meaning words.
A. instigate
B. enquire
C. construe
D. interpret

Solution Video | Have any Doubt ?

A. B-D

B. C-D — Your answer is **Correct**

Solution :
(b)
Instigate : to start something. Enquire : to ask. Construe and interpret are the synonyms here, meaning : to understand.

C. A-B

D. A-C

QUESTION ANALYTICS +

Q. 4

In order to fill a room of capacity 5040 m^3 with water, a water pump is used. The same water pump is used to remove the water from the room as well. To empty the room filled with water it takes 5 m3 per minute more than its filling capacity. The pump needs 14 minutes less to empty the room than to fill it. If the same water pump is used to fill a container in 90 minutes, then capacity of the container is

Solution Video | Have any Doubt ?

A. $3600\ m^3$ — Correct Option

A 3600 m^3 Correct Option

Solution :
(a)

Let the filling capacity of the pump = $x\ m^3/min$

Then the emptying capacity of the pump = $(x + 5)\ m^3/min$

$$\text{Time required for filling the tank} = \frac{5040}{x} \text{ minutes}$$

$$\text{Time required for emptying the tank} = \frac{5040}{(x+5)} \text{ minutes}$$

$$\frac{5040}{x} - \frac{5040}{(x+5)} = 14$$

$$\frac{360}{x} - \frac{360}{(x+5)} = 1$$

$$1800 = x^2 + 5x$$

$$(x + 45)(x - 40) = 0$$

$$x = 40\ m^3/min$$

$$\text{Capacity of the container} = 40 \times 90 = 3600\ m^3$$

B 4200 m^3

C 5400 m^3

D 6400 m^3

QUESTION ANALYTICS +

Q. 5

There is an independence day sale on a popular e-commerce store in which there is a "Buy 3 get 1" scheme wherein if anyone buys three items at marked price then he will get an item free, of upto the minimum marked price amongst the three items bought and if the scheme is not availed then a discount of 10% is applied on the purchase of the three items. A person buys a book whose marked price is ₹1620, a pair of shoes of marked price ₹2640 and a raincoat of marked price ₹1080 and then chooses a free item of marked price ₹900. The e-commerce store marks each of the items at 20% more than their respective cost price. The difference between the profit of the shopkeeper with scheme and without scheme would be ₹_____.

Solution Video | Have any Doubt ?

216 Correct Option

Solution :
216

Case 1: With scheme

$$\text{Total cost price} = \frac{(1620 + 2640 + 1080 + 900)\times 100}{120} = ₹\ 5200$$

$$\text{Total selling price} = 1620 + 2640 + 1080 = ₹\ 5340$$

$$\text{Profit} = 5340 - 5200 = ₹\ 140$$

Case 2: Without scheme

$$\text{Total cost price} = \frac{(1620 + 2640 + 1080)}{120} \times 100 = ₹\ 4450$$

$$\text{Total selling price} = \frac{(1620 + 2640 + 1080)}{100} \times 90 = ₹\ 4806$$

$$\text{Profit} = 4806 - 4450 = ₹\ 356$$

Therefore, required difference = 356 – 140 = ₹ 216

QUESTION ANALYTICS +

Q. 6

In a family of 4 members, the eldest member expires after 5 years at the age of 88 and 10 years after that a baby is born in the family such that the difference of family's eldest to youngest member alive after 20 years from present is 57. At present, the age of youngest member is 14 years and the average age of remaining member is 54. The age of the two eldest members alive after 5 years would be

Solution Video | Have any Doubt ?

A 88, 47

B 42, 19

C 47, 42 Correct Option

Solution :
(c)

At present,

Let the members be M, N, O and P

Where age of P > O > N > M

Since P died after 5 years at the age of 88. So, present age of P = 88 – 5 = 83

Youngest member = M = 14 years

$$N + O + P = 54 \times 3$$

$$N + O = 162 - 83 = 79 \quad \text{...(i)} \quad (O > N)$$

10 years after the death of P means 15 years hence from present, let Q be born.

20 years from present means at that time Q = 5 years and is youngest.

Eldest member at that time = O (age = O + 20)

$$(O + 20) - 5 = 57$$

$$O = 57 - 15 = 42 \text{ years}$$

So, $N = 79 - 42 = 37$ years

After 5 years, members alive are = M, N, O

$$M = 14 + 5 = 19 \text{ years}$$

$$N = 37 + 5 = 42 \text{ years}$$

$$O = 42 + 5 = 47 \text{ years}$$

Required ages of N and O are 42 and 47.

D 37, 42

QUESTION ANALYTICS +

Q. 7

Honda produces 400 cars in a month at 3 different places. At Chennai produces 200 cars a month. At Pune produces 120 cars a months and at Noida produces 80 cars a month. However 8% of the cars produced at Chennai are defective. 3% from Pune and 4% from Noida are defective. All the cars are exported to a showroom. If a car at the showroom is found defective, the ratio of probability that it was manufactured at Chennai and probability that it was manufactured at Pune is

Solution Video | Have any Doubt ?

A 4.4 Correct Option

Solution :
(a)

Let the defective car $= D$

Let the non defective car $= D'$

So, $$P\left(\frac{X}{D}\right) = \frac{200 \times (0.08)}{[200 \times 0.08 + 120 \times 0.03 + 80 \times 0.04]}$$

$$= \frac{16}{16 + 3.6 + 3.2} = 0.7$$

$$P\left(\frac{Y}{D}\right) = \frac{120 \times (0.03)}{[200 \times 0.08 + 120 \times 0.03 + 80 \times 0.04]}$$

$$= \frac{3.6}{16 + 3.6 + 3.2} = 0.158$$

$$\text{Ratio} = \frac{0.70}{0.158} = 4.430$$

B 5.8

C 7.4

D 6.4

QUESTION ANALYTICS +

Q. 8

Paper X is in the form of a square of side 130 mm. Four quadrants of diameter 14 mm are cut from the four corners of the square. Paper Y is in the form of a rectangle whose one side is 150 mm and this side is 20% more than the shorter side. Two semicircles of diameter equal to the smaller side of the rectangle is cut from both the edges of the rectangle. The percent by which the remaining area of paper Y is more or less than that of paper X is

Solution Video | Have any Doubt ?

A 52.4% more

B 61.3% less Correct Option

Solution :
(b)

For paper X:

$$\text{Area} = \text{Area of square} - 4 \times \text{Area of quadrant}$$

$$\text{Radius} = \frac{14}{2} = 7 \text{ mm}$$

$$\text{Required area} = (130 \times 130) - \text{Area of circle of radius 7 mm}$$

$$\text{Required area} = 16900 - \frac{22}{7} \times 7 \times 7$$

$$\text{Area} = 16746 \text{ mm}^2$$

For paper Y:

$$\text{Length of paper} = 150 \text{ mm}$$

$$\text{Breadth of paper} = \frac{150}{1.2} = 125 \text{ mm}$$

$$\text{Radius of semi circle} = \frac{125}{2} = 62.5 \text{ mm}$$

$$\text{Remaining area} = 150 \times 125 - 62.5 \times 62.5 \times \frac{22}{7}$$

$$= 18750 - 12276.8$$

$$= 6473.2 \text{ mm}^2$$

$$\text{Required percentage} = \frac{(16746 - 6473.2) \times 100}{16746}$$

$$= 61.3\% \text{ less}$$

C 61.3% more

D 52.4% less

QUESTION ANALYTICS +

Q. 9

A series of numbers are written using digits 1, 2, 3, 4 and 5 in the following pattern:
1, 2, 2, 3, 3, 3, 4, 4, 4, 4, 5, 5, 5, 5, 5, 1, 1, 1, 1, 1, 1, (six 1's) and so on. Which of the following digits will come at the 100^{th} position in this sequence?

Solution Video | Have any Doubt ?

A 1

B 2

D 4 Your answer is **Correct**

Solution :
(d)

We will be required to get the value of n such that $\frac{n(n+1)}{2} = 100$. If $n = 13$, $\frac{n(n+1)}{2} = 91$ which means that 100^{th} digit will be occupied by 14^{th} set of digits or it will be equal to 4.

QUESTION ANALYTICS +

Q. 10

The ratio of number of iphones manufactured and sold by Apple in the year 2014 is 13 : 11, respectively. In 2015, 17700 iphones were manufactured by the company and the ratio of number of iphones sold to unsold was 11:9, respectively. If in 2015 the number of iphones sold was 2000 unit more than unsold iphones then the number of iphones manufactured in 2014 is _____.
[Consider that the number of unsold iphones in 2014 were included in 2015 to be sold and the company started manufacturing iphones in 2014 only]

Solution Video | Have any Doubt ?

14950 Correct Option

Solution :
14950

Let number of iphones sold in 2015 = $11x$
Then number of iphones unsold in 2015 = $9x$
According to question,

$$11x - 9x = 2000$$
$$\Rightarrow 2x = 2000$$
$$\Rightarrow x = 1000$$

Total number of iphones in 2015 = 20000
Since, only 17700 iphones were manufactured in 2015
So, unsold iphones of 2014 = 20000 – 17700 = 2300
Let, the number of iphones manufactured in 2014 = $13y$
So, number of iphones sold in 2014 = $11y$
Therefore, $13y - 11y = 2300$
$$\Rightarrow 2y = 2300$$
$$\Rightarrow y = 1150$$

Therefore, number of iphones manufactured in 2014 = $13y = 13 \times 1150 = 14950$

QUESTION ANALYTICS +

Q. 11

Consider the following statements:
I. If a language L is accepted by an NFA with n states, then exists a DFA with no more than 2^n states accepting L.
II. A DFA with n states must accept at least one string of length greater than n.
Which of the above statements is/are true?

Have any Doubt ?

A Both I and II

B I only Your answer is **Correct**

Solution :
(b)
I is true, as the NFA corresponding to L can be given as input to the subset construction algorithm, which in turn outputs a DFA which will have at most 2n states.
II is false, because in case the language accepted by the DFA is finite, it can be easily violated. For example, the DFA design for strings having 'exactly 2' length requires 4 states, but the maximum length string accepted by it is equal to 2.
So there's not even one string satisfying the criteria in the given question.
So the appropriate choice is option (b).

C II only

D None of these

QUESTION ANALYTICS +

Q. 12

The number of states in the minimal NFA corresponding to the language consisting of the set of strings containing exactly X a's, where $\sum = \{a\}$ is equal to

Have any Doubt ?

A X states

B X + 1 states Correct Option

Solution :
(b)
Minimal DFA for strings having x a's needs $(x + 1) + 1$ states [1 more state required for trap state]
But the question asks for Minimal NFA, so we can remove the trap state, and therefore the answer will be $(x + 1)$.
So (b) is correct.

C X + 2 states

D None of these Your answer is **Wrong**

QUESTION ANALYTICS +

Q. 13

Consider the following statements given below:
S_1 : User level threads are not suitable for non blocking tasks.
S_2 : Message passing, in inter process communication require Kernel support.
S_3 : A lock that uses busy waiting is called busy lock.
Which of the above statements are correct?

Have any Doubt ?

A S_1 and S_3 only

B S_1 and S_2 only

C Only S_1

D Only S_2 — Correct Option

Solution :
(d)
S_1 : User level threads are suitable for non blocking threads, which means it require less I/O operation because when a user level thread are block all threads will be blocked. S_1 is incorrect
S_2 : In inter process communication, message passing require Kernel support. S_2 is correct
S_3 : A lock that uses busy waiting is called a spin lock. S_3 is incorrect
So option (d) is correct.

QUESTION ANALYTICS

Q. 14

Consider the following set of instructions executed for a program to be accomplish.

Instruction	Meaning
I_1 : STORE M[100], R_1	M[100] $\leftarrow R_1$
I_2 : MOV R_2, M[700]	$R_2 \leftarrow$ M[700]
I_3 : DIV R_1, R_2, R_1	$R_1 \leftarrow R_2 / R_1$
I_4 : ADD R_2, R_1, R_2	$R_2 \leftarrow R_1 + R_2$
I_5 : STORE M[500], R_2	M[500] $\leftarrow R_2$
I_6 : STORE M[200], R_1	M[200] $\leftarrow R_1$

How many number of anti data dependency and true data dependency in the above instructions?

Have any Doubt ?

A 2 and 3 — Your answer is **Correct**

Solution :
(a)
Anti data dependency → Write After Read Hazard (WAR)
True data dependency → Read After Write Hazard (RAW)

WAR hazards	RAW hazards (Adjacent)
① $I_3 - I_1 (R_1)$	① $I_3 - I_2 (R_2)$
② $I_4 - I_3 (R_2)$	② $I_4 - I_3 (R_1)$
	③ $I_5 - I_4 (R_2)$

B 2 and 2

C 2 and 1

D 1 and 3

QUESTION ANALYTICS

Q. 15

A mapping f from A to B is said to be non total if and only if Domain(f) is a proper subset of A. Which of the following mappings is non total from R to R?

Have any Doubt ?

A $f(x) = \sin x$ — Your answer is **Wrong**

B $f(x) = |x|$

C $f(x) = x^{1/2}$ — Correct Option

Solution :
(c)
The domain of (a), (b) and (d) is same as the set of all real numbers, so all these functions are total functions. Since square root of a negative number is not defined, the domain of (c) is the set of all non negative real numbers, which in turn is a proper subset of the set of all real numbers. Therefore only (c) is a non total mapping from R to R.

D $f(x) = ax^3 + bx^2 + cx + d$

QUESTION ANALYTICS

Q. 16

Consider the following statements given below:
S_1 : The output of the intermediate code generation is machine dependent.
S_2 : Recursive descent parsers may suffer from infinite loop.
Which of the above statements are incorrect?

Have any Doubt ?

A Both S_1 and S_2

B Only S_1 Correct Option

Solution :
(b)
S_1 : The output of the intermediate code generation is machine independent. S_1 is incorrect
S_2 : Recursive descent parser may suffer from infinite loop because the grammar may contain left recursion. S_2 is correct
So option (b) is correct.

C Only S_2 Your answer is **Wrong**

D None of the above

QUESTION ANALYTICS +

Q. 17

In how many ways, 6 letters can be placed in 6 envelopes such that at least 4 letters go into their corresponding envelopes?

Have any Doubt ?

A 16 Correct Option

Solution :
(a)
At least 4 should go to their respective envelopes = (Exactly 4 letters are placed in their correct envelopes and 2 are misplaced) + (Exactly 5 letters are placed in their correct envelopes and 1 is misplaced) + (All 6 are placed in correct envelopes)
$= {}^6C_4.1 + 0$ (exactly 5 is not possible) + 1 (all letters go to their respective envelope) = 16

B 24

C 32

D 120

QUESTION ANALYTICS +

Q. 18

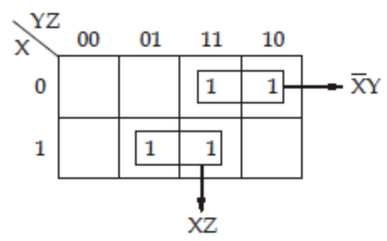
Assume a function F is given below
$F = m_2 + m_3 + m_5 + m_7$
Where m_i are minterms for all $0 \le i \le 7$ corresponding to the inputs X(MSB), Y, Z (LSB). Which of the following gives the simplified sum of products expression?

Have any Doubt ?

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

B $\bar{X}Y + XZ$ Correct Option

Solution :
(b)
Given boolean function is
$F = m_2 + m_3 + m_5 + m_7$



$F = \bar{X}Y + XZ$

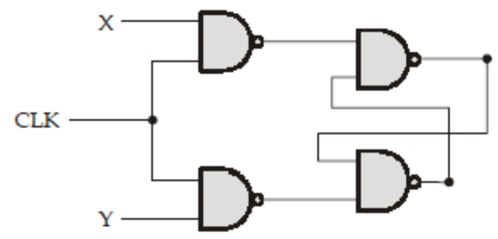
C $XZ + YZ$

D $\bar{X}Y\bar{Z} + YX + YZ$ Your answer is **Wrong**

QUESTION ANALYTICS +

Q. 19

Consider the given circuit:



The race around in above circuit

Have any Doubt ?

A Occurs when CLK = 1

B Occurs when CLK = 1, X = 1, Y = 1 Your answer is **Wrong**

C Occurs when CLK = 1, X = 0, Y = 0

D Does not occurs — Correct Option

Solution :
(d)
The given circuit is of S-R flip-flop where S = X and R = Y and in SR flip-flop race condition does not occurs.

QUESTION ANALYTICS +

Q. 20

Consider the following schedules:

$S_1 : w_2(x), w_1(x), w_3(z), r_1(x), r_3(y), w_2(y), r_3(z)$

$S_2 : r_3(x), r_1(y), r_3(x), w_2(y), r_1(x), r_2(x), w_2(z), r_3(z), r_2(y), w_1(x)$

Which of the following is true about the above schedules?

Have any Doubt ?

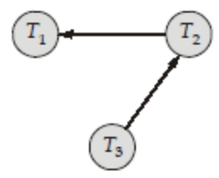
A Both S_1 and S_2 is conflict serializable.

B S_1 is view serializable and S_2 is conflict serializable.

C S_1 is view serializable and S_2 is not conflict serializable. — Your answer is **Correct**

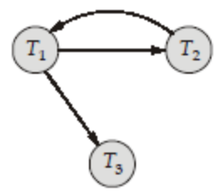
Solution :
(c)

Precedence graph of S_1:



It is conflict serializable so it is also view serializable.

Precedence graph of S_2:



It is not conflict serializable.

So option (c) is correct.

D Both S_1 and S_2 are not conflict serializable.

QUESTION ANALYTICS +

Q. 21

Consider the following C code fragment:

```
int main( )
{
    int i = 1;
    if (i < 4)  {
    i++;
    printf("MadeEasy\n");
    }
    Return 0;
}
```

The output of the above program will be

Have any Doubt ?

A MadeEasy
MadeEasy

B MadeEasy
MadeEasy
MadeEasy

C Runtime Error

D None of these — Your answer is **Correct**

Solution :
(d)
The output will be just MadeEasy. That's it, as remember it's not a while loop, just an if-statement.

QUESTION ANALYTICS +

Q. 22

What values will be printed by the program given below?

```
#include <stdio.h>
void f(int *p, int *q, int *r)
{
    r = p;
    p = q;
    *p = 2;
    *r = *r + *p;
    *q = *q – *r;
```

```
}
int main( )
{
    int i = 0, j = 1, k = –2;
    f(&j, &i, &k);
    printf("%d %d %d\n", k, i, j);
    return 0;
}
```

Have any Doubt ?

A –1, 2, –3

B 1, 2, 3

C –1, 3, –2

D –2, –1, 3 — Your answer is **Correct**

Solution :
(d)
After the execution of the above code, the values of i, j, k will be –1, 3 and –2 respectively. Since the output is asked in the order of k, i and j, the values printed will be –2, –1 and 3.
So option (d) will be the correct answer.

QUESTION ANALYTICS

Q. 23

Consider the following statements:
(i) Accessing of data in a column wise fashion maintains spatial locality only when the block size is equal to the total size of the elements in the row.
(ii) Coherence in write through protocol never occurs even cache memory is organized in multilevel.
Which of the above is true?

Have any Doubt ?

A Only (i)

B Only (ii) — Correct Option

Solution :
(b)
• Statement (i) is wrong. To maintain spatial locality in mentioned scenario block size should always be more than the total size of the elements stored in the row.
• Statement (ii) is correct because when there is an update of data in cache memory then at the same time CPU updates the data in main memory in write through protocol.

C Both (i) and (ii)

D None of the above — Your answer is **Wrong**

QUESTION ANALYTICS

Q. 24

A certain problem is having an algorithm with the following recurrence relation.
$T(n) = 2.T(\sqrt{n}) + \log(\sqrt{n})$
How much time would the algorithm take to solve the problem?

Have any Doubt ?

A $\Theta(\log_2 n \log_2 (\log_2 n)^2)$

B $\Theta(\log_2 n (\log_2 n^2))$

C $\Theta(\log_2 n \log_2 (\log_2 n))$ — Your answer is **Correct**

Solution :
(c)
Here Master's theorem is not applicable directly.

$$T(n) = 2.T(\sqrt{n}) + \log(\sqrt{n})$$

Put $n = 2^k$

$$T(2^k) = 2.T\left(2^{\frac{k}{2}}\right) + \log_2\left(2^{\frac{k}{2}}\right)$$

$$T(2^k) = 2.T\left(2^{\frac{k}{2}}\right) + \frac{k}{2}$$

Put $S(k) = T(2^k)$

$$S(k) = 2.S\left(\frac{k}{2}\right) + \frac{k}{2}$$

Now apply Master's theorem: $S(k) = \Theta(k \log k)$

$$T(2^k) = \Theta(\log n \,.\, \log \log_2 n)$$

D $\Theta(\log_2 n \log_2 \log_2 \log_2 n)$

QUESTION ANALYTICS

Q. 25

Consider a window size over a TCP connection is initially 1. The system uses slow start algorithm to transfer the segment. A user has total 2000 segment to transfer. What is the minimum number of RTT's required to accomplish user task? (Assume there is no duplicate acknowledgment or time out)

Have any Doubt ?

A 11 — Correct Option

Solution :
(a)

Window size [WS] = 1 initially

⇒ After 1 RTT, WS = 2 and 1 segment successfully transferred

⇒ After 2 RTT, WS = 4 and 3 segment successfully transferred

⇒ After 3 RTT, WS = 8 and 7 segment successfully transferred

⇒ After 4 RTT, WS = 16 and 15 segment successfully transferred

⋮

⇒ After x RTT, WS = 2^n and $2^n - 1$ segment successfully transferred

Now, $2^n - 1 = 2000$

$2^n = 2001$

$n = \lceil \log_2 2001 \rceil$

$n = 11$

Hence minimum 11 RTT's required to successfully accomplish user task.

B 12 — Your answer is **Wrong**

C 13

D 14

QUESTION ANALYTICS

Q. 26

Direct Memory Access (DMA) takes 20 cycles for the initialization and 3 cycles for the transfer of each block. An interrupt program takes 2 cycles for every instruction and executed for every byte transferred. The block size of the system is 4 bytes. The speed up of DMA over interrupt program achieved when program of 8 instructions executed for transfer of 80 bytes is _____.

Have any Doubt ?

16 — Correct Option

Solution :
16

Number of cycles required when program executed using DMA

$= 20 + 3 \times$ Number of blocks

$= 20 + 3 \times \left(\frac{80}{4}\right) = 20 + 3 \times 20 = 80$ cycles

Number of cycles required when program executed using interrupt program

$= (2 \times 8) \times 80$ [Executed for every 80 bytes]

$= 16 \times 80 = 1280$ cycles

Speed up achieved by DMA over interrupt program

$= \frac{1280}{80} = 16$

QUESTION ANALYTICS

Q. 27

Consider the following program segment:

```
int known (int a)
{
    int y;
    while (a! = 1)
    {
        if (a & 01)
            a >> = 1;
    }
}
```

Number of tokens generated by lexical analyzer in the above program segment is _____.

Have any Doubt ?

29 — Correct Option

Solution :
29

1	2	3	4	5	6																							
int	known	(	int	a	)																							
7																												
{																												
	8	9	10																									
	int	y	;																									
		11	12	13	14	15	16																					
		while	(	a!	=	1	)																					
		17																										
		{																										
			18	19	20	21	22	23																				
			if	(	a	&	01	)																				
				24	25		26	27																				
				a	>>	=	1	;																				
		28																										
		}																										
29																												
}																												

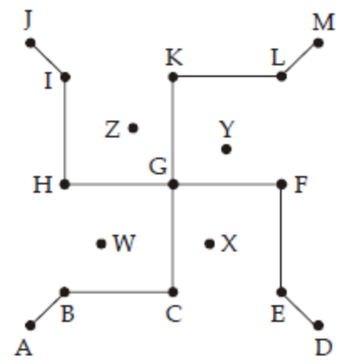
Total 29 tokens is generated.

Your Answer is 28

QUESTION ANALYTICS +

Q. 28

Let a, b, c be the number of cut vertices, number of cut edges and the chromatic number of the given graph S. Then the value of $(a + 2b + 3c)$ will be equal to _____.



Have any Doubt ?

39 Correct Option

Solution :
39

For number of cut vertices:
Except A, D, M, J(corner vertices) and W, X, Y, Z all are cut vertices.

$\therefore \quad a = (17 - 8) = 9$

= (Total number of vertices) – (Vertices which are not cut vertices)

For 'b':
Since the graph has no cycle, every edge will be a cut edge.

$\therefore \quad b = 12$

For 'c':
Since the graph has no odd length cycle, graph S is bipartite. Therefore chromatic no(S) = 2.

$\therefore \quad c = 2$

$a + 2b + 3c = (9 + 24 + 6) = 39$

Your Answer is 49

QUESTION ANALYTICS +

Q. 29

Consider a relation R(A, B, C, D, E) and following functional dependencies:

$F = \{A \rightarrow B, BC \rightarrow E, EF \rightarrow AD\}$

The number of candidate keys possible which contain attribute B _____.

FAQ | Have any Doubt ?

1 Your answer is **Correct**1

Solution :
1

R(A, B, C, D, E, F)

Closure of (BCF^+) = {B, C, E, A, D, F}

So {BCF} is a candidate key of R.

{ACF} is a candidate key.

Closure of (CEF^+) = {A, D, E, F, B, C}

{CEF} is a candidate key.

So only one candidate key {BCF} which contain attribute B.

QUESTION ANALYTICS +

Q. 30

The height of a binary tree is defined as the number of nodes in the longest path from root to the leaf node. Let X be the height of a complete binary tree with 256 nodes. Then the value of X will be _____.

Have any Doubt ?

9 Correct Option

Solution :
9

Although the question uses the word 'height', the height here according to the question is actually given as the depth of the tree. So we will first find the height of the tree, and add 1 to it to get the depth, and that will be the value of X.

Therefore the height of complete binary tree with 256 nodes (according to the 'normal' definition)

= ceil[log(256 + 1) – 1] = 8

Therefore X = depth = 8 + 1 = 9

Your Answer is 7

QUESTION ANALYTICS +

Q. 31

A system uses virtual address space of size 64 GB and page size is 16 KB. System has 128 K physical frames and page table entry contain 2 valid bit, 3 protection bit and 2 modified bit, then size of the page table (in MB) when virtual memory uses single level paging _____.

Have any Doubt ?

12 Correct Option

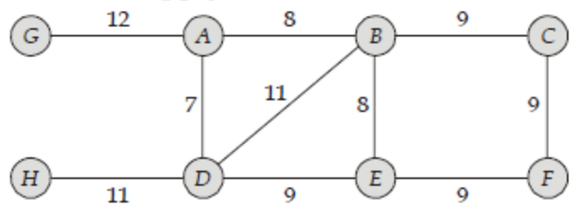
Solution :
12

$$
\begin{aligned}
\text{Virtual address space} &= 64\ \text{GB} = 2^{36}\ \text{B} \\
\text{Page size} &= 16\ \text{KB} = 14\ \text{bit} \\
\text{Number of frames} &= 128\ \text{K} = 17\ \text{bit} \\
\text{Page table entry size} &= 17 + 2 + 3 + 2 \\
&= 24\ \text{bit} = 3\text{B} \\
\text{Page table size} &= \frac{2^{36}}{2^{14}} \times 3\text{B} \\
&= 2^{22} \times 3\text{B} = 3 \times 4\ \text{MB} \\
&= 12\ \text{MB}
\end{aligned}
$$

QUESTION ANALYTICS +

Q. 32

Consider the following graph G.



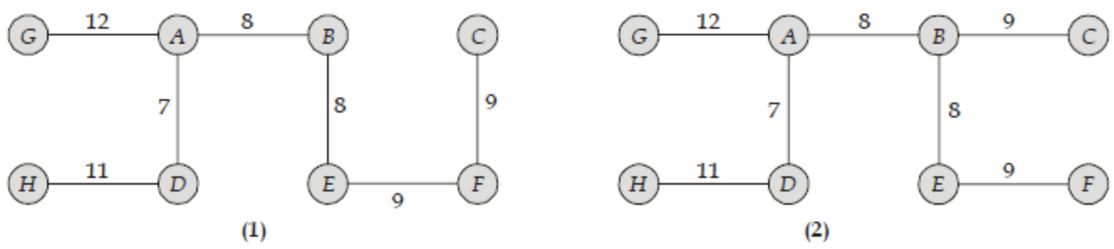
The total number of minimum spanning trees from graph G are _____.

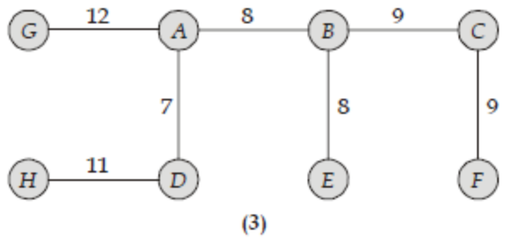
Have any Doubt ?

3 Correct Option

Solution :
3

3 minimum spanning trees are possible.





Your Answer is 2

QUESTION ANALYTICS +

Q. 33

How many of the following expression result same set of records _____.
(Assume R(ABC) S(DEA))

(i) $\pi_A(R \bowtie S)$

(i) $\pi_{R.A}(R \times S)$

(iii) $\pi_A(\sigma_{R.A=S.A} R \times S)$

(iv) $\pi_A(R) \cap \pi_A(R)$

Have any Doubt ?

3 Correct Option

Solution :
3
(i), (iii) and (iv) results same set of records.

Your Answer is 2

QUESTION ANALYTICS +

Q. 34

Consider the following statements given below:
S_1 : Deadlock prevention requires knowledge of resource requirements in advance.
S_2 : Operating system implements a policy that requires a process to release all resources before making a request for another resource, is free from starvation and deadlock.
S_3 : If system is in deadlock then it is definitely in unsafe state.
How many number of statements are correct _____.

Have any Doubt ?

1 Correct Option

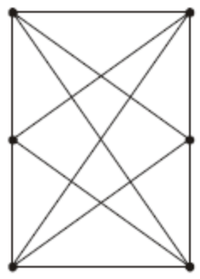
Solution :
1
S_1 : Deadlock avoidance requires knowledge of resource requirements in advance not deadlock prevention. S_1 is incorrect
S_2 : That policy is free from deadlock but there may be starvation. S_2 is incorrect
S_3 : If system is in deadlock then it is definitely in unsafe state. S_3 is correct
So only 1 statement is correct.

Your Answer is 2

QUESTION ANALYTICS +

Q. 35

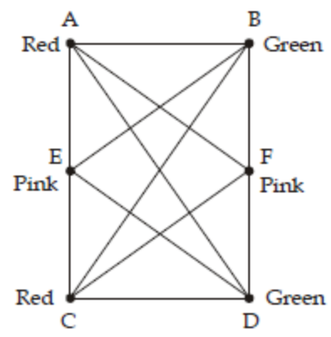
The chromatic number of the following graph is _____.



FAQ | Have any Doubt ?

3 — Your answer is **Correct**3

Solution :
3



So chromatic number = 3

QUESTION ANALYTICS +

Q. 36

Consider the following regular expressions:

I. $0(0 + 1)^*$
II. $0^* 10^* 1(0 + 1)^*$
III. $(0 + 10)^*(1 + \in)$
IV. $[(0^* 10^* 10^*)^* + 0^*]10^*$

A language L whose regular expression is r is said to be reverse isomorphic if $L(r) = L(r^R)$. How many of the above regular expressions are reverse isomorphic?

Have any Doubt ?

A 0

B 1

C 2

D None of these — Correct Option

Solution :
(d)

II, III and IV are reverse isomorphic.

I denotes strings starting with 0. However its reversal will have strings ending with 0. Therefore I is not reverse isomorphic.

II is reverse isomorphic as it denotes strings containing at least two 1's and same goes for its reversal as well.

The regular expression for III is $(0 + 10)^* (1 + \in)$ and its reversal will be $(1 + \in)(0 + 01)^*$. Clearly both regular expressions generate the same language that is, the set of strings which don't have any consecutive 1's. So III is also reverse isomorphic.

IV is the regular expression for odd number of ones, and its reversal also represents the same language and so IV is also reverse isomorphic.

QUESTION ANALYTICS +

Q. 37

Consider a network connecting two systems connected 2000 Km apart. The band width of the network is 70 Mbps. The propagation speed of the signal is 2×10^8 m/sec and average size of the frame is 10 KB. Assume processing delays at nodes are negligible. Selective repeat sliding window protocol is used to utilize the full capacity of the network. The minimum bits required to represent the window size is

Have any Doubt ?

A 7 bits

B 8 bits

C 9 bits — Your answer is **Wrong**

D 10 bits — Correct Option

Solution :
(d)

$$\text{Distance} = 2000 \text{ Km}$$
$$\text{Speed} = 2 \times 10^8 \text{ m/sec}$$
$$\text{B.W.} = 70 \text{ Mbps}$$
$$\text{Propagation delay } (T_p) = \frac{2000 \times 10^3 \text{ m}}{2 \times 10^8 \text{ m/sec}}$$
$$= \frac{1}{100} \text{sec} = 10 \text{ msec}$$
$$\text{Transmission time } (T_t) = \frac{10 \times 10^3 \text{ bits}}{70 \times 10^6 \text{ bits/sec}}$$
$$= 1$$

$$T_t = \frac{1}{7}\text{msec} = 0.142\ \text{msec}$$

For utilization to be 100%

$$1 = \frac{W}{1+2A}$$

When W = Window size

$$A = \frac{T_p}{T_d} = \frac{20\ \text{msec}}{0.142\ \text{msec}} = 140$$

$$1 = \frac{W}{1+2\times 140}$$

$$W = 281$$

Number of sequence bits required in selective repeat

$$= \lceil 2\times \log_2 W \rceil = \lceil 2\times 281 \rceil = 10\ \text{bits}$$

QUESTION ANALYTICS

Q. 38

Consider the following grammar:

$S \rightarrow Bb \mid cAb \mid d$

$B \rightarrow ab \mid c$

$A \rightarrow e$

Which of the following is correct about the above grammar?

Have any Doubt ?

A. Only CLR(1)

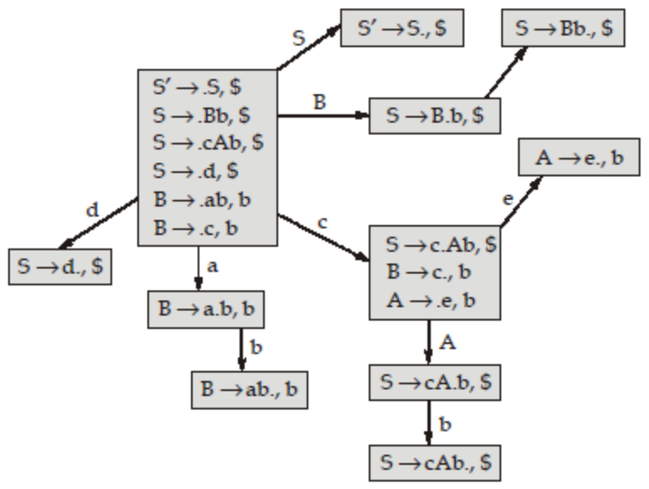
B. LL(1) and CLR(1)

C. LALR(1) and CLR(1) — Correct Option

Solution :

(c)

CLR(1) construction of given grammar



This grammar is LALR(1) and CLR(1).

For LL(1)

$$\text{First (S)} = \text{First (Bb)} \cap \text{First (cAb)} \cap \text{First (d)}$$
$$= \{a, c\} \cap \{c\} \cap \{d\} \neq \phi$$

So it is not LL(1).

So option (c) is correct

D. Only LL(1) — Your answer is **Wrong**

QUESTION ANALYTICS

Q. 39

Consider the following solution of critical section problem for two process:

```
boolean get[2] = {FALSE, FALSE};
        int turn = 0;
void P_i ( )
{
        While (1)
        {
            get [i] = TRUE;
                turn = j;
            While (get [j] && turn == j);
                CRITICAL SECTION
                get [i] = FALSE;
                Remainder section
        }
}
```

Here get and turn are shared variable between two process P_0 and P_1. The structure of the process $P_i (i == 0 \text{ or } 1)$ with $P_j (j == 1 \text{ or } 0)$ being the other process.

Which of the following is true about the above solution?

Have any Doubt ?

A. It does not satisfied mutual exclusion but progress.

B. It does not satisfied mutual exclusion.

C. It satisfied mutual exclusion but can not prevent deadlock.

D. It satisfied mutual exclusion and prevent deadlock. — Correct Option

Solution :
(d)

Suppose P_0 and P_1 concurrently executing the function P_i.

P_0 :

get[0] = TRUE
turn = 1

Now P_1 execute

get[1] = TRUE
turn = 0

Now P_0 enter into critical section. Only one process can enter into critical section and there is no deadlock.

So option (d) is correct.

QUESTION ANALYTICS

Q. 40

Consider the following problems regarding decidability.
I. Given a Turing Machine M, whether L(M) is context free.
II. Given a Non-deterministic PDA P, whether there exists a Deterministic Turing Machine M such that both P and M accept the same language.
III. Given a Deterministic Turing Machine M, whether there exists a Non Deterministic PDA P such that both P and M accept the same language.
IV. Given a regular language L, whether the complement of L is a DCFL.
Which of the above problems are decidable?

Have any Doubt ?

A. II, III and IV

B. II and III

C. III and IV — Your answer is **Wrong**

D. II and IV — Correct Option

Solution :
(d)

I is clearly undecidable.

II is decidable, because the expressive power of Turing Machines is much higher than that of NPDAs - Turing Machines can handle all the way upto RE, so we can say that for every PDA N, there exists a DTM T which accepts L(N).

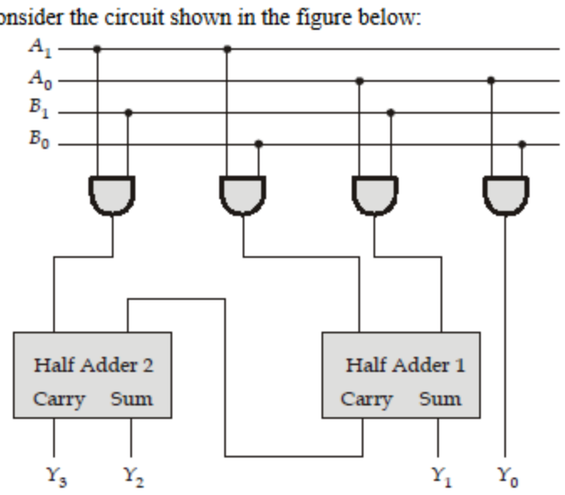
III is undecidable, as the given Turing Machine may or may not be context free. If it is context free, then we can say yes, but if it is not context free, then there won't be any PDA for it. So the answer will be sometimes yes and sometimes no and hence Rice's Theorem applies and thus such a problem falls under the domain of nontrivial questions, and therefore is undecidable.

IV is trivially decidable, as regular languages are closed under complementation. And if we know that L' is regular, we can say that every regular language is a DCFL and the answer to this question will always be 'YES', therefore this is a trivial question and is therefore decidable.

QUESTION ANALYTICS

Q. 41

Consider the circuit shown in the figure below:



The input to the circuit is two, 2-bit numbers. The numbers are represented as (A_1A_0) and (B_1B_0). The function of the circuit is

Have any Doubt ?

A. A look ahead carry adder circuit

B. An array divider circuit

C. A parity check circuit

D. An array multiplier circuit — Your answer is **Correct**

Solution :
(d)

The output,

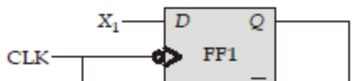
$$Y_0 = A_0B_0$$
$$Y_1 = B_0A_1 \oplus B_1A_0$$
$$Y_2 = B_1A_1 \oplus \text{Carry 1}$$
$$Y_3 = \text{Carry 2}$$

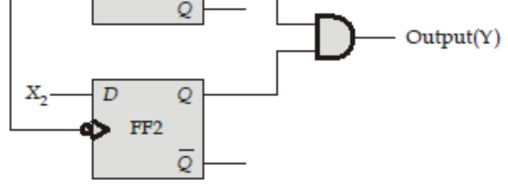
Thus, it can be seen that the output is equal to multiplication of 2-bit number (A_1A_0) and (B_1B_0).

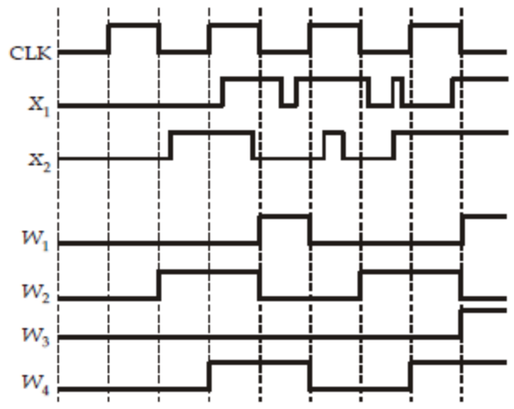
QUESTION ANALYTICS

Q. 42

In the circuit shown, choose the correct timing diagram of the output (Y) from the given waveforms W_1, W_2, W_3 and W_4.







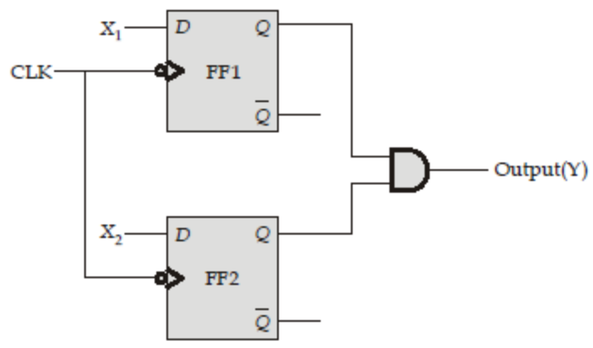
Have any Doubt ?

A W_1

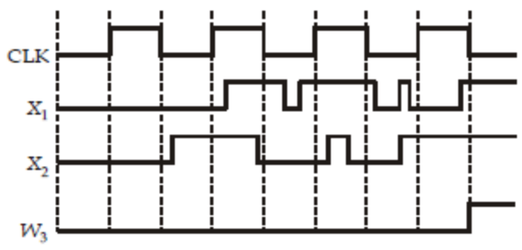
B W_2

C W_3 Correct Option

Solution :
(c)



CLK	X_1	X_2	Y
1	X	X	Previous output/ No change
0	0	0	0
0	0	1	0
0	1	0	0
0	1	1	1



So, according to waveform solution waveform W_3 satisfies it.

D W_4

QUESTION ANALYTICS +

Q. 43

Consider the following statements with respect to relations R and S. Note that R^{-1} denotes the inverse relation of R, and R′ denotes the complementary relation of R respectively.

I. If $R \subseteq S$, then $R^{-1} \subseteq S^{-1}$
II. If $S \subseteq R$, then $R^{-1} \subseteq S^{-1}$
III. If $R \subseteq S$, then $R' \subseteq S'$
IV. If $S \subseteq R$, then $R' \subseteq S'$

Which of the above statements are correct?

Have any Doubt ?

A I and III

B II and IV

C I and IV Your answer is **Correct**

Solution :
(c)

I and IV are true. Let's see why IV is true first. We will treat set theory as boolean algebra here, and will demonstrate how to apply this approach.

Given, $S \subseteq R$, which in same as, $\Rightarrow S - R = \phi$
The same can be written in Boolean Algebra as, $\Rightarrow S \wedge R' = 0$
Since we know that $\wedge$ is commutative, $\Rightarrow R' \wedge S = 0$
Now $R' \wedge S = 0$ is same as $R' \wedge (S')' = 0$ $\Rightarrow R' - S' = \phi$
$\Rightarrow R' \subseteq S'$

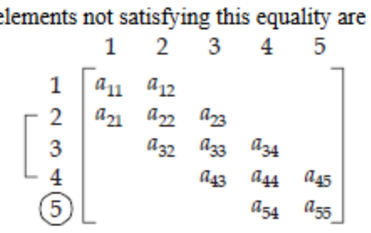
Therefore IV is correct.
In order to show that R^{-1} is a subset of S^{-1}, we just need to show that every element in R^{-1} belongs to S^{-1}. So let's assume that R is a subset of S. So if (a, b) is an element of R, then (a, b) belongs to S as well. As (a, b) belongs to R, (b, a) belongs to R^{-1}. Also, (a, b) belongs to S, (b, a) will belong to S^{-1}. Since we can show this presence of every element in R^{-1} in S^{-1}, we see that R^{-1} is a subset of S^{-1}. However II is clearly not true.

D II and III

QUESTION ANALYTICS

Q. 44

A 2 Dimensional Matrix is said to be stored in X representation if and only if every element $A[i][j]$ satisfies $|i-j| = 0$, or $|i-j| = 1$ (elements not satisfying this equality are not stored). An instance of a 5 × 5 matrix in X representation is given below.



Given a matrix P[1 …. 50, 1 …. 50] in row major order which is stored in X representation such that the size of each element is 1 Byte and base address is 1000, then the address of the element P[25, 26] will be

Have any Doubt ?

A 1071

B 1072

C 1073 Correct Option

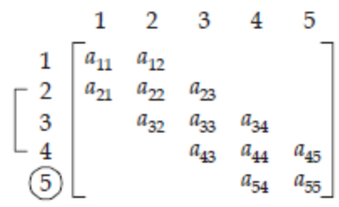
Solution :
(c)
The key to note here, is that other than the first and the last row, every row has 3 elements. The first and last row have 2 elements. So always note these patterns in order to solve such questions. Therefore the address of P[25,26] will be equal to,
1000 [Base address] + 2 [first row] + 3(24 – 2 + 1) [elements between row 2 and row 24] + 2 = 1073 Hence (c) will be the answer.

D None of these

QUESTION ANALYTICS

Q. 45

A 2 Dimensional Matrix is said to be stored in X representation if and only if every element A[i][j] satisfies $|i-j| = 0$, or $|i-j| = 1$ (elements not satisfying this equality are not stored). An instance of a 5 × 5 matrix in X representation is given below:



Given a matrix P[1 …. 50, 1 …. 50] in row major order which is stored in X representation such that the size of each element is 1 Byte and base address is 1000, the size of the matrix P in bytes is

Have any Doubt ?

A 136

B 148 Correct Option

Solution :
(b)
Since the size of each element is 1 Byte, we can simply count the number of elements present in the matrix.
1^{st} and 50^{th} row → 2 elements
All other rows (48 rows) → 3 elements
Therefore size = 2 + 48(3) + 2 = 148
Hence (b) will be the answer.

C 156

D 160

QUESTION ANALYTICS

Q. 46

Consider an array A which has n elements, such that every element in the array is a natural number. Then the time complexity of the most efficient algorithm which computes the maximum sum subarray of A will be

Have any Doubt ?

A $O(n\log n)$

B $O(n)$

C $O(n^2)$

D O(1) Correct Option

Solution :
(d)
All the numbers in the array are natural numbers, meaning that every element in the array is positive. Since every element in the array is positive, it means that the entire array itself will be the subarray with the maximum sum. So the most efficient way to solve this problem would be to simply return the array itself.

QUESTION ANALYTICS

Q. 47

The real numbers is approximated when exactly value can not stored in floating point representation. If X′ is the stored value approximating the real value X, then relative error e is expressed as

$$e = \frac{X - X'}{X}$$

Assume 1 bit, 4 bit and 7 bit used for sign, exponent and significand field. What will be e when 0.4 decimal real value represent in this floating point representation?

Have any Doubt ?

A 0.001

B 0.0039 — Correct Option

Solution :
(b)

Given, 0.4×2^0

$$(0.4)_{10} = (0.0110011001100)$$

Here, 7 bit used for significand part. Then closest we can get 0.1100110.

Now converting back significant part into decimal we get X'

M

0110011

7 bit

$$X' = 0.25 + 0.125 + 0.015625 + 0.0078125$$
$$= 0.3984375$$
$$e = \frac{0.4 - 0.3984375}{0.4}$$
$$e = 0.00390625$$

C 0.013

D 0.008

QUESTION ANALYTICS +

Q. 48

Consider the following functions, black( ) and white( ):

```
void black(char*s)
{
    if(!s [0]) return;
    black(s + 1);
    black(s + 1);
    printf("%c", s[0]);
}
void white(char*s)
{
    if(!s [0]) return;
    white(s + 1);
    printf("%c", s[0]);
    white(s + 1);
}
```

The outputs obtained corresponding to the function calls, black("213") and white("213") will be

Have any Doubt ?

A 3313312, 3132313 — Correct Option

Solution :
(a)
The question can be easily be done without even lifting the pen, using the necessary condition that whatever the output of black( ) and white( ) may be, both the functions must output the same number of characters. So options (b), (c) and (d) are ruled out as both don't print equal number of characters and therefore option (a) is the correct choice.

B 3313312, 313231

C 331331, 3132313

D 3313312, 332313

QUESTION ANALYTICS +

Q. 49

If $A = \begin{bmatrix} a & b \\ b & a \end{bmatrix}$ is skew symmetric, then the values of a and b are

Have any Doubt ?

A $a = 0, b = 0$ — Correct Option

Solution :
(a)

If A is skew symmetric, $A^T = -A$

$$\begin{bmatrix} a & b \\ b & a \end{bmatrix} = -\begin{bmatrix} a & b \\ b & a \end{bmatrix}$$
$$a = -a \Rightarrow a = 0$$
$$b = -b \Rightarrow b = 0$$

Therefore option (a) is correct answer.

B $a = 0, b = 1$ — Your answer is **Wrong**

C $a = 1, b = 0$

D $a = 1, b = 1$

QUESTION ANALYTICS +

Q. 50

Fifteen coupons are numbered from 1 to 15. Seven coupons are selected at random, one at a time with replacement. The probability that the largest number appearing on every selected coupon is 9, is

Have any Doubt ?

A $\frac{{}^{9}C_{7}}{{}^{15}C_{7}}$

B $\left(\frac{8}{15}\right)^{7}$

C $\left(\frac{3}{5}\right)^{7}$ Your answer is **Correct**

Solution :

(c)

Probability of selecting a coupon, on which largest printed number can be 9 = $\frac{9}{15}$.

Coupons numbered 1 to 9 can be selected out of the 15 available coupons.

Now, coupons are selected one at a time and with replacement, each time probability is $p = \frac{9}{15}$,

Total probability that largest number appearing on selected coupon is 9

$$= {}^{7}C_{7}p^{7}(1-p)^{0} = p^{7} = \left(\frac{9}{15}\right)^{7} = \left(\frac{3}{5}\right)^{7}$$

D $\left(\frac{9}{16}\right)^{6}$

QUESTION ANALYTICS +

Q. 51

$\lim_{x\to 0}\left(\frac{3+x}{3-x}\right)^{1/x} =$

Have any Doubt ?

A $e^{1/2}$

B $e^{2/3}$ Your answer is **Correct**

Solution :

(b)

$$\lim_{x\to 0}\left(\frac{3+x}{3-x}\right)^{1/x} = \lim_{x\to 0}\left(\frac{1+\frac{x}{3}}{1-\frac{x}{3}}\right)^{1/x}$$

Since, $\lim_{x\to 0}(1+ax)^{1/x} = e^{a}$

$$= \frac{e^{1/3}}{e^{-1/3}} = e^{2/3}$$

Therefore option (b) is correct answer.

C e

D e^{3}

QUESTION ANALYTICS +

Q. 52

For the matrix $P = \begin{bmatrix} 3 & -2 & 2 \\ 0 & -2 & 1 \\ 0 & 0 & 1 \end{bmatrix}$, one of the eigen values is equal to –2, then the eigen vector corresponding to this eigen value of P is

Have any Doubt ?

A $\begin{bmatrix} 3 \\ -2 \\ 1 \end{bmatrix}$

B $\begin{bmatrix} -3 \\ 2 \\ 0 \end{bmatrix}$

C $\begin{bmatrix} 1 \\ -2 \end{bmatrix}$

$\begin{bmatrix} 3 \end{bmatrix}$

D $\begin{bmatrix} 2 \\ 5 \\ 0 \end{bmatrix}$ Correct Option

Solution :
(d)

For eigen value $\lambda = -2$

$$(P - \lambda I)\hat{X} = 0$$

$$\begin{bmatrix} 3-(-2) & -2 & 2 \\ 0 & -2-(-2) & 1 \\ 0 & 0 & 1-(-2) \end{bmatrix} \begin{bmatrix} x_1 \\ x_2 \\ x_3 \end{bmatrix} = \begin{bmatrix} 0 \\ 0 \\ 0 \end{bmatrix}$$

or,
$$\begin{bmatrix} 5 & -2 & 2 \\ 0 & 0 & 1 \\ 0 & 0 & 3 \end{bmatrix} \begin{bmatrix} x_1 \\ x_2 \\ x_3 \end{bmatrix} = \begin{bmatrix} 0 \\ 0 \\ 0 \end{bmatrix}$$

$\Rightarrow \quad 5x_1 - 2x_2 + 2x_3 = 0$

Only (d) satisfies this equation.

QUESTION ANALYTICS +

Q. 53

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

List-I	List-II
A. Destination unreachable	1. TTL field hit 0
B. Source quench	2. Invalid header
C. Redirect	3. Undelivered packet
D. Parameter problem	4. Choke packet
E. Time exceeded	5. Teach a router about geography

Codes:

	A	B	C	D	E
(a)	4	3	5	1	2
(b)	3	4	5	2	1
(c)	4	1	3	2	4
(d)	3	5	4	2	1

Have any Doubt ?

A a

B b Your answer is **Correct**

Solution :
(b)

- Destination unreachable → Packet could not be delivered
- Source quench → Choke packet
- Redirect → Teach a router about geography
- Parameter problem → Invalid header field
- Time exceeded → TTL (Time to live) field hit 0

C c

D d

QUESTION ANALYTICS +

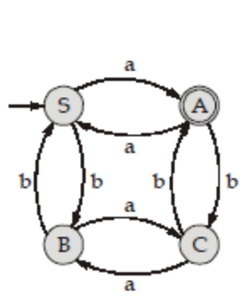
Q. 54

The number of states in the minimal DFA corresponding to the language consisting of set of all strings which contain odd number of a's and even number of b's, where the input alphabet is $\{a, b\}$ is equal to _____.

Have any Doubt ?

4 Correct Option

Solution :
4



Number of states required = 2 × 2 = 4

QUESTION ANALYTICS +

Q. 55

Consider the following relations:

id	name
10	Ram
15	Rohan
20	Suresh
34	Anubhav
46	Shivani

CS

id	name	rank
10	Ram	2
20	Suresh	1
15	Rahul	8
46	Shivani	5
34	Anubhav	3
56	Ram	6

EC

Consider the given SQL query:

```
SELECT EC.id FROM EC WHERE
    NOT EXISTS (SELECT CS.id FROM CS
    WHERE CS.name = 'Rahul' and EC.id = CS.id)
```

Number of tuples returned by the above SQL query _____.

Have any Doubt ?

6 — Your answer is **Correct**6

Solution :
6
(6)
In the relation CS no student name is Rahul so inner query gives empty relation and NOT EXISTS returns true for empty relation.
All the tuples in the EC relation is given as output by the SQL query.
Total 6 tuples returned.

QUESTION ANALYTICS

Q. 56

Host A and Host B are connected with a channel of bandwidth 5 KHz. Channel is not error force and signal to Noise ratio is recorded 30 dB. Whenever user have data to transmit it transmits continuously. Assume there is negligible propagation time. The data rate of the channel is _____ Kbits. (Upto 2 decimal places)

Have any Doubt ?

49.83 (49.00 - 50.00) — Correct Option

Solution :
49.83 (49.00 - 50.00)

Given, B.W. = 5 KHz

Signal to Noise Ratio = 30 dB

$$30\ \text{dB} = 10\log_{10}\left(\frac{S}{N}\right)$$

$$\left(\frac{S}{N}\right) = 10^3 = 1000$$

Because channel is erroneous

So, Maximum data rate $= B\log_2\left(1+\frac{S}{N}\right)$

$= 5 \times 10^3 \times \log_2(1 + 1000)$

$= 49.83$ Kbits

QUESTION ANALYTICS

Q. 57

A hypothetical processor on cache read miss requires one clock to send an address to Main Memory (MM) and eight clock cycles to access a 64-bit word from MM to processor cache. Miss rate of read is decreased from 14.8% to 2.6% when line size of cache is increased from one word to four words. The speed up of processor is achieved in dealing with average read miss after increasing the line size is _____. (Upto 2 decimal places)

Have any Doubt ?

1.42 (1.40 - 1.50) — Correct Option

Solution :
1.42 (1.40 - 1.50)

- Read miss penalty for one word = 1 + 8 = 9 clock cycles

  Now, Average Read Miss = 0.148 × 9 = 1.332 cycles
- Read miss penalty for 4 word = 4 × (1 + 8) = 36 clock cycles

  Now Average Read Miss = 0.026 × 36 = 0.936 cycles

$$\text{Speed up achieved} = \frac{1.332}{0.936} = 1.42$$

QUESTION ANALYTICS

Q. 58

Consider the following CFG:

$S \rightarrow SABC$

$A \rightarrow aAd \mid \in$

$B \rightarrow bB \mid \in$

$C \rightarrow Cc \mid Be \mid \in$

(Where S, A, B, C are non-terminals and *a*, *b*, *c*, *e*, *d* are terminal)
Number of elements in the FOLLOW(S) are _____.

Have any Doubt ?

5 — Correct Option

Solution :
5

FOLLOW(S) = FIRST(A)

$\Rightarrow$ $\{a\} \cup \{FIRST(B)\} = \{a\} \cup \{b\} \cup \{FIRST(C)\}$

$= \{a\} \cup \{b\} \cup \{b, c, e, \in\}$ ($\in$ can not be part of FOLLOW)

$= \{a, b, c, e\} \cup \{\$\}$ (S is start symbol so its FOLLOW contain $)

$= \{a, b, c, e, \$\}$

It contain 5 elements.

Your Answer is 3

QUESTION ANALYTICS

Q. 59

Out of all the binary operations possible on a set with 3 elements, a binary operation is selected at random. Let the probability of the chosen binary

operation being non-commutative is X. Then the value of 54 × X is equal to _____.

Have any Doubt ?

52 — Correct Option

Solution :
52

Number of commutative binary operations on a set with n elements = $n^n \cdot n^{n(n-1)/2}$

Number of non-commutative binary operations on a set with n elements = $n^{n^2} - \left[n^n \cdot n^{(n^2-n)/2}\right]$

Therefore the required probability = $\dfrac{\left(n^{n^2} - n^n \cdot n^{(n^2-n)/2}\right)}{\left(n^{n^2}\right)}$

Substituting $n = 3$, we get $\dfrac{26}{27}$

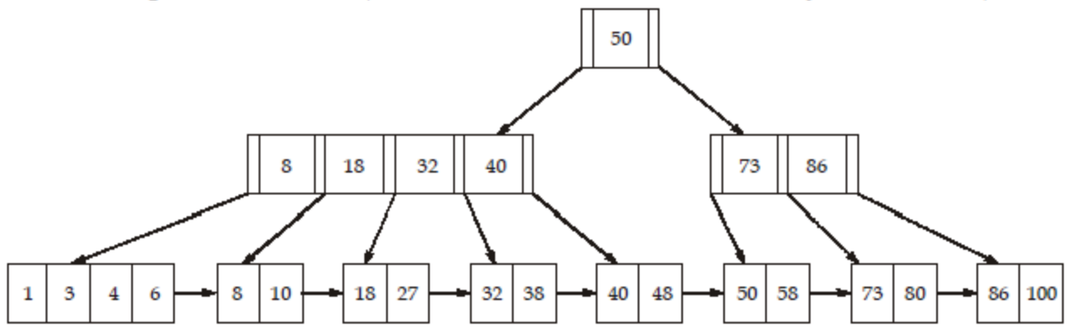
Therefore $X = \dfrac{26}{27}$

Thus $54 \times X = 26 \times 2 = 52$

QUESTION ANALYTICS

Q. 60

Consider the following B+ tree with order 4 (order of B^+ tree is the maximum number of keys a node can have)



How many maximum additional records could to added to the above B+ tree without changing its height _____.

Have any Doubt ?

82 — Correct Option

Solution :
82
Root node can point to 5 internal node.
Total maximum number of records this B+ tree can have = 5 × 5 × 4 = 100.
B^+ tree contain 18 records already
Maximum additional number of records can be added = 100 – 18 = 82.

Your Answer is 50

QUESTION ANALYTICS

Q. 61

Consider the following function secret( ).

```
#include <stdio.h>
unsigned char secret(unsigned char x, int y)
{
    return ((x & 0x0F) << y | (x & 0xF0) >> y);
}
    int main( )
{
    unsigned char x = 100;
    printf("%u", secret (x, 4));
    return 0;
}
```

The output obtained corresponding to the function call secret(100, 4) is _____.

Have any Doubt ?

70 — Your answer is **Correct**70

Solution :
70
Since the value of y is 4, the above function will swap the two nibbles in the given byte.
The idea is to first get the last 4 bits i.e. lower nibble and get the first 4 bits i.e. the higher nibble and then combine them using bitwise OR.
The expression "x & 0x0F" gives us last 4 bits of x, which in turn is left shifted 4 times in order to promote the lower nibble to a higher nibble.
Similarly the expression "x & 0xF0" gives us first four bits of x, which is right shifted 4 times in order to set it up for becoming the lower nibble.
And finally we apply bitwise OR between them, which will give the final number after having swapped the 2 nibbles of the given byte.
Since x = 100, the binary representation of x will be 01100100. Now after interchanging the nibbles, we get 01000110, whose value in decimal is 70.
Therefore 70 will be the answer.

QUESTION ANALYTICS

Q. 62

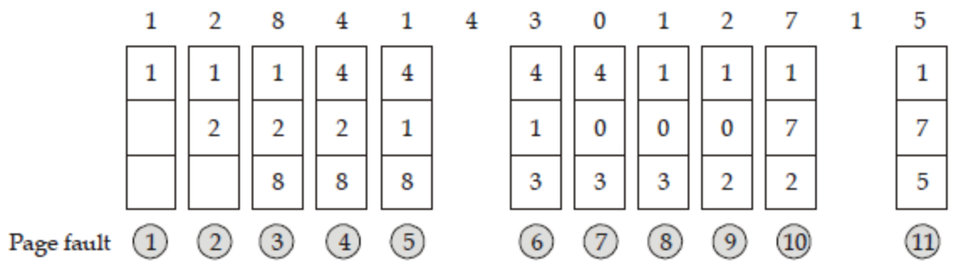
Consider the main memory with 3 available frames and the following sequence of page reference.
1, 2, 8, 4, 1, 4, 3, 0, 1, 2, 7, 1, 5
What is the difference between number of page faults occurs when Least Recently Used (LRU) algorithm and optimal page replacement algorithm is used _____.

Have any Doubt ?

3 — Your answer is **Correct**3

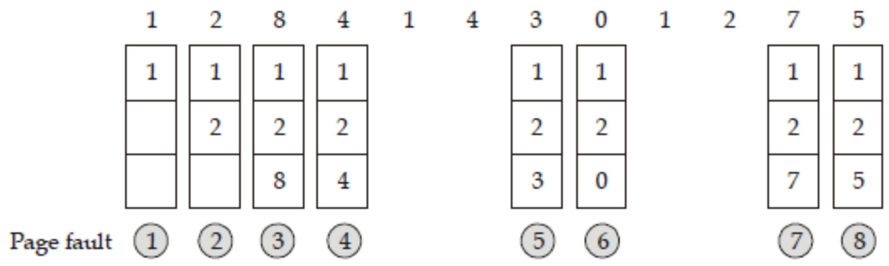
Solution :
3

LRU page replacement algorithm



Total 11 page fault

Optimal page replacement algorithm



Total 8 page fault

So difference between LRU page replacement and optimal page replacement algorithm is 11 – 8 = 3.

QUESTION ANALYTICS

Q. 63

Consider the following statements about Hamming code. A code C = {a, b, c} whose element over {0, 1} is shown below:

a = (00000)
b = (10110)
c = (01011)

I. The Hamming distance (d) between two code words x and y of code C is d
d = min $[d(x, y) : x, y \in c, x = y]$

II. Maximum error C will be able to correct up to 2 bit.

III. The Hamming distance of code C is 3.

The number of correct statements are _____.

Have any Doubt ?

1 — Correct Option

Solution :
1

$$C = \{a, b, c\}$$
$$a = (00000)$$
$$b = (10110)$$
$$c = (01011)$$
$$d(a, b) = 3$$
$$d(a, c) = 3$$
$$d(b, c) = 4$$

- Statement I is wrong, because Hamming distance between 2 codes is d and
$$d = \min \{d(x, y) : x, y \in c, x \neq y\}$$
- Statement III is correct
$$d = \min \{(a, b), (a, c), (b, c)\}$$
$$= \min \{3, 3, 4\}$$
$$d = 3$$
- Statement II is wrong
Maximum error bit can be corrected
$$= \left\lfloor \frac{d-1}{2} \right\rfloor \left\lfloor \frac{3-1}{2} \right\rfloor = 1$$

So only 1 bit can be corrected.

QUESTION ANALYTICS

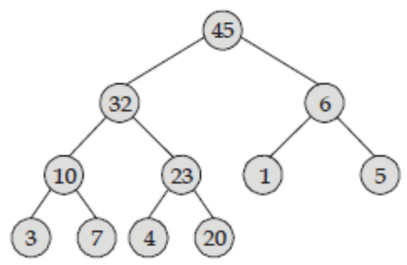
Q. 64

Max-heap is constructed by inserting the following integer in the order into an empty tree.
The sum of maximum integer value present at every level of max heap tree _____.
Input: 20, 32, 1, 3, 4, 5, 6, 7, 10, 23, 45

Have any Doubt ?

120 — Your answer is **Correct**120

Solution :
120



$\max_0$ = Maximum element present at 0 level = 45
$\max_1$ = Maximum element present at 1 level = 32
$\max_2$ = Maximum element present at 2 level = 23
$\max_3$ = Maximum element present at 3 level = 20
Sum = $\max_0 + \max_1 + \max_2 + \max_3$
= 45 + 32 + 23 + 20 = 120

QUESTION ANALYTICS

Q. 65

Out of all boolean square matrices of size 2 × 2 possible, a matrix is chosen at random. The probability that the matrix selected is non singular is equal to _____. (Upto 3 decimal places)

Have any Doubt ?

0.375 (0.375 - 0.375)

0.375
Your answer is **Correct**

Solution :
0.375 (0.375 - 0.375)

A matrix is non singular iff it is invertible, which means that $|A| \neq 0$.

$\Rightarrow \quad |A| = +1 \text{ or } |A| = -1$

Case 1:

$$|A| = 1$$

$$\begin{bmatrix} 1 & - \\ - & 1 \end{bmatrix}$$

In order to keep $|A| = +1$,

The main (principal) diagonal can be filled in only one way i.e. (1, 1); the antidiagonal can be filled in 3 ways i.e. (0, 0) (0, 1) (1, 0).

So number of ways = 3 × 1 = 3

Case 2:

$$|A| = -1$$

$$\begin{bmatrix} & 1 \\ 1 & \end{bmatrix}$$

In order to keep the determinant (–1), the antidiagnonal of the matrix can only be filled in one way i.e. (1, 1); whereas the principal diagonal can be (0, 0) (0, 1), (1, 0).

So number of ways = 3 × 1 = 3

Total number of matrices which are invertible = (3 + 3) = 6

So the required probability = $\left(\frac{6}{2^4}\right) = \frac{3}{8} = 0.375$

QUESTION ANALYTICS