MULTIPLE SUBJECT : DIGITAL LOGIC + DISCRETE MATHEMATICS (GATE - 2019) - REPORTS

Q. 1

Consider the following two statements:
S_1: If $\overline{G}$ is connected, then G will be disconnected.
S_2: If $\overline{G}$ is disconnected, then G will be connected.
Which of the above statements is correct?

Solution Video | Have any Doubt ?

A Both S_1 and S_2

B Only S_1

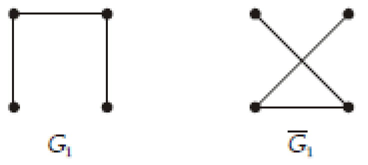
C Only S_2 Correct Option

Solution :
(c)

S_2 is correct and S_1 is incorrect.

This is because of a theorem which says 'at least one of G and $\overline{G}$ must be connected'.

Anyways for the sake of clarity, here's a counter example for S_1.



Clearly G_1 is connected and $\overline{G}_1$ is also connected.

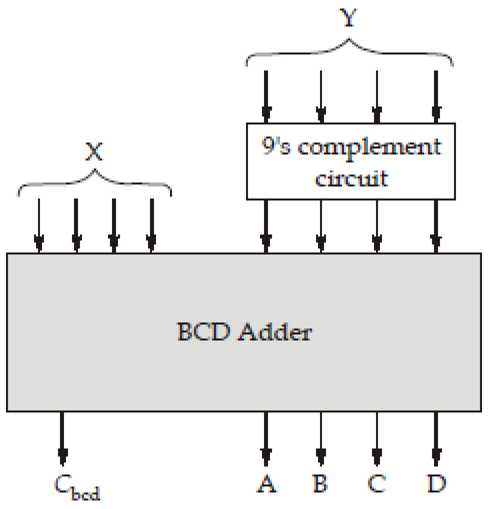
Hence S_1 is false.

D None of these

QUESTION ANALYTICS +

Q. 2

In the given below circuit input X = 1001 and Y = 0011 the output ABCD (8 – 4 – 2 – 1) and C_{bcd} of the circuit respectively are:



Solution Video | Have any Doubt ?

A 1111, 0

B 1011, 0

C 0100, 1

D 0101, 1 Correct Option

Solution :
(d)

$$X = 1001$$
$$9\text{'s complement of } Y(0011) = 0110$$

$$\text{Now} \quad X + Y = \begin{array}{r} 1001 \\ +0110 \\ \hline 1111 \\ +0110 \\ \hline \textcircled{1}0101 \\ \hline \end{array} \begin{array}{l} \\ \\ \leftarrow \text{Invalid BCD} \\ \text{so, add 6} \\ \\ \end{array}$$
$$\downarrow C_{bcd}$$

Option (d) is correct.

QUESTION ANALYTICS +

Q. 3

Consider the following statements:

S_1: If n pigeons occupy m pigeonholes such that n < m, at least $\left(\left\lfloor \frac{n-1}{m} \right\rfloor + 1\right)$ pigeons will occupy the same pigeonhole.

S_2: If m pigeons occupy n pigeonholes such that n < m, at least $\left| \frac{m}{n} \right|$ pigeons will occupy the same pigeonhole.

Which of the above statements is/are true?

Solution Video | Have any Doubt ?

A Both S_1 and S_2

B Only S_1

C Only S_2 Correct Option

Solution :
(c)

In S_1, no of pigeons < no of piegonholes. Hence pigeonhole principle doesn't apply and therefore S_1 is false.
S_2 is true, because

$$\left(\left\lceil \frac{m}{n} \right\rceil\right) = \left(\left\lfloor \frac{m-1}{n} \right\rfloor + 1\right)$$

This is actually another version of pigeonhole principle and both are one and the same.
Hence S_2 is true.

D None of these

QUESTION ANALYTICS +

Q. 4

The 6's complement of the number $(73)_8$, when it is expressed with the base of 6

Solution Video | Have any Doubt ?

A 155

B 312

C 135

D 421 Correct Option

Solution :
(d)

$$(73)_8 = (59)_{10} = (135)_6$$

Now, 5's complement of $(135)_6$ is

$$\begin{array}{rr} & 555 \\ & -135 \\ \hline \text{5's complement:} & 420 \\ \text{Add 1 to make for 6's complement:} & +1 \\ \hline \text{6's complement:} & 421 \end{array}$$

QUESTION ANALYTICS +

Q. 5

Let A be a finite set with m elements. Then the number of elements in the largest equivalence relation of A is

Solution Video | Have any Doubt ?

A m

B m^2 Correct Option

Solution :
(b)

The largest equivalence relation is formed by relating all the elements with each other. Hence there will be $m \times m = m^2$ ordered pairs which means that the size of largest equivalence relation will be m^2.

C $\frac{m(m-1)}{2}$

D 1

QUESTION ANALYTICS +

Q. 6

For the following characteristic table using AB flip-flop, the characteristics equation Q(t + 1) is

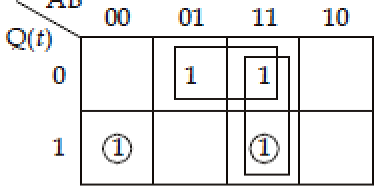
A	B	Q(t + 1)
0	0	Q(t)
0	1	$\bar{Q}(t)$
1	0	0
1	1	1

Solution Video | Have any Doubt ?

A $\bar{A}\bar{B}Q(t)+B\bar{Q}(t)+AB$ Correct Option

Solution :
(a)

Using K-map:



$$Q(t+1) = \bar{A}\bar{B}Q(t) + B\bar{Q}(t) + AB$$

B $\bar{A}\bar{B}Q(t) + AB$

C $\bar{A}\bar{B}\bar{Q}(t) + \bar{A}\bar{B}$

D $\bar{A}\bar{B}\bar{Q}(t) + \bar{B}Q(t) + AB$

QUESTION ANALYTICS +

Q. 7

The statement $(p \Rightarrow p \vee q) \wedge (q \Rightarrow \sim p \vee q)$ is equivalent to which of the following?

I. $p \Rightarrow p \vee q$
II. $q \Rightarrow (p \Rightarrow q)$
III. True
IV. False

Solution Video | Have any Doubt ?

A I only

B I and IV only

C I and III only

D I, II and III only — Correct Option

Solution :
(d)
The statement is, $(p \Rightarrow p \vee q) \wedge (q \Rightarrow \sim p \vee q)$

$$\equiv (\underbrace{p' + p}_{\text{True}} + q) \wedge (\underbrace{q' + p' + q}_{\text{True}})$$

$$\Downarrow \qquad\qquad \Downarrow$$

$$\equiv \text{True} \quad \wedge \quad \text{True}$$

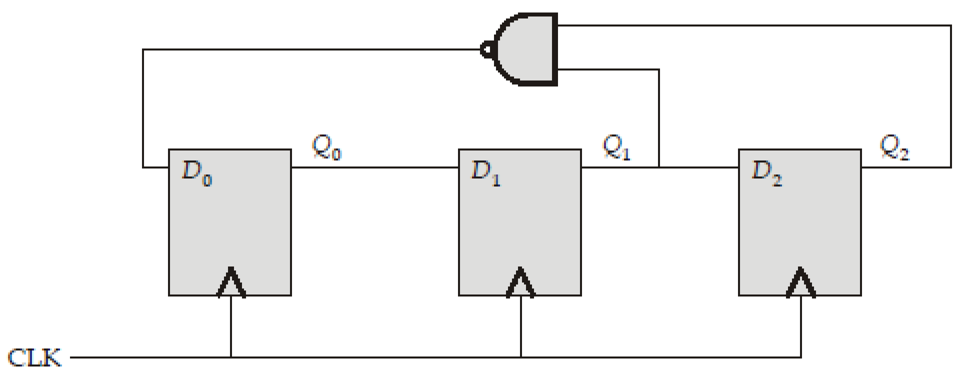
$$\equiv \text{True}$$

Consider $(p \Rightarrow p \vee q) \wedge (q \Rightarrow \sim p \vee q)$ as
A ∧ B
So if A ∧ B is true, both A and B will be true.
⇒ I is equivalent to the original statement.
II is $q \Rightarrow (p \Rightarrow q) \equiv p \Rightarrow (\sim p \vee q)$
III is also equivalent.
Hence I, II and III all are equivalent to the original statement.

QUESTION ANALYTICS +

Q. 8

In the circuit shown below, initially all flip-flops are cleared. The output $Q_2Q_1Q_0$ after four clock pulses is:



Solution Video | Have any Doubt ?

A 111

B 110 — Correct Option

Solution :
(b)

$$D_0 = \overline{Q_1 Q_2} = \bar{Q}_1 + \bar{Q}_2$$
$$D_1 = Q_0$$
$$D_2 = Q_1$$

CLK	D_2	D_1	D_0	Q_2	Q_1	Q_0
	0	0	1	0	0	0
1	0	1	1	0	0	1
2	1	1	1	0	1	1
3	1	1	0	1	1	1
4				1	1	0

After 4-clock pulse $(Q_2Q_1Q_0) = (110)$

C 100

D 000

QUESTION ANALYTICS +

Q. 9

Let M and N be two sets respectively. The cardinality of M is x and the cardinality of N is y. It is also given that $y > x$. Then the number of possible mappings from M to N that are not one one when $x = 3$ and $y = 4$ is ________.

Solution Video | Have any Doubt ?

● 40 Correct Option

Solution :
40

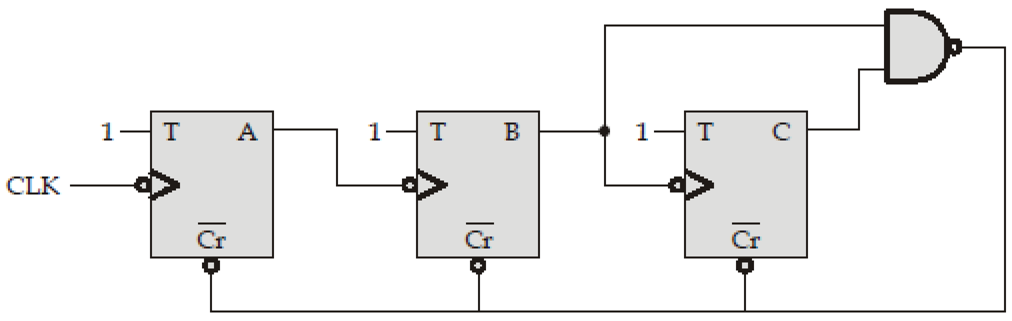
Number of one one mappings = $({}^yP_x)$
Total number of functions possible = (y^x)
⇒ Number of functions that are NOT one one

$$= y^x - ({}^yP_x)$$
$$= 4^3 - ({}^4P_3)$$
$$= 64 - (4 \times 3!)$$
$$= 64 - 24$$
$$= 40$$

QUESTION ANALYTICS +

Q. 10

Consider the asynchronous circuit given below:



The modulus value of circuit is ________.

Solution Video | Have any Doubt ?

● 6 Correct Option

Solution :
6

A	B	C	$\overline{Cr} = \overline{BC}$
0	0	0	1
1	0	0	1
0	1	0	1
1	1	0	1
0	0	1	1
1	0	1	1
0	1	1	0

QUESTION ANALYTICS +

Q. 11

The ratio of chromatic number to the diameter for C_{40}, where C_n represents the cycle graph with n vertices is ________. (Upto 1 decimal place)

Solution Video | Have any Doubt ?

● 0.1 Correct Option

Solution :
0.1

$$[\text{Chromatic number for } C_n] = \begin{cases} 2, n \text{ is even} \\ 3, n \text{ is odd} \end{cases}$$

$$\Rightarrow \quad \text{Chromatic number } (C_{40}) = 2$$

$$\text{Diameter } (C_n) = \left\lfloor \frac{n}{2} \right\rfloor$$

$$\Rightarrow \quad \text{Diameter } (C_{40}) = \left\lfloor \frac{40}{2} \right\rfloor = 20$$

$$\text{Hence the ratio} = \frac{2}{20} = \frac{1}{10} = 0.1$$

QUESTION ANALYTICS +

Q. 12

The 2's compliment representation in 8-bit format is 11010000. The equivalent decimal value of the original number is ________.

Solution Video | Have any Doubt ?

● 48 Correct Option

Solution :
48

11010000
2's compliment = 00110000
Magnitude = 48

The correct answer is (–48) because MSB bit is 1 in 2's compliment form.

QUESTION ANALYTICS +

Q. 13

Number of integers from 1 to 2100 are divisible by 3 or 5 or 7 ________.

Solution Video | Have any Doubt ?

● 1140 Correct Option

Solution :
1140

$$n(3 \text{ or } 5 \text{ or } 7) = n(3) + n(5) + n(7) - [n(3 \cap 5) + n(5 \cap 7) + n(3 \cap 7)] + n(3 \cap 5 \cap 7)$$

$$= \left\lfloor \frac{2100}{3} \right\rfloor + \left\lfloor \frac{2100}{5} \right\rfloor + \left\lfloor \frac{2100}{7} \right\rfloor - \left(\left\lfloor \frac{2100}{15} \right\rfloor + \left\lfloor \frac{2100}{35} \right\rfloor + \left\lfloor \frac{2100}{21} \right\rfloor \right) + \left\lfloor \frac{2100}{105} \right\rfloor$$

Solve to get, $n = 1140$

QUESTION ANALYTICS +

Q. 14

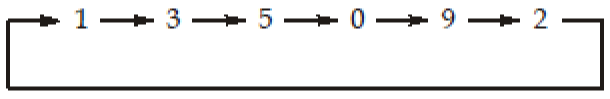
Suppose a synchronous counter is designed that counts the sequence (1, 3, 1, 0, 1, 2 and repeats). The minimum number of T flip-flop are required to construct this sequential circuit are ________.

Solution Video | Have any Doubt ?

● 4 Correct Option

Solution :
4

First design synchronous counter using 4 flip-flops for the sequence.



The sequence will be as follows:

	FF3	FF2	FF1	FF0	
1	0	0	0	1	→ 1
3	0	0	1	1	→ 3
5	0	1	0	1	→ 1
0	0	0	0	0	→ 0
9	1	0	0	1	→ 1
2	0	0	1	0	→ 2

Now, take output from FF1 and FF0 to get the desired sequence i.e. 1, 3, 1, 0, 1, 2 as shown in the dotted box.

QUESTION ANALYTICS +

Q. 15

The number of terms in the expansion of $(x + y + z + w)^3$ is ________.

Solution Video | Have any Doubt ?

● 20 Correct Option

Solution :
20

$${}^{4-1+3}C_3 = {}^{6}C_3 = 20$$

QUESTION ANALYTICS +

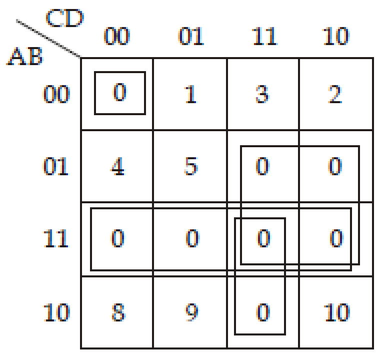
Q. 16

Simplify the function $F = \sum m(1, 2, 3, 4, 5, 8, 9, 10)$. The number of literals in the minimal product of sum form are ________.

Solution Video | Have any Doubt ?

● 11 Correct Option

Solution :
11



AB \ CD	00	01	11	10
00	0	1	3	2
01	4	5	0	0
11	0	0	0	0
10	8	9	0	10

$$F = \overset{(2)}{(\bar{B} + \bar{C})}\overset{(2)}{(\bar{A} + \bar{B})}\overset{(3)}{(\bar{A} + \bar{C} + \bar{D})}\overset{(4)}{(A + B + C + D)}$$

Hence, total number of literals in the minimal POS form = 11.

QUESTION ANALYTICS +

Q. 17

Consider the sentence 'All the odd and even numbers are integers'. Let the domain be the set of all real numbers. Now consider the following first order formulae.

I. $\forall x(\text{Odd}(x) \wedge \text{Even}(x) \Rightarrow \text{Integer}(x))$

II. $\forall x(\sim \text{Integer}(x) \Rightarrow \sim \text{Odd}(x) \wedge \sim \text{Even}(x))$

III. $\forall x(\text{Odd}(x) \wedge \text{Even}(x) \wedge \text{Integer}(x))$

Which out of I, II, III which is(are) the correct formulae for the sentence given above?

Solution Video | Have any Doubt ?

A Only I

B Only II Correct Option

Solution :
(b)
I is incorrect as a number can't be both odd and even at the same time.
To see how II is correct, take its contrapasitive.

$\forall x\left[(\text{Odd }(x)\ \vee \text{Even }(x)) \Rightarrow \text{ Integer }(x)\right]$

If a number is odd or even, then surely it's an integer.
Hence II is correct.
III is clearly incorrect.
Hence correct choice is (b).

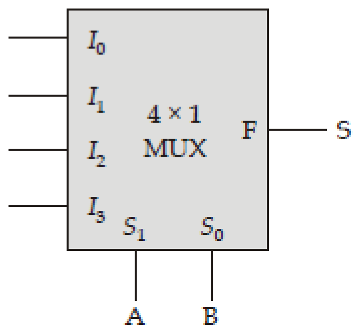
C Only III

D None of these

QUESTION ANALYTICS +

Q. 18

Consider a 4 × 1 MUX to be used to implement the sum of a 1-bit full adder with input bits A and B and the carry input C_{in}. Which of the following conbination of inputs to I_0, I_1, I_2 and I_3 of the MUX will realize the sum S?



Solution Video | Have any Doubt ?

A $I_0 = I_3 = C_{in}; I_1 = I_2 = \overline{C}_{in}$ Correct Option

Solution :
(a)
For, 4 × 1 MUX

$$F = \overline{A}\overline{B}\cdot I_0 + \overline{A}BI_1 + A\overline{B}I_2 + ABI_3$$

Now, truth table for full adder.

	A	B	C_{in}	Sum	
I_0	0	0	0	0	$I_0 = C_{in}$
	0	0	1	1	
I_1	0	1	0	1	$I_1 = \overline{C}_{in}$
	0	1	1	0	
I_2	1	0	0	1	$I_2 = \overline{C}_{in}$
	1	0	1	0	
I_3	1	1	0	0	$I_3 = C_{in}$
	1	1	1	1	

B $I_0 = I_3 = \overline{C}_{in}; I_1 = I_2 = C_{in}$

C $I_0 = I_1 = C_{in}; I_2 = I_3 = \overline{C}_{in}$

D $I_0 = I_1 = \overline{C}_{in}; I_2 = I_3 = C_{in}$

QUESTION ANALYTICS +

Q. 19

The value of the following expression:

$$\left[\frac{1}{81^n} - \frac{10}{81^n}{}^{2n}C_1 + \frac{10^2}{81^n}{}^{2n}C_2 - \frac{10^3}{81^n}{}^{2n}C_3 + ... + \frac{10^{2n}}{81^n}\right] \text{ is}$$

Solution Video | Have any Doubt ?

A 1024

B 256

C 180

D 1 Correct Option

Solution :
(d)
Simply the expression first, it's quite easy.

$$\frac{1}{81^n}\left[1 - 10\cdot{}^{2n}C_1 + 10^2\cdot{}^{2n}C_2 - 10^3\cdot{}^{2n}C_3 + ... + (-1)^{2n}10^{2n}\right]$$

$$\frac{1}{81^n}\left[{}^{2n}C_0(10)^0 - {}^{2n}C_1(10)^1 + {}^{2n}C_2(10)^2 - {}^{2n}C_3(10)^3 + ... + {}^{2n}C_{2n}(10)^{2n}\right]$$

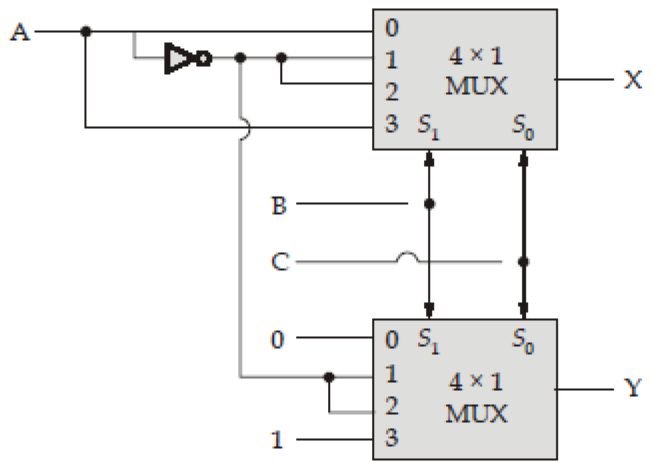
$$\frac{1}{81^n}(1-10)^{2n} = \frac{(-9)^{2n}}{81^n} = \frac{[(-9)^2]^n}{81^n}$$

$$= \frac{81^n}{81^n} = 1$$

QUESTION ANALYTICS +

Q. 20

Consider the circuit given below:



The circuit act as

Solution Video | Have any Doubt ?

A Full adder

B Full subtractor Correct Option

Solution :
(b)

The circuit act as full subtracter.

B	C	X	Y
0	0	A	0
0	1	$\bar{A}$	$\bar{A}$
1	0	$\bar{A}$	$\bar{A}$
1	1	A	1

$$X(A, B, C) = \Sigma_m(1, 2, 4, 7)$$
$$Y(A, B, C) = \Sigma_m(1, 2, 3, 7)$$

Which is clearly the minterms of full subtracter. X for difference and Y for borrow.

C Priority encoder

D Half adder sum and half subtracter difference

QUESTION ANALYTICS +

Q. 21

How many ways can we distribute at most 10 identical balls to 3 boxes?

Solution Video | Have any Doubt ?

A $^{13}C_3$ Correct Option

Solution :
(a)

Number of ways to distribute ≤ 10 identical balls to 3 boxes is equivalent to no of non negative integral solutions to this equation.

$$x_1 + x_2 + x_3 \le 10$$

Which is same as,

$$x_1 + x_2 + x_3 + x_4 = 10 \quad \text{[Box method]}$$

$$\Rightarrow \quad ^{4-1+10}C_{10} = {}^{13}C_{10}$$

Hence the answer is (a)

B $^{13}C_5$

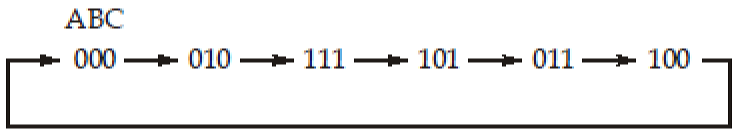
C $^{23}C_{13}$

D None of these

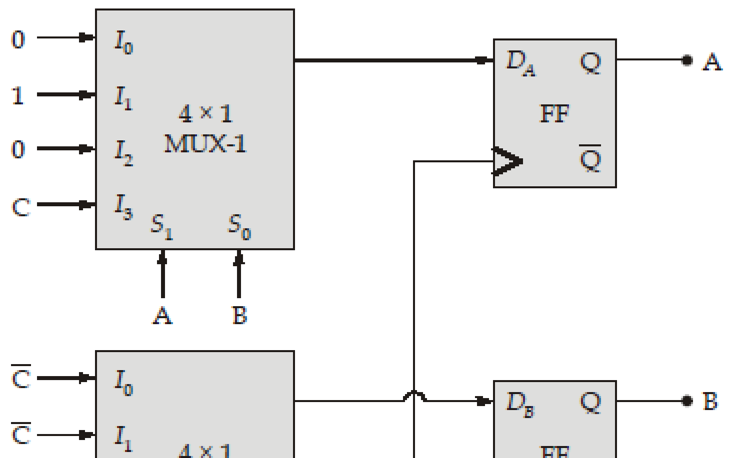
QUESTION ANALYTICS +

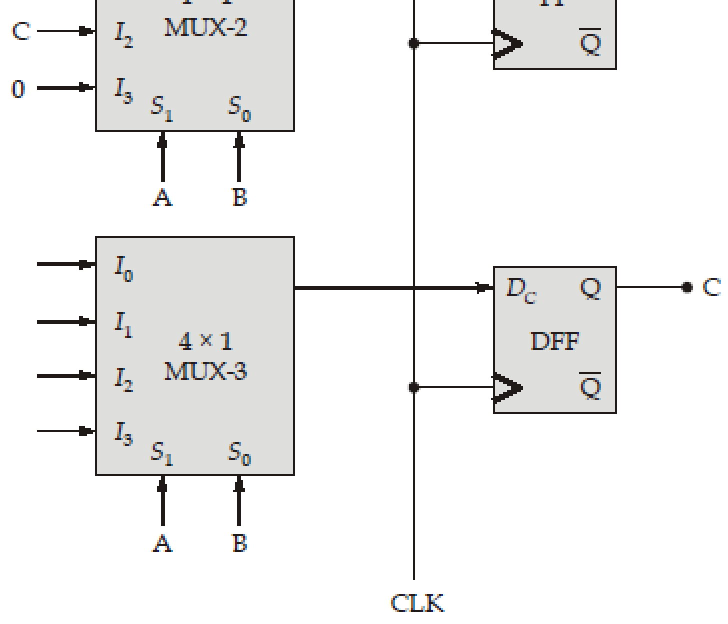
Q. 22

A synchronous counter switching sequence is given below:



The possible implementation using DF flip-flops is shown below. Identity the inputs of MUX-3.





	I_0	I_1	I_2	I_3
(a)	1	C	$\bar{C}$	0
(b)	0	$\bar{C}$	C	C
(c)	$\bar{C}$	C	C	1
(d)	C	0	0	1

Solution Video | Have any Doubt ?

Ⓐ a

Ⓑ b

Correct Option

Solution :
(b)

CLK		A	B	C	FF-C
	0	0	0	0	0
↑	2	0	1	0	①
↑	7	1	1	1	①
↑	5	1	0	1	①
↑	3	0	1	1	0
↑	4	1	0	0	0
		0	0	0	

Now,

AB →

	C	00	01	10	11
$\bar{C}$	0	0	②	4	6
C	1	1	3	⑤	⑦
		0	$\bar{C}$	C	C

$I_0 = 0$

$I_1 = \bar{C}$

$I_2 = C$

$I_3 = C$

So correct option is (b).

Ⓒ c

Ⓓ d

QUESTION ANALYTICS +

Q. 23

Consider the function $\Gamma : n \rightarrow N$, where N is the set of natural numbers defined as

$$\Gamma(n) = \begin{cases} n^2, & n \text{ is odd} \\ 2n+1, & n \text{ is even} \end{cases}$$

For $n \in N$, which of the following is true for Γ?

Solution Video | Have any Doubt ?

Ⓐ Surjective but not injective

Ⓑ Injective but not surjective

Ⓒ Bijective

Ⓓ Neither surjective nor injective

Correct Option

Solution :
(d)

Check for Injectivity:

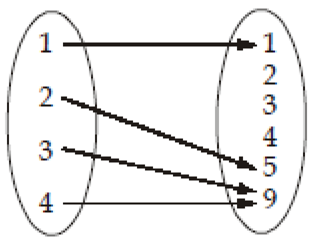
Put $n = 3$

$\Gamma(3) = 3^2 = 9$

And $n = 4, \Gamma(4) = 2(4) + 1 = 9$

Since $\Gamma(3) = \Gamma(4)$ and $3 \neq 4 \Rightarrow \Gamma$ is not injective.

Check for Surjectivity:



To check for surjectivity, we need to see if Codomain = Range. But here we see that 2, 3, 4 etc. don't have any preimage, thus making range ⊂ Codomain.

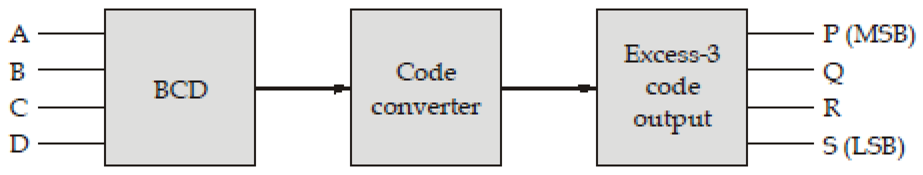
$\Rightarrow$ Γ is INTO, not ONTO.

Hence (d) is the appropriate choice.

QUESTION ANALYTICS +

Q. 24

Consider a code converter as shown below that converts BCD to excess-3 code for the decimal digits.



The simplified Boolean function output excess-3 code for R will be

Solution Video | Have any Doubt ?

A $AB+(\overline{C+D})$

B $C\oplus D$

C $C\odot D$ Correct Option

Solution :
(c)

Truth table for BCD to excess-3 code output.

Decimal value	Input				Output				Decimal value
	A	B	C	D	P	Q	R	S	
0	0	0	0	0	0	0	1	1	3
1	0	0	0	1	0	1	0	0	4
2	0	0	1	0	0	1	0	1	5
3	0	0	1	1	0	1	1	0	6
4	0	1	0	0	0	1	1	1	7
5	0	1	0	1	1	0	0	0	8
6	0	1	1	0	1	0	0	1	9
7	0	1	1	1	1	0	1	0	10
8	1	0	0	0	1	0	1	1	11
9	1	0	0	1	1	1	0	0	12

K-map for R:

AB \ CD	00	01	11	10
00	1		1	
01	1		1	
11	X	X	X	X
10	1		X	X

$$R = \overline{C}\overline{D}+CD$$
$$= C\odot D$$

D $AB+(\overline{C\odot D})$

QUESTION ANALYTICS +

Q. 25

Out of all boolean matrices of size $n\times n$ possible, a matrix is picked at random. Let us call this matrix as MA. The probability that the matrix chosen obeys the property $M_A=(M_A)^t$, where $(M_A)^t$ refers to the matrix obtained by taking transpose of the original matrix is ________. (Take $n=3$ and upto 3 decimal places)

Solution Video | Have any Doubt ?

0.125 (0.125 - 0.125) Correct Option

Solution :
0.125 (0.125 - 0.125)

The question is actually asking the probability of picking a symmetric relation out of all possible relations.

Required probability, P(symmetric) $= \dfrac{2^n\cdot 2^{n(n-1)/2}}{2^{n^2}}$

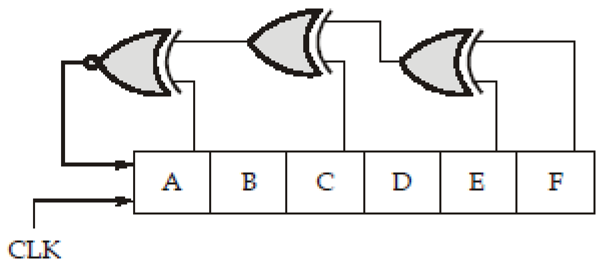
Substitute $n = 3$

To get, $\dfrac{1}{8} = 0.125$

QUESTION ANALYTICS +

Q. 26

A six bit right shift register is initialized to a value of (A, B, C, D, E, F) = (010000). The minimum number of clock pulses are required to produce 101101 are ________.



Solution Video | Have any Doubt ?

4 Correct Option

Solution :
4

Assume output from XNOR gate is X.

$X = (C \oplus (E \oplus F)) \odot A$

CLK	X	A	B	C	D	E	F
0	1	0	1	0	0	0	0
1	1	1	0	1	0	0	0
2	0	1	1	0	1	0	0
3	1	0	1	1	0	1	0
4		1	0	1	1	0	1

Required output

So, total 4 clock cycles are required.

QUESTION ANALYTICS +

Q. 27

We define a new measure, called GoldIndex(G, C). It takes two arguments as input, namely a graph G, and a set of colours, C respectively. The subroutine outputs an integer denoting the number of ways of assigning colours to vertices in G such that at least two vertices in G have the same colour. Let K_n denote the complete graph having n vertices respectively, and C = {Red, Green, Blue, Yellow}. Then the GoldIndex(K_3, C) will be equal to ________.

Solution Video | Have any Doubt ?

● 40 Correct Option

Solution :
40

Let's do this problem by complementary counting.

Let X = Total number ways of colouring each vertex in G

Let Y = Number of ways of colouring G such that no two vertices have the same colour

GoldIndex (K_3, C) = X – Y

Let's first find X = 4.4.4 = 4^3 = 64

(4 choices i.e. Red, Green, Blue, Yellow for colouring each vertex, and 3 such vertices in K_3)

Y = ${}^4C_3 \cdot 3!$

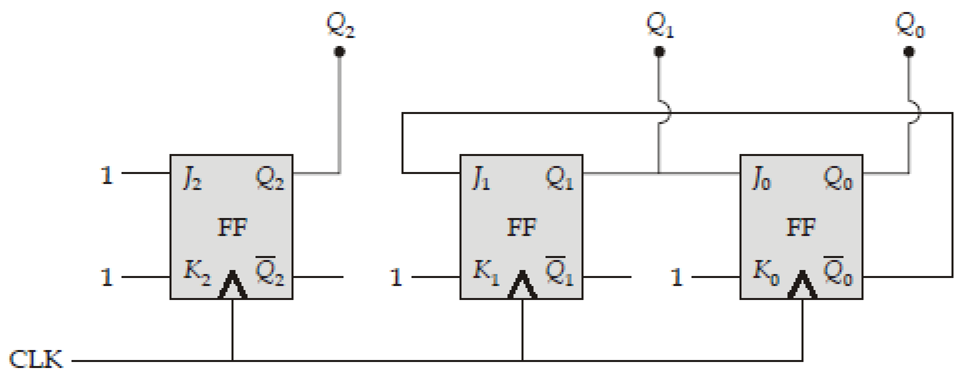
(Since Chromatic Number of K_n is n, first choose 3 out of 4 colours and then assign them to the vertices in 3! ways)

Therefore GoldIndex(K_3, C) = 64 – 24 = 40

QUESTION ANALYTICS +

Q. 28

Consider the below sequential circuit using J-K flip-flops. Initially the output at ($Q_2Q_1Q_0$) = 001.



The number of clock cycles required to get at $Q_2Q_1Q_0$ = 000 is ________.

Solution Video | Have any Doubt ?

● 4 Correct Option

Solution :
4

	Present State								
CLK	Q_2	Q_1	Q_0	$J_2 = 1$	$K_2 = 1$	$J_1 = \overline{Q}_0$	$K_1 = 1$	$J_0 = Q_1$	$K_0 = 1$
	0	0	1	1	1	0	1	0	1
1	1	0	0	1	1	1	1	0	1
2	0	1	0	1	1	1	1	1	1
3	1	0	1	1	1	0	1	0	1
4	0	0	0						

Hence total 4 clocks are required to get the desired state 000.

QUESTION ANALYTICS +

Q. 29

The value of the summation, $\sum_{r=2}^{5} {}^5C_r \, {}^5C_r$ is equal to ________.

Solution Video | Have any Doubt ?

● 226 Correct Option

Solution :
226

We know, $\sum_{r=0}^{n} ({}^nC_r \, {}^nC_r) = {}^{2n}C_n$

Therefore, $\sum_{r=0}^{5} ({}^5C_r)^2 = {}^{10}C_5$

$= ({}^5C_0)^2 + ({}^5C_1)^2 + \sum_{r=2}^{5} ({}^5C_r)^2 = {}^{10}C_5$

$\sum_{r=2}^{5} ({}^5C_r)^2 = 252 - 26$

$= 226$

QUESTION ANALYTICS +

Q. 30

The number of minterms after minimizing the following Boolean expression is ________.
[D′ +AB′ +A′C +AC′D+A′C′D]′

Have any Doubt ?

1 Correct Option

Solution :
1

$$
\begin{aligned}
&= [D' + AB' + A'C + AC'D + A'C'D]' \\
&= [D' + AC' + AB' + A'\,[C + C'D]]' \\
&= [\underline{D' + AC' + AB' + A'C + A'}D]' \\
&= [D' + \underline{A' + A}C' + AB' + AC']' \\
&= [D' + \underline{A' + C' + AB' + A'}C]' \\
&= [D' + \underline{A' + C' + AB'}]' \\
&= [A' + B' + C' + D']' \\
&= ABCD
\end{aligned}
$$

Hence, only 1 minterm after minimizing.

QUESTION ANALYTICS +

Q. 31

Let X be a set containing n elements. We define a relation R on X^4, such that

$R = \{(\alpha, \beta, \Gamma, \delta) \,|\, (\alpha < \beta \text{ and } \beta < \alpha) \text{ or } (\Gamma < \delta \text{ and } \delta < \Gamma)\}$

Now consider the following statements:
1. R is reflexive.
2. R is symmetric.
3. R is antisymmetric.
4. R is asymmetric.
5. R is transitive.
6. R is a partial order relation.
7. R is irreflexive.

How many statements is/are correct ________.

Solution Video | Have any Doubt ?

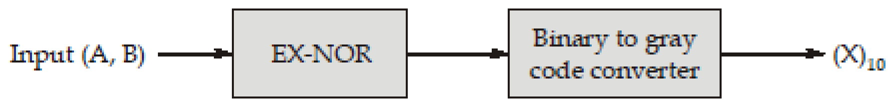
5 Correct Option

Solution :
5
R if observed carefully, is actually empty set. And we know that the empty relation is irreflexive, symmetric, antisymmetric, asymmetric and transitive.
However it is not reflexive and hence cannot be partial order relation.
Hence 5 is the answer.

QUESTION ANALYTICS +

Q. 32

Consider the input A = 10110100 and B = 01110000 is feeded as input as shown in the below diagram:



The value of X is ________.

Solution Video | Have any Doubt ?

38 Correct Option

Solution :
38

$A \odot B$ [A EX-NOR B]

$$
\Rightarrow \quad \begin{array}{r} 10110100 \\ 01110000 \\ \hline 00111011 \\ \hline \end{array}
$$

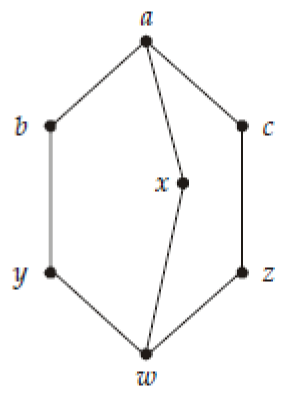
Now convert above binary data to gray code.
Gray code of (0011 1011) is 0010 0110.

$$(0010\ 0110)_2 = (38)_{10}$$

QUESTION ANALYTICS +

Q. 33

Consider the Hasse diagram of a lattice given below:



Let X be the number of complements of the element z. Also let Y be the number of complements of *y*. Then $(X - Y)^2$ will be equal to ________.

Solution Video | Have any Doubt ?

0 Correct Option

Solution :
0

Complements of element $y = \{x, c, z\}$

$\Rightarrow \quad X = 3$

Complements of element $z = \{x, b, y\}$

⇒ $Y = 3$

Hence $(X - Y)^2 = (3 - 3)^2 = 0$

QUESTION ANALYTICS