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Vijay Kumar Agarwal

MEGA MOCK TEST GATE 2024

Que: 1 **Type : NAT** **Positive Marks : 1** **Negative Marks : 0**

Q.

```
#include <stdio.h>
int main()
{
    int a = 1, b = 5, c = 3, d;
    d = a *= b++ + a << c--, printf("%d\t%d\t", b, c), ++a;
    printf("%d\t%d", a, d);
    return 0;
}
```

The sum of the printed values is 105.

d 48

a 1 → 48 → 49

b 5 → 6

c 3 → 2

49 48 6 2

d = 10 20, 30 ;

a *= b++ + a << c--

a) a *= b + a << c

b) b = b+1, c = c-1

a *= 6 << 3

= 6 × 2³

a *= 48

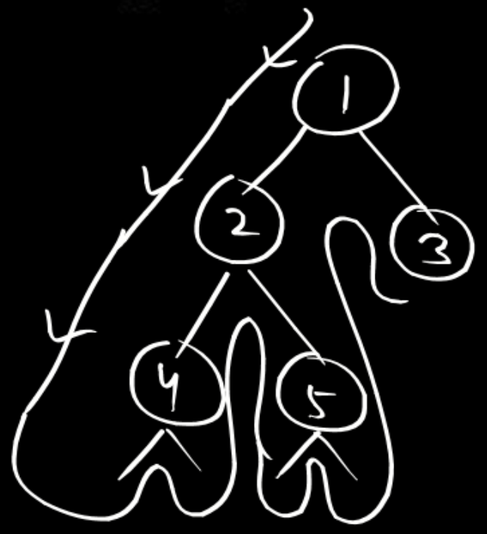
a = a + 48

d = 48

Que: 2 | Type : MSQ | Positive Marks : 1 | Negative Marks : 0

Q. Consider the following tree traversal on Complete Binary Tree. Which of the following traversals options is/are sufficient to Uniquely reconstruct the Complete Binary Tree?

Preorder : 1 2 4 5 3



A. Only Pre-order

B. Only Post-order

C. Only In-order

D. Only Level order traversal

MEGA MOCK TEST GATE 2024

Que: 3 **Type : MCQ** **Positive Marks : 1** **Negative Marks : 0.33**

Q.
```
#include <stdio.h>
int main() {
    int a[3][3] = {50, 30, 10, 20, 40, 60, 80, 70, 90};
    int(*p)[3][3] = &a;
    printf("%d\t", ***p);
    printf("%d\t", **(*p+2));
    printf("%d\t", *(*(*p+1)+1));
    return 0;
}
```
The output is____.

a[0] a[1] a[2]

40

((*(p+1)+1)

((a+1)+1)

*(a[1]+1)

⇒ a[1][1]

A) 50, 80, 40

B) 50, 60, 40

C) 50, 70, 40

D) None of these

1) ***p ⇒ ***&a

⇒ **a ⇒ **&a[0]

⇒ *a[0]

⇒ *&a[0][0]

⇒ a[0][0]

50

2) **(*p+2)

⇒ **(*&a+2) ⇒ **(a+2)

⇒ *a[2] ⇒ *&a[2][0] ⇒ a[2][0]

80

3)

Q. Consider the following program:

```
#include<stdio.h>
void fun2();
void fun1()
{
    static int count = 67;
    printf("%c", count+++32);
    fun2();
}
void fun2(){
    static int count = 67;
    printf("%c", ++count);
}
int main(void){
    int i, j;
    for(i = 1; i<4; i=i*2){
    fun2();
    fun1();
    continue;
    fun2();
    }
    return 0;
}
```

The output string is____.

(A) DcEfDg

(B) DcEFdG

(C) DdEFGdHI

(D) DcEFGgHI

i = 1, i = 2

i = 1

fun2() → count2 : 67 → 68

pf ⇒ D

fun1() → count1 : 67 → 68

pf ⇒ 67 + 32 ⇒ 'c'

i = 2

fun2() → count2 : 68 → 69

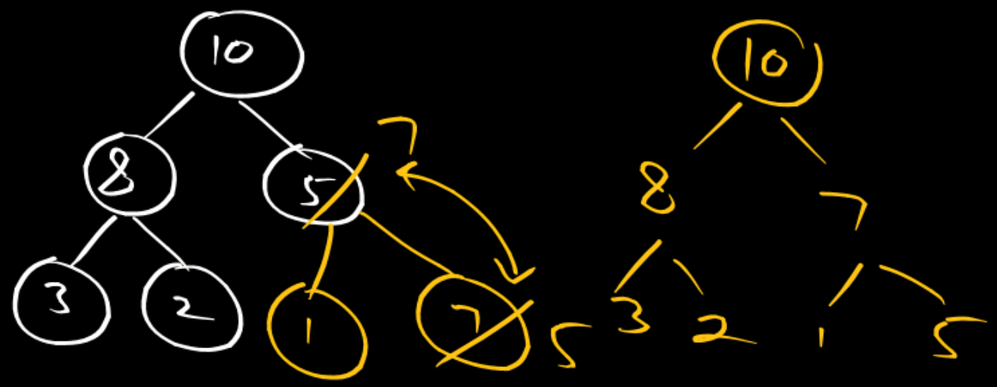
pf ⇒ 'E'

DcE

A 65
B 66
C 67
D 68
E 69

Que: 5 Type : MCQ Positive Marks : 2 Negative Marks : 0.66

Q. A priority queue is implemented as a max-heap. Initially, it has 5 elements. The level-order traversal of the heap: 10, 8, 5, 3, 2. Two new elements 1 and 7 are inserted into the heap in that order. The level-order traversal of the heap after the insertion of the elements is:



A 10, 8, 7, 3, 2, 1, 5

B 10, 8, 7, 2, 3, 1, 5

C 10, 8, 7, 1, 2, 3, 5

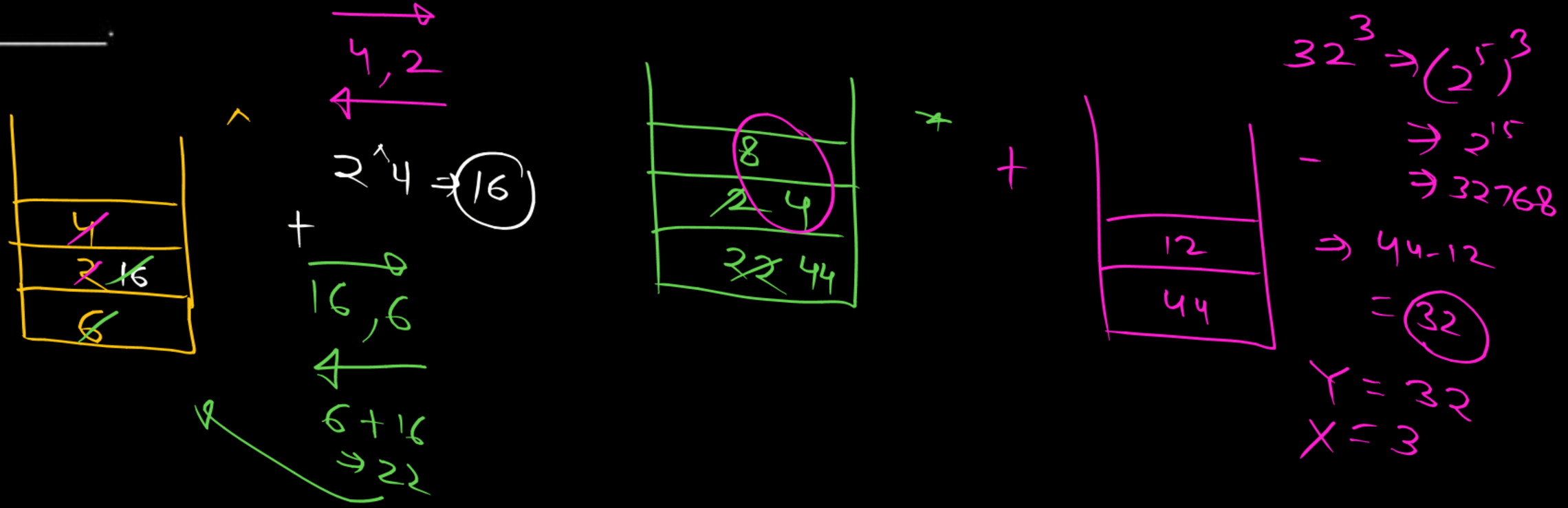
D 10, 8, 7, 5, 3, 2, 1

Que: 6 **Type : NAT** **Positive Marks : 2** **Negative Marks : 0**

Q. Consider the following postfix expression:

6 2 4 ^ + 2 * 4 8 + –

Let X be the maximum size of the operand stack required to evaluate the postfix expression and Y be the final result of the expression evaluation. The value of Y^X is _____.



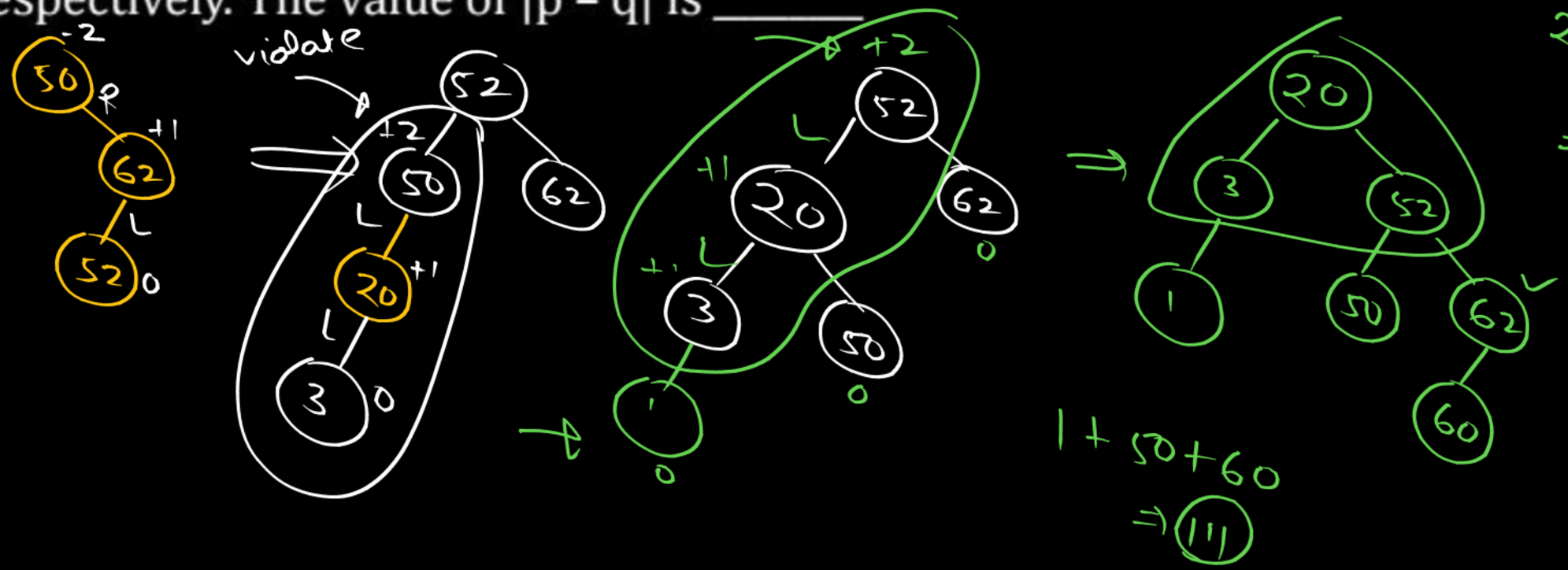
50 52 62 3 20 50 3 20 52

Q. An AVL is generated by inserting in order the following integers:

50, 62, 52, 20, 3, 1, 60

26

Let p be the sum of the internal nodes and q be the sum of the leaf nodes respectively. The value of |p – q| is _____



Que: 1 **Type : NAT** **Positive Marks : 1** **Negative Marks : 0**

Q. X is a random variable such that X ~ B (n, p). Given that the mean is 10 and p = 0.4, then the value of n is_____.

$X \sim B(n, p)$ $E[X] = 10$

$B(n, p)$

$E[X] = np$

$n = ?$

$p = 0.4$

$np = 10$

$n \times 0.4 = 10$

$\boxed{n = 25}$

Que: 2 | Type : MCQ | Positive Marks : 1 | Negative Marks : 0.33

RHL = n ✓ ✓ M Imp

Q. $\lim_{x\to 1}[x-3]$ is equal to : (where [.]is greatest interger function)

greatest Integer LHL = (n-1)

$\lim_{x\to 1}[x-3]$

(A) -2 (B) -3

LHL ≠ RHL

(C) Does not exist (D) None of these

$\lim_{h\to 0} f(a-h) = (n-1)$

$\lim_{h\to 0} f(a+h) = n$

$\lim_{h\to 0}[1+h-3]$

$RHL = \lim_{h\to 0}[-2] = -2$

$LHL = \lim_{h\to 0} f(a-h)$

$= \lim_{h\to 0}[1-h-3] = -3$

MEGA MOCK TEST GATE 2024

Que: 3 | Type : NAT | Positive Marks : 2 | Negative Marks : 0

Q. The ratio of the number of trucks along a highway, on which a petrol pump is located, to the number cars running along the same highway is 3 : 2. It is known that an average of one truck in thirty truck and two cars in fifty stop at the petrol pump to be filled up with the fuel. If a vehicle stops at the petrol pump to be filled up with the fuel. Find the probability that it is a car?

3 : 2

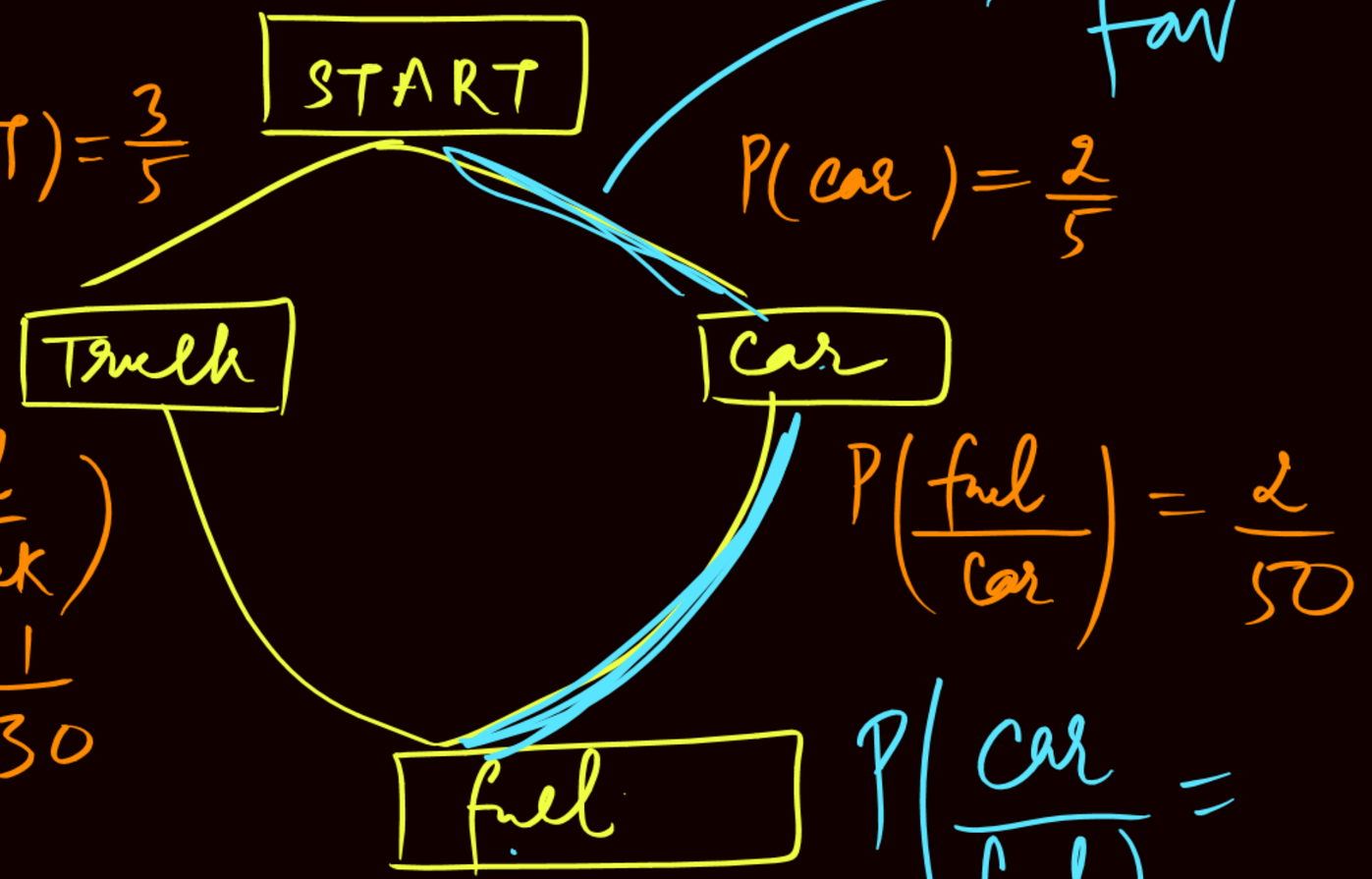
$P(\text{Truck}_{\text{fuel}}) = \frac{1}{30}$ $P(\text{Cars}_{\text{fuel}}) = \frac{2}{50}$

3 : 2
Truck car

$P(\text{Truck}) = \frac{3}{5}$

$P(\text{car}) = \frac{2}{5}$

5-6



$$= \frac{\frac{2}{5} \times \frac{2}{50}}{\frac{2}{5} \times \frac{2}{50} + \frac{3}{5} * \frac{1}{30}}$$

$$= \frac{4}{9}$$

Imp

Q. The largest Eigen value of the Matrix $\begin{bmatrix} 1 & 4 & 16 \\ 4 & 16 & 1 \\ 16 & 1 & 4 \end{bmatrix}$ is.

(A) 16

(B) 21

(C) 48

(D) 64

The largest eigen value

$|A - I\lambda| = 0$

Sum = 1 + 16 + 4

= 21

Q. The binary sequence 10010 is

A ✗ $(-18)_{10}$ as per sign–magnitude representation

B ✗ $(+17)_{10}$ as 2's complement representation

C ✓ $(-2)_{10}$ as per sign–magnitude representation

D ✗ $(14)_{10}$ as per 2's complement representation

C

Signed

1 0 0 1 0 = -2

-ve

1 0 0 1 0 → 2's

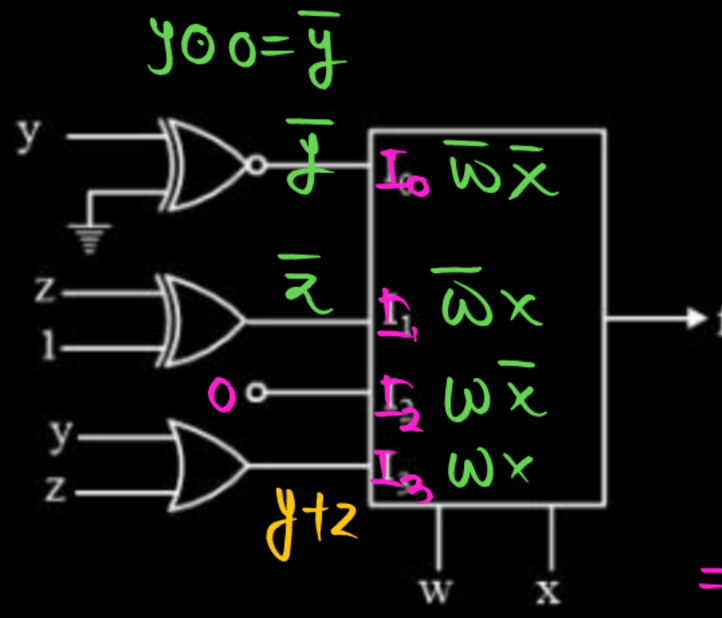
0 1 1 1 0

-14

-14

Que: 3 | Type : NAT | Positive Marks : 1 | Negative Marks : 0

Q. For the given circuit diagram



$y_{00} = \bar{y}$

$I_0\ \bar{w}\bar{x}$, $I_1\ \bar{w}x$, $I_2\ w\bar{x}$, $I_3\ wx$

$\bar{z}$, $y+z$

$\bar{w}\bar{x}\bar{y}$	$\bar{w}x\bar{z}$	wxy	wxz
0000	0110	1110	1101
0001	0100	1111	1110

$f = \bar{w}\bar{x}\bar{y} + \bar{w}x\bar{z} + wx(y+z)$

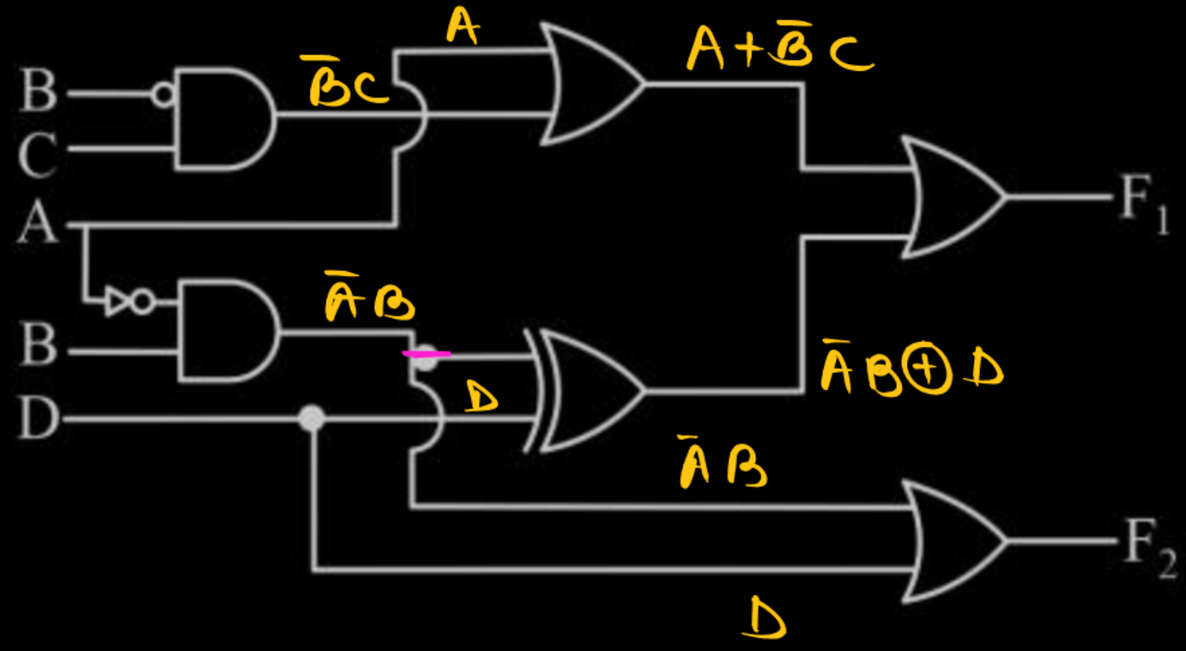
$= \bar{w}\bar{x}\bar{y} + \bar{w}x\bar{z} + wxy + wxz$

$= \Sigma m(0,1,4,6,13,14,15,$

the number of min-terms present in the Boolean function f is ____.

Standard

Q. In the circuit shown below if B = 1 then which of the following is/are True?



$B=1$

$F_1 = A+\bar{B}C+(\bar{A}B\oplus D)$

$= A+(\bar{A}\oplus D)$

$= A+(A\odot D) = A+AD+\bar{A}\bar{D}$

$= A(1+D)+\bar{A}\bar{D}$

$= A+\bar{A}\bar{D}$

$= (A+\bar{A})(A+\bar{D})$

$= A+\bar{D}$

$F_2 = \bar{A}B+D$

$= \bar{A}+D$

(A) $F_1F_2 = A+C$

(B) $F_1+F_2 = 1$

(C) $F_1F_2 = A\bar{D}+\bar{A}D$

(D) $F_1F_2 = \bar{A}.\bar{D}+A.D$

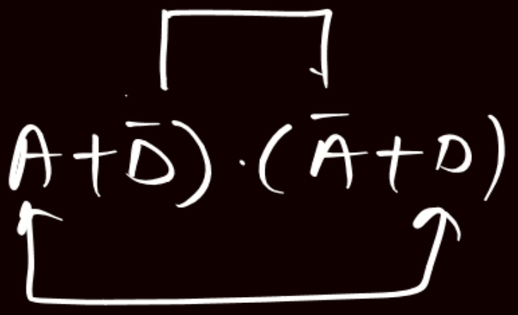
$$F_1 = A + \bar{D}$$

$$F_2 = \bar{A} + D$$

$$F_1 + F_2 = A + \bar{D} + \bar{A} + D$$

$$= 1$$

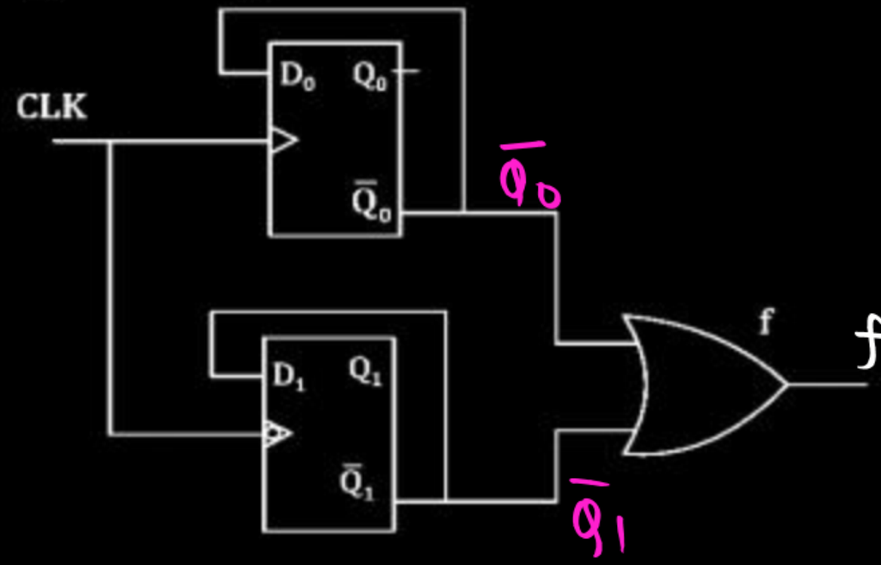
$$F_1 F_2 = (A + \bar{D}) \cdot (\bar{A} + D)$$



$$= AD + \bar{A}\bar{D}$$

$$= A \odot D$$

Q. For the given sequential circuit



$\bar{Q}_0$

$\bar{Q}_1$

$f = \bar{Q}_1 + \bar{Q}_0$

$$\text{Duty cycle} = \frac{T_{ON}}{T_{ON} + T_{OFF}} \times 100$$

The duty cycle of the output waveform is-

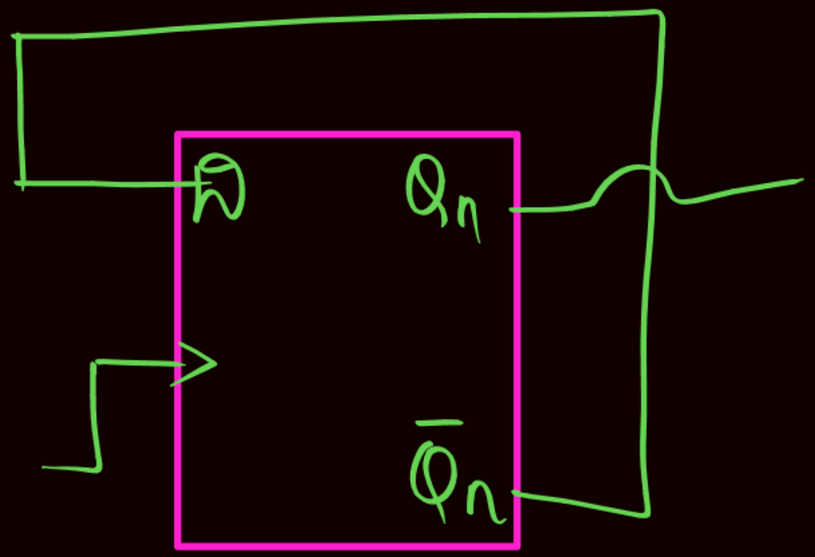
(A) 50%

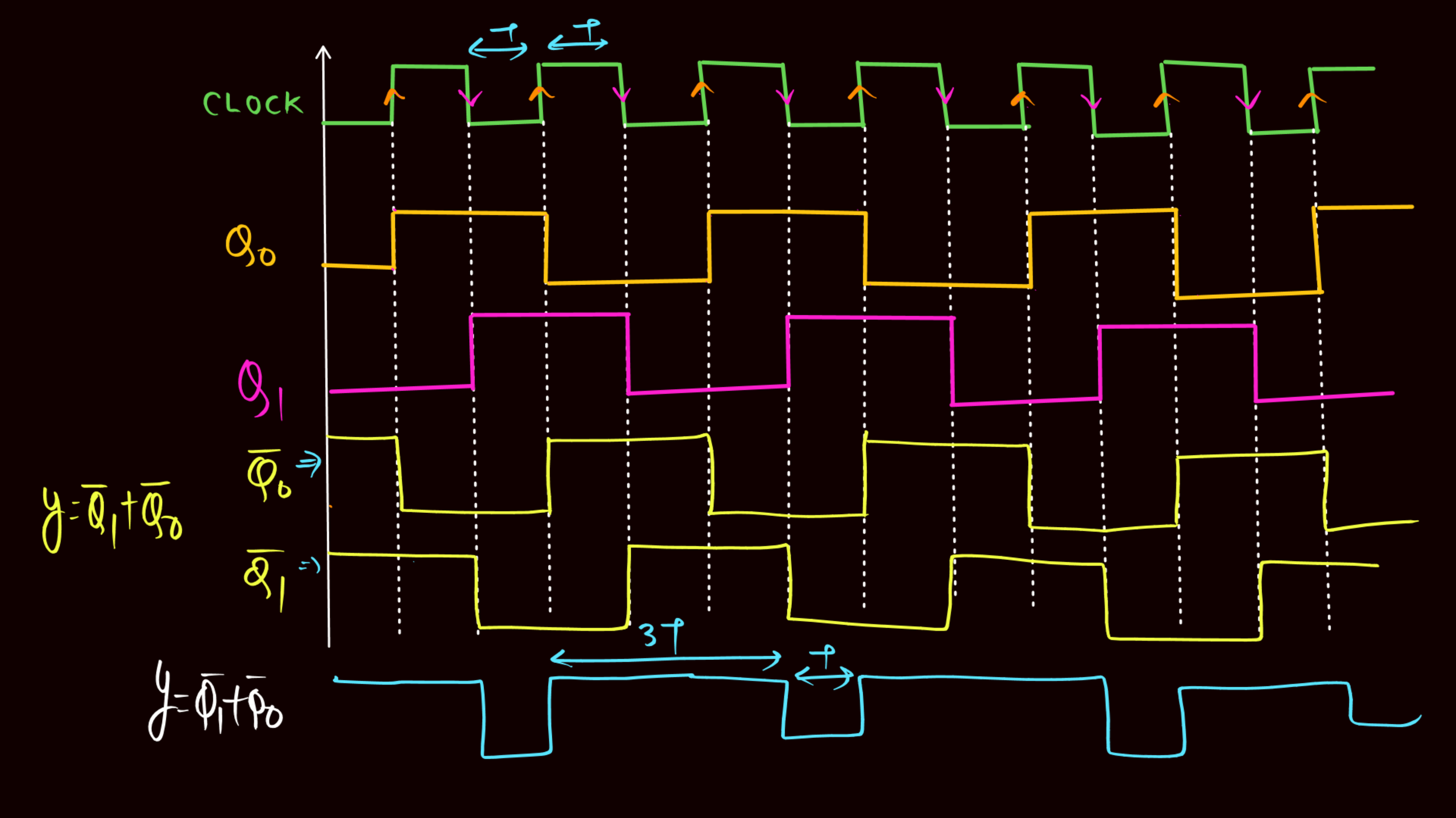
(B) 25%

(C) 75%

(D) 40%

toggle




T
T
CLOCK
Q_0
Q_1
$\bar{Q}_0$
$\bar{Q}_1$
$y = \bar{Q}_1 + \bar{Q}_0$
3T
T
$y = \bar{Q}_1 + \bar{Q}_0$

$$\text{Duty} = \frac{T_{ON}}{T_{ON} + T_{OFF}} = \frac{3t}{3t + t} \times 100 = \underline{75\%}$$

Que: 1 **Type : NAT** **Positive Marks : 1** **Negative Marks : 0**

Q. For all sets A and B and power set P

S_1: $P(A \cup B) \subseteq P(A) \cup P(B)$

S_2: $P(A \cap B) = P(A) \cap P(B)$

S_3: If $A \subseteq B$ then $P(A) \subseteq P(B)$

How many statements are TRUE?_____.

$A = \{1, 2\}$ $B = \{a, b\}$

$A \cup B = \{1, 2, a, b\}$.

$\{1, 2, a, b\} \in P(A \cup B)$

$\{1, 2, a, b\} \notin P(A) \cup P(B)$

Que: 2 Type : MSQ Positive Marks : 1 Negative Marks : 0

Q. For each of the following values, determine whether there exists a corresponding planar graph.

A 7 vertices and 13 edges

B 6 regions and 5 vertices

C 8 vertices and 20 edges

D 10 regions and 5 edges

Q. Which of the Following is/are representing Tree?

$e = 2.9$

(A) 10 vertices and the sum of degrees of vertices is 24 (F) $\sum d(v) = 2e$

(B) 12 vertices and 15 edges (F)

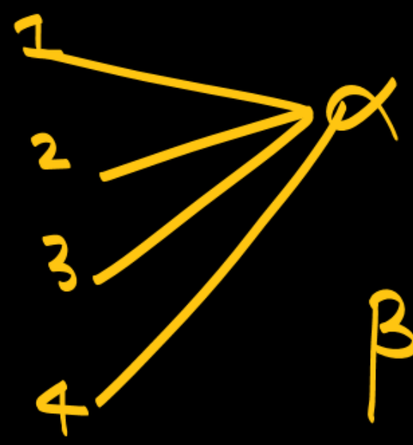
(C) 8 vertices and 7 edges (T)

(D) 4 vertices and the sum of degrees of vertices is 3 (F)

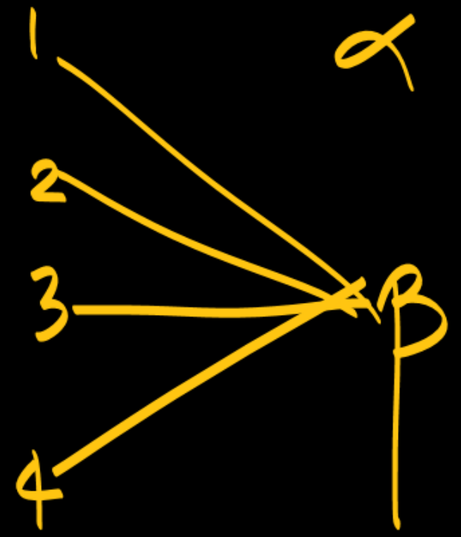
Que: 4 **Type : NAT** **Positive Marks : 2** **Negative Marks : 0**

Q. Consider the function $g : X \to Y$ where $X = \{1, 2, 3, 4\}$ and $Y = \{\alpha, \beta\}$. How many functions g are not surjective?

Ans: 2



non onto.



non onto.

onto = Total - non onto

non onto = Total - onto.

Que: 5 Type : MCQ Positive Marks : 2 Negative Marks : 0.66

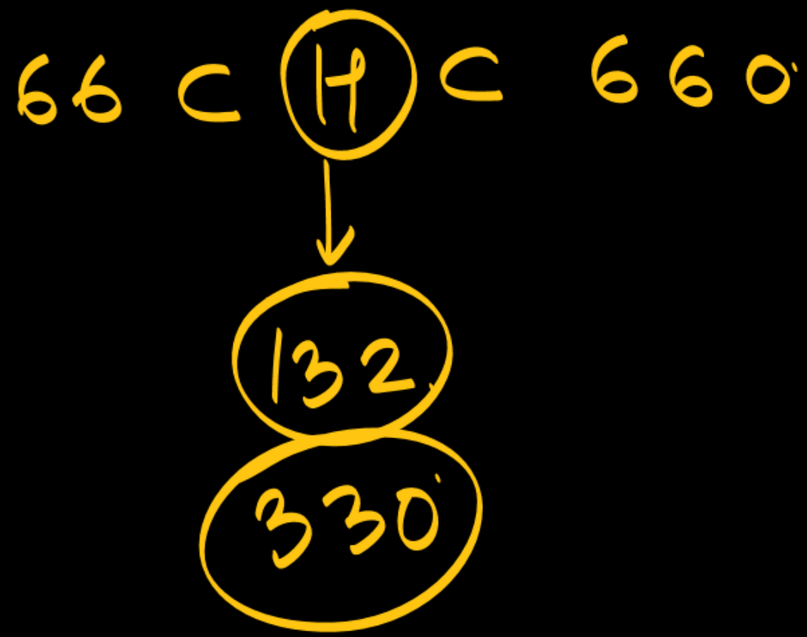
Q. Let G be a group with subgroups H and K .
If |GI = 660, |K |= 66, and K ⊂ H ⊂ G, what are the possible values for |H|?

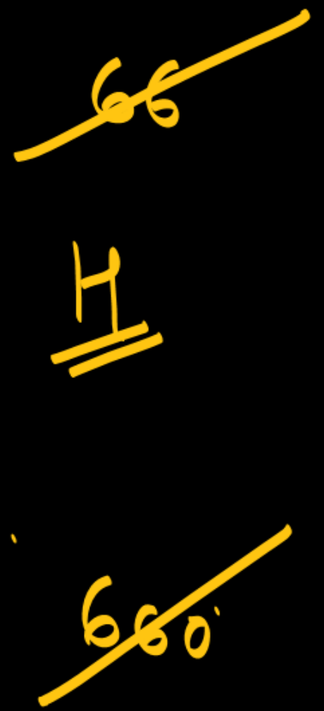
A 120, 330

B 132, 330

C 220, 450

D 324, 660



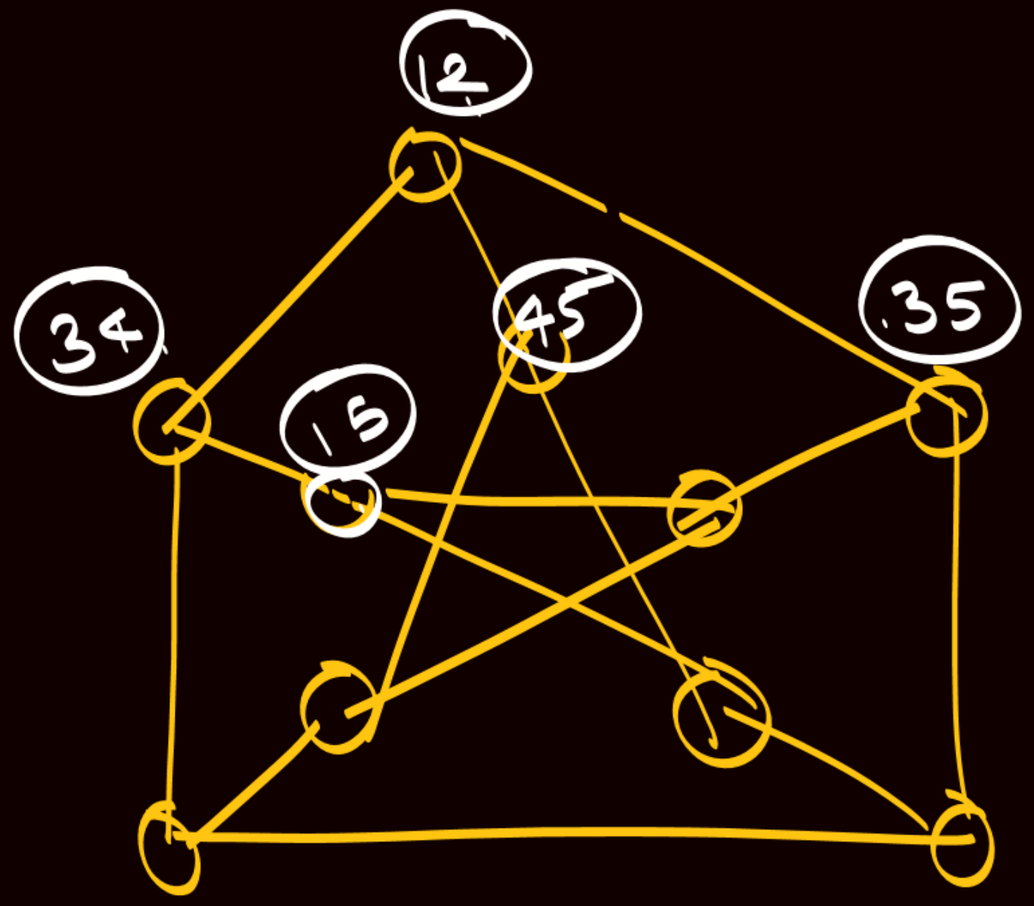


Set: {1, 2, 3, 4, 5}.

$5C_2$ = 10 ways we can create subset of size 2.

2 vertices are connected

$\{a,b\} \cap \{c,d\} = \emptyset$ $\quad \chi(G) = ?!$



$\{a,b\} \cap \{c,d\} = \phi$

$\chi(G) = 3.$

Que: 1 | Type : MCQ | Positive Marks : 1 | Negative Marks : 0.33

Q. Consider the following four IP addresses:

200.96.146.0/24 , HID = 8 bit , 2^8 IP

200.96.147.0/24 , HID = 8 bit , "

200.96.148.0/24 , HID = 8 bit , "

200.96.149.0/24 , HID = 8 bit , "

The single CIDR aggregation of the above four IP addresses is

① Contiguous (True)

② same size = 2^8 & No. of n/w = 4 = 2^2

③ First NID must be div. by total size of the supernet

(A) 200.96.146.0/21

(B) 200.96.146.0/22

(C) 200.96.146.0/23

(D) ✓ Not possible to perform in single aggregation

Total size of supernet $= 2^8 + 2^8 + 2^8 + 2^8$

$= 2^{10}$

200.96.146.0

Rem or HID

200.96.100100 | 10.00000000 | 2^{10} (False)

Subnetting is Not possible

Que: 2 Type : MCQ Positive Marks : 1 Negative Marks : 0.33

Q. The File Transfer Protocol (FTP) uses:

A. A non-persistent TCP connection on port 21 for a control session, and a separate non persistent TCP connection on port 20 for each data file transfer

B. A persistent TCP connection on port 21 for a control session, and a single persistent TCP connection on port 20 for all of the data file transfers

C. A non-persistent TCP connection on port 21 for a control session, and a single persistent TCP connection on port 20 for all of the data file transfers.

D. A persistent TCP connection on port 21 for a control session, and a separate non persistent TCP connection on port 20 for each data file transfer

MEGA MOCK TEST GATE 2024

Que: 3 **Type : NAT** **Positive Marks : 2** **Negative Marks : 0**

Q. Suppose you are designing a selective repeat protocol for a 1-Mbps point-to-point link to the stationary satellite revolving around the Earth at an altitude of 3×10^4 km. Assuming that each frame carries 1 KB of data, what is the minimum number of bits you need for the sequence number. Assume the speed of light is 3×10^8 m/s.

$B = 10^6$ bits/sec

$d = 3 * 10^4$ km

Frame size = 1 KB

$= 1024 * 8$ bit

$= 8192$ bits

$v = 3 * 10^8$ m/sec

$= 3 * 10^5$ km/sec

SR Protocal

$P_d = \frac{d}{v}$

$P_d = \frac{3 * 10^4 \text{ km}}{3 * 10^5 \text{ km/sec}}$

$P_d = 0.1$ sec

$T_d(F) = \frac{8192 \text{ bits}}{10^6 \text{ bits/sec}}$

$= 8192 * 10^{-6}$ sec

$= 0.008192$ sec

AD Rule

$$\text{efficiency} = \frac{\text{useful time}}{\text{total time}}$$

$$\frac{1}{1} = \frac{N * T_d(F)}{T(F) + 2 * P_d}$$

$$N = \frac{T_d(F) + 2 * P_d}{T_d(F)}$$

$$N = \frac{0.008192 + 2 * 0.1}{0.008192}$$

$$N = \lceil 25.41 \rceil = 26$$

N ↓ window sender size

minimum sequence No required in SR Protocal = $N + N = 2N = 2 * 26 = 52$

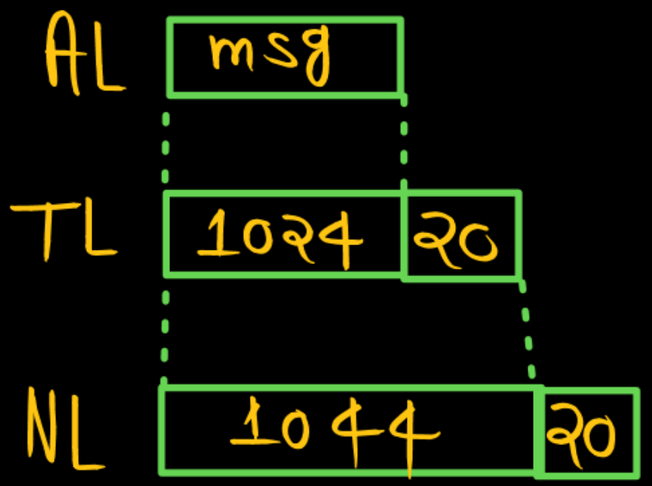
$$2^K = 52$$

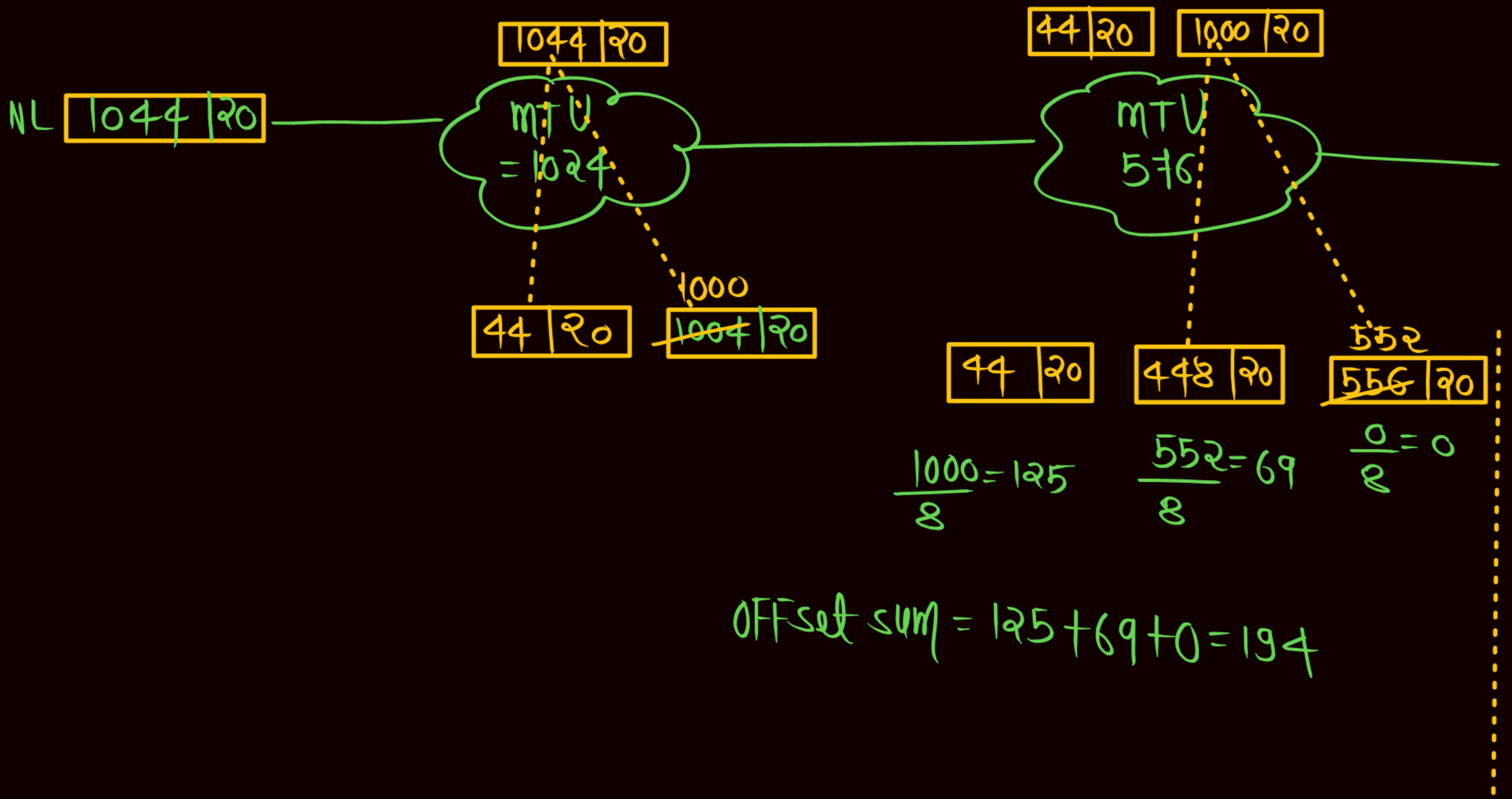
$$2^K = 2^6$$

K = 6bit

Que: 4 **Type : NAT** **Positive Marks : 2** **Negative Marks : 0**

Q. Suppose a TCP message that contains 1024 bytes of data and 20 bytes of TCP header is passed to IP for delivery across two networks interconnected by a router (i.e., it travels from the source host to a router to the destination host). The first network has an MTU of 1024 bytes; the second has an MTU of 576 bytes. Each network's MTU gives the size of the largest IP datagram that can be carried in a link-layer frame. Find the sum of offset value of all the fragments. Assume all IP headers are 20 bytes.




1044 | 20
NL
1044 | 20
MTU = 1024
44 | 20
1000
1004 | 20
44 | 20
1000 | 20
MTU 576
44 | 20
448 | 20
552
556 | 20
1000/8 = 125
552/8 = 69
0/8 = 0
OFFset sum = 125 + 69 + 0 = 194

Que: 5 | Type : MSQ | Positive Marks : 2 | Negative Marks : 0

Q. Host A and B are communicating over a TCP connection, and Host B has already received from A all bytes up through byte 96. Suppose Host A then sends two segments to Host B back-to-back. The first and second segments contain 40 and 80 bytes of data, respectively. In the first segment, the sequence number is 97, the source port number is 302, and the destination port number is 80. Host B sends an acknowledgment whenever it receives a segment from Host A. If the first segment arrives before the second segment, in the acknowledgment of the first arriving segment, what is the acknowledgment number(X), the source port number(Y), and the destination port number(Z) then which of the following is/are true

(ABD)

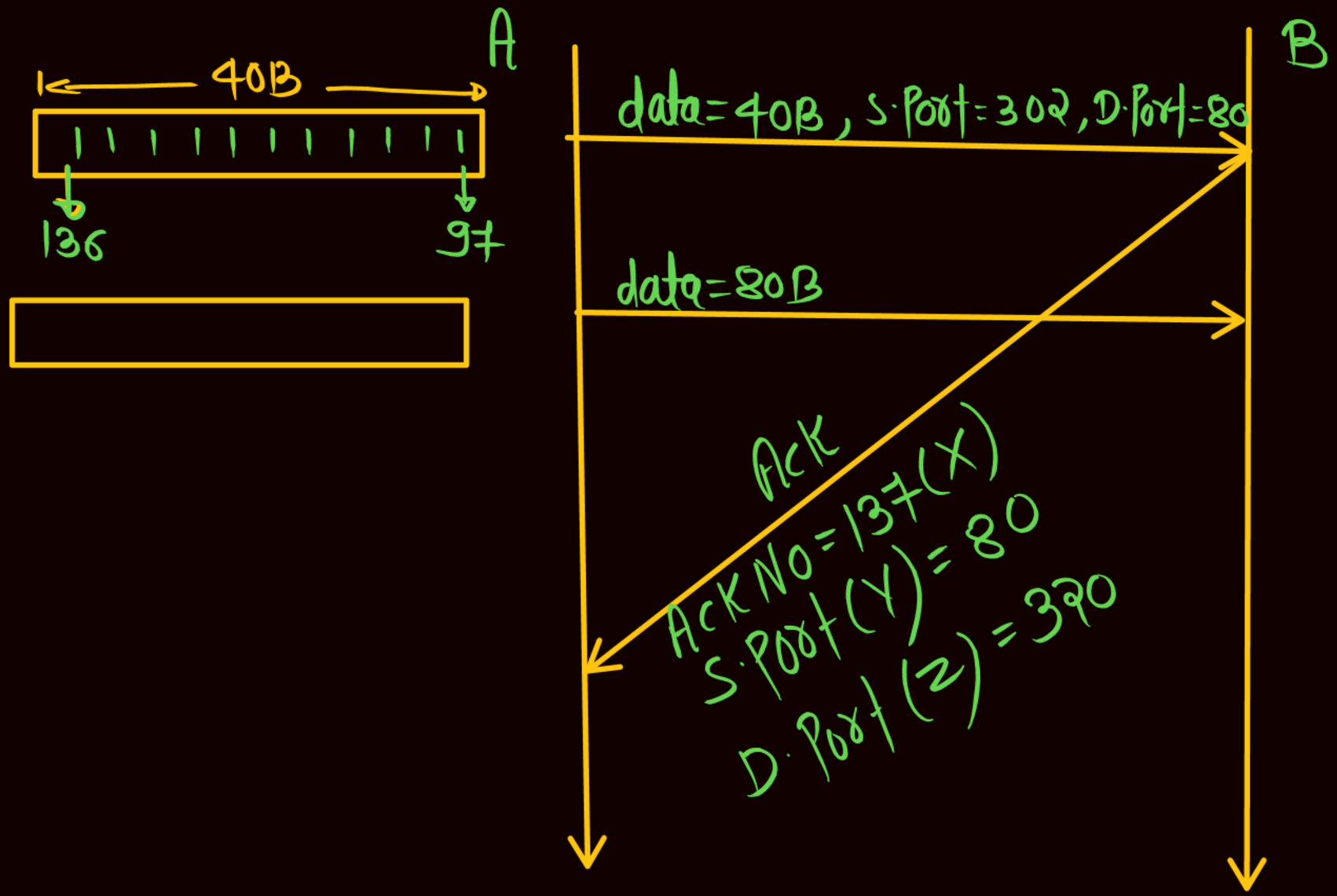
upto 96th Byte Already Received

A. Acknowledgement Number(X)=137

B. Source port number(Y)=80

C. Acknowledgement Number(X)=136

D. Destination port number(Z)=302


A
40B
136
97
B
data=40B, S.Port=302, D.Port=80
data=80B
Ack
AckNo=137(X)
S.Port(Y)=80
D.Port(Z)=390

Que: 1 Type : MCQ Positive Marks : 1 Negative Marks : 0.33

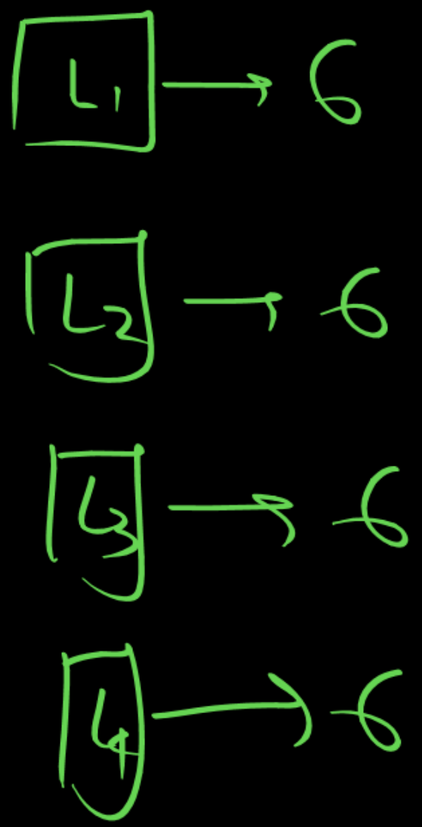
Q. In how many ways four letters can be posted in 6 post boxes, if each box can take any number letters?

A 1296

B 4096

C 96

D 24



$6 \times 6 \times 6 \times 6 = 1296$

Que: 2 | Type : MCQ | Positive Marks : 1 | Negative Marks : 0.33

Q. If the number 653ab is divisible by 90, then (a + b) =?

A 13

B 22

C 90

D 4

$0 \le a \le 9$

$0 \le b \le 9$

$$\frac{653ab}{90} = \frac{653ab}{9 \times 10}$$

$b = 0$ then divisible by 10

Divisible by '9' $\Rightarrow$ $6+5+3+a+b = 14+a$ (18)

$a = 4$

$a + b = 0 + 4 = 4$

Q. A ship sails out to a mark at the rate of 15 km per hour and sails back at the rate of 20 km/h. What is its average rate of sailing?

A 16.85 km/h

B 17.14 km/h

C 17.85 km/h

D 18 km/h

$$\text{Avarge} = \frac{2xy}{x+y}$$

$x = 15$ km/h

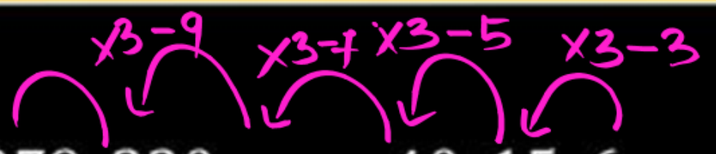
$y = 20$ km/h

$$= \frac{2 \times 15 \times 20}{15+20}$$

$$= 17.14 \text{ km/h}.$$

Que: 4 Type : MCQ Positive Marks : 1 Negative Marks : 0.33

Q. Find the missing term in the series: 979, 330, ____, 40, 15, 6



40X3-7

120-7=113

A 76

B 113

C 89

D 100

Que: 5 Type : MCQ Positive Marks : 1 Negative Marks : 0.33

Q. Choose the most appropriate word from the options given below to complete the following sentence:

I write a letter to you _____ tentatively the dates of the programme.

A Involving

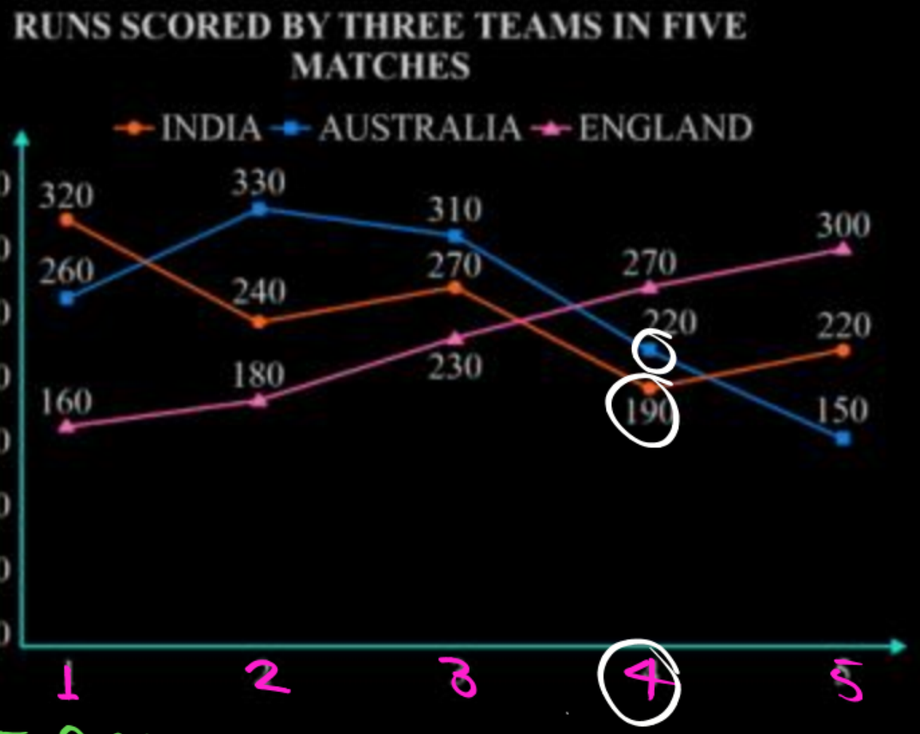
B Urging

C Guiding

D Indicating

AIR-23 → 01

Q. Based on the given graph, total runs scored by India and Australia in Match 4 together is approximately what percentage of the total runs scored by England in all the five matches together?



A 42%

B 18%

C 36%

D 24%

Math-4 I+A = 190+220
= 410

E = 160+180+230+270+300
= 1190

$\frac{410}{1190} \times 100 = 35.96\%$

Que: 7 Type : MCQ Positive Marks : 2 Negative Marks : 0.66

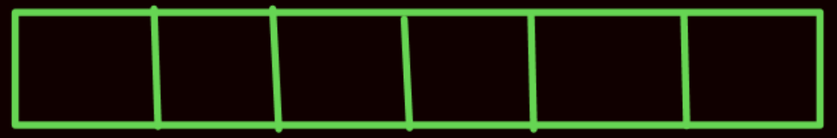
Q. In how many different ways can six players be arranged in a line such that two of them, Rohan and Sohan are never together?

(A) 720

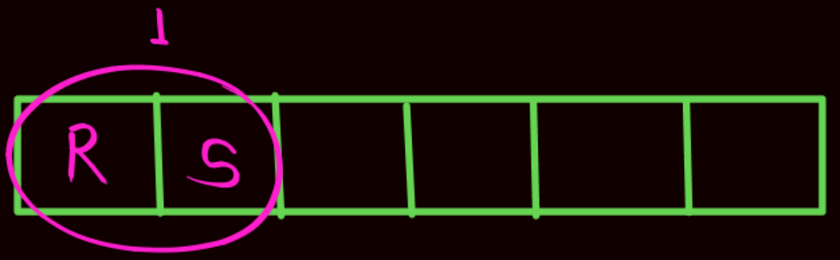
(B) 600

(C) 360

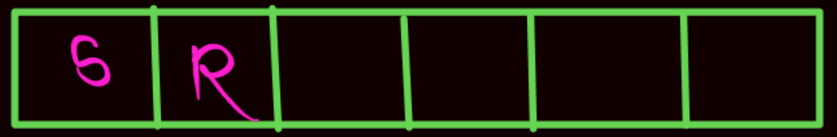
(D) 480



$6! = 720$



$5! = 120$



$5! = 120$

240

$720 - 240 = 480$

Que: 8 Type : MCQ Positive Marks : 2 Negative Marks : 0.66

Q. What is the maximum percentage discount (approximately) that a merchant can offer on his marked price, so that he ends up selling at no profit or loss, if he initially marked his goods up by 40%?

A 40%

B 60%

C 28.5%

D 33.5%

$C.P = x$

$M.P = 1.4x = S.P.$

$M.P = S.P$

$$\frac{1.4x - x}{1.4x} \times 100 = 28.5\%$$

Que: 9 Type : MCQ Positive Marks : 2 Negative Marks : 0.66

Q. Which word is not a synonym for the word "Wrath"?

A Disappointment

B Anger

C Happiness

D Argument

Q. The last day of a century can be which day?

31st dec

(A) Thursday ✗

(B) Tuesday ✗

(C) Saturday ✗

(D) Sunday ✓

100 ⟶ 5 odd Firday

200 ⟶ 3 odd Wednesday

300 ⟶ 1 odd Monday

400 ⟶ 0 odd Sunday

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Khaleel Ur Rehman Khan


Chandan Jha


Pankaj Sharma


Rahul Joshi


Mallesham Devsane


Satish Yadav


Vijay Kumar Agarwal

Q. R is a relations schema with the following FD's [AD→C, B→A, C→E, E→BD]
Which of the following is Not a candidate key of R?

A AE

$(AE)^+ = [AEBDC]$

$(A)^+ = (A)$

C BE

$(E)^+ = (EBDAC)$

E is Candidate key

B AB

$(AB)^+ = (AB)$

D CD

$(C)^+ = (CEBDA)$

C is CK

Any (A) (B) (C) & (D)

Q. Consider the following relations given below:

A

sno	pno
s1	p1
s1	p2
s1	p3
s1	p4
s2	p1
s2	p2
s3	p2
s4	p2
s4	p4

B1

pno
p2

B2

pno
p2
p4

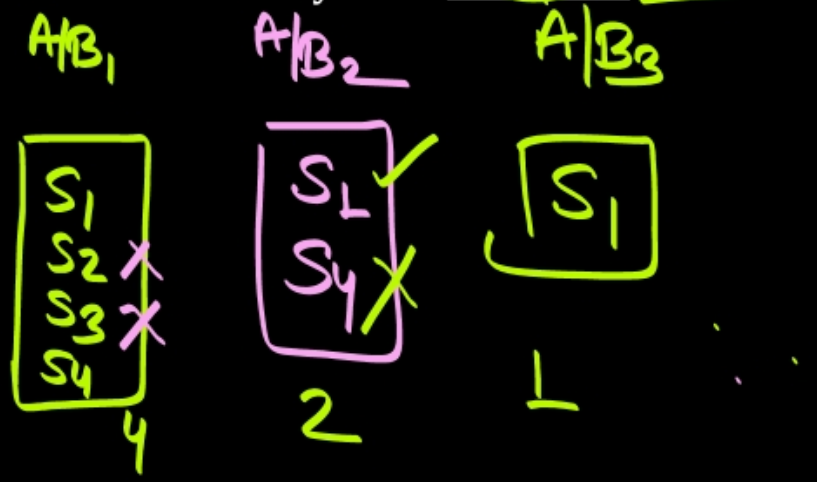
B3

pno
p1
p2
p4

The number of tuples return by A/B_1 is x.

The number of tuples return by A/B_2 is y.

The value of $x + y + z$ is _____?



Que: 3 | Type : NAT | Positive Marks : 1 | Negative Marks : 0

Q. Consider the following relational schema R(ABCDE) with functional dependencies:

{AB→C, C→D , D→E, E→A, D→B}

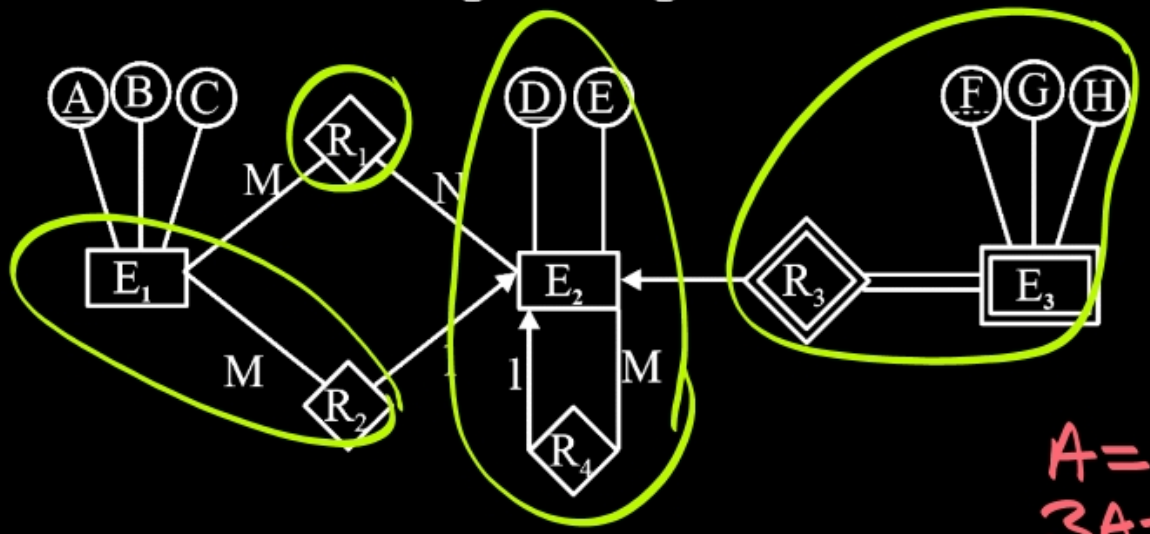
The number of additional relations are required to convert it into lossless join & Dependency Presenting 2NF Decomposition is X and number of additional relations are required to convert it into lossless join & Dependency Presenting 3NF Decomposition is Y, then the value of X+Y is _____ 0 Ans

Candidate key = [AB, EB, C, D]

Prime key Attribute = [A, B, C, D, E]

R is in 3NF

Q. Consider the following ER diagram



E_1R_2 (A B C D) FK & LF.K

R_1 (A D) & 2F.K

E_2R_4 (D E D) & LFK

R_3E_3 (F G H) & LFK

A = 4 B = 5

3A + 2B = 3×4 + 2×5 = 22

Let A is the minimum number of relational table required and B is the minimum number of foreign key required for conversion of ER into relational table then value of 3A + 2B is ____.

22 Ans

Q. Which of the following schedule is not allowed under basic time stamp protocol (TSP)

Transaction time stamps:

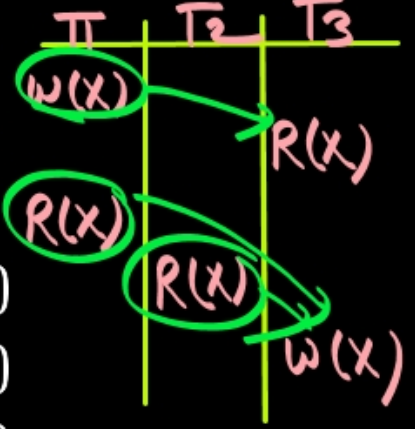
$T_1 = 10$
$T_2 = 20$
$T_3 = 30$

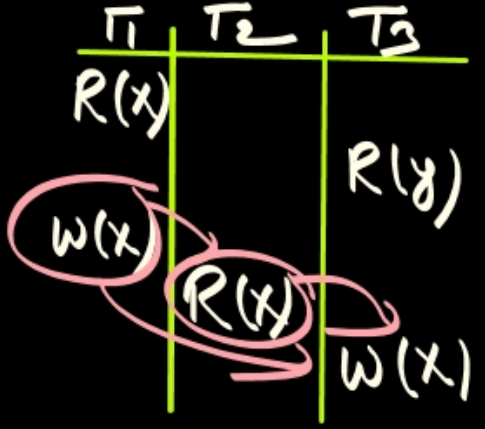
S_1: TSP $W_1(X); R_3(X); R_1(X); R_2(X); W_3(X)$

S_2: TSP $R_1(X); R_3(Y); W_1(X); R_2(X); W_3(X)$

S_3: $R_1(X); R_3(X); R_2(X); W_1(Y); W_3(Y)$

S_4: $R_3(X); R_2(Y); W_3(X); R_1(X); W_1(X)$





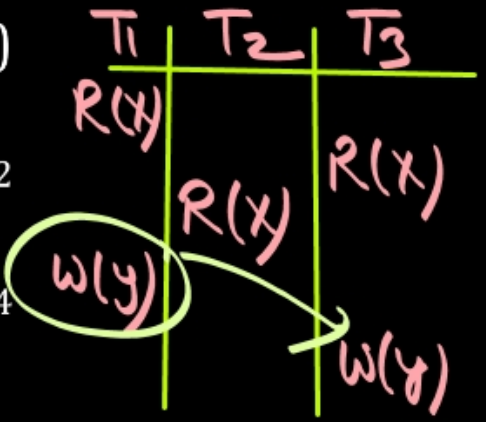
A S_1

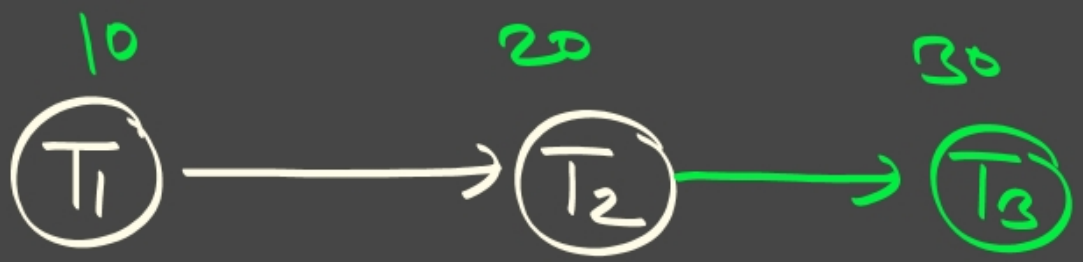
B S_2

C S_3

D S_4

S_4 : NOT TSP





All Conflict operation Must be executed in Same Order

Que: 6 | Type : NAT | Positive Marks : 2 | Negative Marks : 0

Q. If the block of size 1024 bytes is allocated for B tree or B^+ tree Index with block pointer size 14 byte. Record pointer size 11 bytes, search key size 16 bytes and order P defined maximum child pointer in B/B^+ tree index. The difference between the order of B^+ tree & B tree Internal node is_____.

B+Tree : Internal Node

$P*B_P + (P-1)key \le B.S$

$P*14 + (P-1)16 \le 1024$

$14P + 16P - 16 \le 1024$

$30P \le 1040$

$P \le \frac{1040}{30} \Rightarrow (34.3) = 34$

B Tree

$P*B_P + (P-1)[key + R_P] \le B.S$

$P*14 + (P-1)[16+11] \le 1024$

$14P + 27P - 27 \le 1024$

$41P \le 1051$

$P \le \left(\frac{1051}{41}\right) = 25$

$34 - 25 = 9$ Ans

Computer Organization & Architecture

Que: 1 **Type : NAT** **Positive Marks : 1** **Negative Marks : 0**

Q. A hypothetical DMA is designed to transfer the data from I/O Device to main memory under burst transfer mode. The count register size is 36 bits & get the control of the system buses 6 times then the maximum size of the data transferred by controller is (in Giga byte).

Count Register = 36 bit

DMA Can transfer in one time = 2^{36} Byte $\Rightarrow$ 64 GByte

Control on the System Bus = 6 times

Total Data transfer = 6 X 64 GByte

$\Rightarrow$ 384 GByte

Q. Consider a 32 bit register which stores floating numbers in IEEE single precision format. What is the value of the number, if 32 bit are given below?

bias = 127

Sign(1bit)	Exponent (8bit)	Mantissa (23 bit)
0	10000100 (E=132)	1101 0000 0000 0000 0000 000

$(-1)^S \perp.M \times 2^E \Rightarrow (-1)^S \perp.M \times 2^{E-bias}$

(A) 48 $(-1)^0 \perp.11010000 \times 2^{132-127}$

(B) 50

(C) 56 $+1.11010000 \times 2^5$

(D) None of these ✓

111010 = 58

Q. If a 8 way set associative cache is made up of 64 bit words. 8 words per line and 8192 sets. What is the size of cache memory?

A 1Mbyte

B 2Mbyte

C 4Mbyte

D 8Mbyte

Ans (C).

1 word = 64 bit = 8 Byte

Line (Block) Size = 8 word

Block Size = $8 \times 8B = 64Byte = 2^6$

$\#SET = \frac{\#Lines}{N\text{-ways}} \Rightarrow 8192 = \frac{\#Lines}{8\ way}$

$\#Lines = 8192 \times 8 \Rightarrow 2^{13} \times 2^3 = 2^{16}$ Lines

CM Size = # Lines (Block) x Line Size

$\Rightarrow 2^{16} \times 2^6 B$

$\Rightarrow 2^{22}$ Byte = 4MByte

Que: 4 | Type : NAT | Positive Marks : 2 | Negative Marks : 0

Q. The instruction pipeline of RISC processor has the following stages: Instruction fetch (IF), Instruction Decode(ID), Operand Fetch (OF), Perform Operation (PO), and Write Back (WB). The IF, ID, OF and WB stage takes 1 clock cycle each for every instruction. Consider a sequence of 100 instruction. In the PO stage 50 instruction takes 5 clock cycle each, 30 instruction takes 4 clock cycle and 20 instruction takes 3 clock cycle. Assume that there is no Data Hazard and no control Hazard. Then number of clock cycle required for completion of execution of the sequence of instruction is _____.

PO stage

$1+1+1+1+(50\times5+30\times4+20\times3)$

$4+(250+120+60)$

434 cycle Ans

$ET_{PIPE} = [k + (n-1)]\,cycle$

$\Rightarrow [5 + (100 - 1)]$

$= 104\ cycle$

Total ET $= 104 + 330$

$= 434\ cycle$ Ans

		Extra
50 Instn	5 cycle	4
30 Instn	4 cycle	3
20 Instn	3 cycle	2

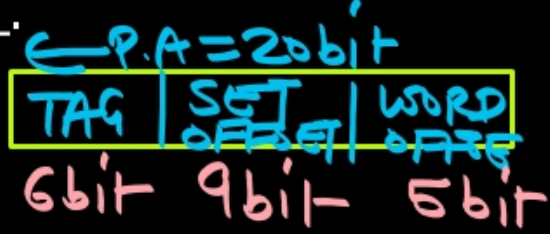
Total stalls $= 50 \times 4 + 30 \times 3 + 20 \times 2$

$200 + 90 + 40$

$= 330$

Que: 5 | Type : NAT | Positive Marks : 2 | Negative Marks : 0

Q. Consider the machine with a byte addressable main memory of 1 MB, block size of 32 bytes and 4-way set associative mapped cache having 2^{11} lines. Suppose there are two bytes in main memory i.e. First bytes $[EC5B4]_{16}$ and second byte $[D5C30]_{16}$ respectively. Then the difference of the set value (in Decimal) between given two bytes i.e. [Set value of second byte – Set value of 1st byte] is_____.



MEGA MOCK TEST GATE 2024

Que: 1 Type : MCQ Positive Marks : 1 Negative Marks : 0.33

Q. Which of the following is (are) true about virtual memory systems that use pages?

I. The virtual address space can be larger than the amount of physical memory.

II. Programs must be resident in main memory throughout their execution.

III. Pages correspond to semantic characteristics of the program.

Demand Paging

(A) I only

(B) II only

(C) I and II

(D) I and III

Que: 2 | Type : MSQ | Positive Marks : 1 | Negative Marks : 0

Q. A privileged instruction may be executed only while the hardware is in kernel mode. Which of the following is MOST likely to be a privileged instruction?

<BCD>

A ✗ An instruction that changes the value of the program counter

B ✓ An instruction that sends output to a printer

C ✓ An instruction that modifies a memory management register

D ✓ An instruction that reset the computer's time-of-day clock

Que: 3 **Type : NAT** **Positive Marks : 2** **Negative Marks : 0**

Q. Consider the following page reference string: 1, 2, 3, 4, 2, 1, 5, 6, 2, 1, 2, 3, 7, 6, 3, 2, 1
Assuming there are 4 page frames available and that all frames are initially empty, the total number of page faults that would occur for the page reference string above if the least-recently-used(LRU) replacement policy is _____ 10 ✓.

1	1	1	1	~~1~~	6			
2	2	2	2	2	2			
~~3~~	5	~~5~~	3	3	3			
4	~~4~~	6	~~6~~	7	7			

Que: 4 Type : MSQ Positive Marks : 2 Negative Marks : 0

Q. Which of the following best describes the difference between paging and segmentation?

<AB>

A. Paging breaks a process virtual memory into physical units of the same size, whereas segmentation breaks a process virtual memory into logical units that are typically of different sizes.

B. Paging suffers from internal fragmentation, whereas segmentation suffers from external fragmentation.

C. Paging requires page tables for address translation, whereas segmentation does not require segment tables for address translation.

D. Paging requires one page table per process, whereas segmentation requires only one global segment table for the entire system.

Que: 5 | Type : NAT | Positive Marks : 2 | Negative Marks : 0

Q. Consider three processes P1, P2 and P3 with respective arrival times of 0 ms, and 10 ms and 20 ms and respective processing times of 30 ms, 15 ms, and 30 ms. The three processes are preemptively scheduled on a single-CPU system using the shortest-remaining-processing-time-first scheduling policy. SRTF

The absolute difference of Avg. Waiting Time and Avg. Response Time is 5.

P.No	A.T	B.T
1	0	~~30~~ 20
2	10	~~15~~
3	20	30

SRTF

$$Av.WT = \frac{15+0+25}{3} = \frac{40}{3} = 13.33$$

$$Av.RT = \frac{0+0+25}{3} = 8.33$$

Algorithms

Que: 1 Type : MCQ Positive Marks : 1 Negative Marks : 0.33

Q. Which of the following algorithm has running time $\Theta(n^2)$ in the worst case but $\Theta(n \log n)$ on average?

A Bubble Sort n^2 ; n^2

B Merge Sort : $n\log n$; $n\log n$

C Heap Sort : $n\log n$; $n\log n$

D Quick Sort : n^2 ; $n\log n$

Que: 2 Type : MCQ Positive Marks : 1 Negative Marks : 0.33

Q. Mergesort works by splitting a list of n numbers in half, sorting each half recursively, and merging the two halves. Which of the following data structures will allow mergesort to work in O(n log n) time?

I. A singly linked list

II. A doubly linked list

III. An array (Traditional Impl.)

A) III only

B) I and II only

C) II and III only

D) I, II, and III

Que: 3 | Type : MCQ | Positive Marks : 2 | Negative Marks : 0.66

Q. Let T(n) be defined by T(1) = 7 and T(n+1) = 3n + T(n) for all integers n≥ 1. Which of the following represents the order of growth of T(n) as a function of n ?

A $\Theta(n)$

B $\Theta(n \log n)$

C $\Theta(n^2)$

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

$T(n) = T(n-1) + 3(n-1)$

$T(n) = T(n-1) + 3n - 3$

$\Theta(n^2)$

Q. Consider the following table:

Number : Item number
Weight : Weight of the item
Profit : Profit of the item

Greedy
Fractional
Knapsack

Number	Weight (kg)	Profit
1	10	100
2	12	200
3	16	128
4	12	144
5	13	190
6	15	90
7	20	190

Capacity of knapsack is 39 kg. If partially cut items are allowed in knapsack to maximize profit value then sum of the weights of item which are not selected at all ? 51.

Pi/Wi

$\frac{P_1}{w_1} = \frac{100}{10} = 10$

$\frac{P_2}{w_2} = \frac{200}{12} =$

$\frac{P_3}{w_3} = \frac{128}{16} =$

$\frac{P_4}{w_4} = \frac{144}{12}$

$\frac{P_5}{w_5} = \frac{190}{13}$

$\frac{P_6}{w_6} = \frac{90}{15}$

$\frac{P_7}{w_7} = \frac{190}{20}$

Q. The All Pairs Shortest Path Problem can be specified as follows.

Input:

Directed graph G(V, E), where V = {1, 2, ..., n}

Cost C(i, j) $\in$ R+ $\cup$ {∞} for all i, j $\in$ V, where C(i, j) = ∞ if and only if (i, j) $\notin$ E

Definition:

D(i, j) is the length of the shortest path from i to j for all i, j $\in$ V.

If there is no path from i to j, then D(i, j) = ∞.

If i = j, then D(i, j) = 0.

Problem:

Find D(i, j) for all i, j $\in$ V.

$$A^K(i,j) = \min_{1 \le K \le n} \left\{ A^{K-1}(i,j),\ A^{K-1}(i,k) + A^{K-1}(k,j) \right\}$$

The Floyd-Warshall algorithm gives a dynamic programming solution to the problem by defining an array A(k, i, j) for 0 $\le$ k $\le$ n and i, j $\in$ V by the following condition.

Que: **Type : NAT** **Positive Marks : 2** **Negative Marks : 0**

A(k, i, j) is the length of a shortest path from i to j such that all intermediate nodes on the path are in {1, 2, ..., k} (where on intermediate nodes are allowed if k = 0).

Then D(i, j) = A(n, i, j).

The algorithm computes A(k, i, j) using a recurrence on k, where the initial step is given as follows.

$A(0, i, j) = C(i, j)$ for all $i, j \in V$ such that $i \neq j$

$A(0, i, j) = 0$ for all $i \in V$

Que: Type : MCQ Positive Marks : 2 Negative Marks : 0.66

Which of the following is the general step in the recurrence, where $1 \le k \le n$?

A $A(k, i, j) = \min_{l<k} \{A(l, i, k) + A(l, k, j)\}$

B $A(k, i, j) = \min_{l<k} \{A(k-1, i, l) + A(k-1, l, j)\}$

C $A(k, i, j) = \min\{A(k-1, i, j), A(k-1, i, k) + A(k-1, k, j)\}$

D $A(k, i, j) = \min\{C(i, j), A(k, i, k) + A(k, k, j)\}$

thank you!