(44) ⟹

$\boxed{12}$

$$R = \begin{bmatrix} 1 & 2 & 4 & 8 \\ 1 & 3 & 9 & 27 \\ 1 & 4 & 16 & 64 \\ 1 & 5 & 25 & 125 \end{bmatrix}$$

Product of Eigen Value of R

Solⁿ

$$\begin{bmatrix} 1 & 2 & 4 & 8 \\ 0 & 3-2 & 3^2-2^2 & 3^3-2^3 \\ 0 & 4-2 & 4^2-2^2 & 4^3-2^3 \\ 0 & 5-2 & 5^2-2^2 & 5^3-2^3 \end{bmatrix}$$

$$= (3-2)(4-2)(5-2) \begin{bmatrix} \cancel{1} & \cancel{2} & \cancel{2^2} & \cancel{2^3} \\ \cancel{0} & 1 & 3+2 & 19 \\ \cancel{0} & 1 & 4+2 & 28 \\ \cancel{0} & 1 & 5+2 & 39 \end{bmatrix}$$

$$= 1 \times 2 \times 3 \times \begin{bmatrix} \cancel{1} & \cancel{5} & \cancel{19} \\ \cancel{0} & 1 & 9 \\ \cancel{0} & 2 & 20 \end{bmatrix}$$

$= 1 \times 2 \times 3 \times 2 \longrightarrow$ Eigen Values

$= 12$ Ans

(45) ⇒ Total time to transfer = 1+3+8 = 12 cycles

[160]

8 W ———— 12 cycles

8 × 4 bytes ———— 12 cycles

in 1 sec

$$= \frac{32\ B}{12 \times \left(\frac{1}{60} + 10^{-6}\right) sec}$$

$$= 160 \times 10^{6} \text{ bytes/sec}$$

Ans

(46) ⇒ T → 8 levels Full Binary Tree.

[4.857]

choose two leaf a & b at random.
Distance b/w a & b in T. is ——

Solⁿ

Select two node — $^{8}C_2 = 28$ ways

X	2	4	6
P(X)	4/28	8/28	16/28

$$E(X) = 2\left(\frac{4}{28}\right) + 4\left(\frac{8}{28}\right) + 6 \times \left(\frac{16}{28}\right)$$

$$= \frac{8+32+96}{28} = \frac{136}{28}$$

$$= 4.857$$

Ans

(47) Suppose Y distributed uniformly in the open interval $(1, 6)$. The probability that the polynomial $3x^2 + 6xY + 3Y + 6$ has only ~~real~~ real root is—

0.8

Sol^n

$$3x^2 + (6Y)x + (3Y+6)$$

$$b^2 - 4ac \geq 0$$

$$(6Y)^2 - 4 \times 3 \times (3Y+6) \geq 0$$

$$Y^2 - Y + 2 \geq 0$$

$$Y \in (-\infty, -1] \cap [2, \infty)$$

$$Y \in [2, 6)$$

Y distributed —— $(1, 6)$

$$f(Y) = 1/5, \qquad 1 < Y < 6$$

$$P(2 \leq Y < 6) = \int_2^6 f(Y)\,dy$$

$$= \frac{1}{5}[Y]_2^6$$

$$= \frac{4}{5}$$

$$= 0.8 \text{ Ans}$$

48 Σ is set of bijection - $\{1 --- 5\}$ to $\{1, --- 5\}$

$id(j) = j, \forall j$

120

$X = x_1 x_2 ---- x_n \in \Sigma^n, n \geq 0$

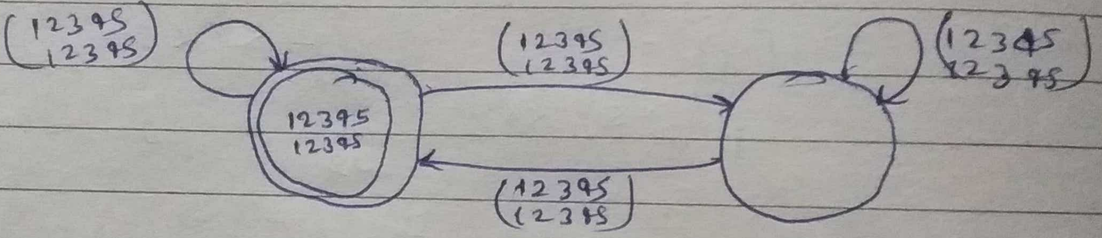
$\pi(x) = x_1 \circ x_2 \circ x_3 \circ ---- \circ x_n$

$L = \{x \in \Sigma^* \mid \pi(x) = id\}$

minimum no. of state in any DFA accept L -

Sol^n DFA accept L will have

$5! = 120$ Ans $\rightarrow$ States



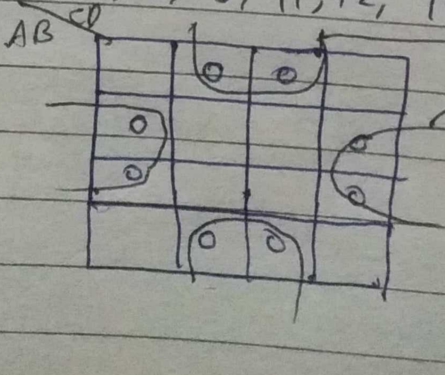
49

50 Minimum no. 2 i/p NOR gate —

3 Ans $f = \Sigma(0, 2, 5, 7, 8, 10, 13, 15)$?

Assume all element & their complement available -

Sol^n $F = \Pi(1, 3, 4, 6, 9, 11, 12, 14)$



$\rightarrow B + \bar{D}$

$\rightarrow \bar{B} + D$

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

$\rightarrow$ 3 NOR GATE

51 ⇒

5

Student

Roll_No.	Student_Name
1	Amit
2	Priya
3	Vinit
4	Rohan
5	Smita

Performance

Roll_No.	Sub-Code	Marks
1	A	86 ✓
1	B	95 ✓
1	C	90 ✓
2	A	89 ✓
2	C	92 ✓
3	C	80

SQL -

```
SELECT    S.Student_Name ,  sum(P. Marks)
FROM      Student  S,  Performance  P
WHERE     P. Marks  > 84
GROUP BY     S.Student_Name ;
```

Return no. of rows.

→ 5 Ans

52 ⇒

5

```
#include <stdio.h>
int main() {
      float sum = 0.0, j = 1.0, i = 2.0;
            where (i/j > 0.0625)
                  j = j + j;
                  sum = sum + i/j;
                  printf("%f \n", sum);
      } return 0; }
```

No. of times sum printed = 5 Ans

(53)

```c
# include <stdio.h>
int main()
{   int a[] = {2, 4, 6, 8, 10};
    int i, sum = 0, *b = a+4;
    for (i=0; i<5; i++)
        sum = sum + (*b-i) - *(b-i);
    printf("%f \n", sum);
    return 0;
}
```

(10)

O/P = 10 Ans

(54)

In an RSA, public modulus parameters $n = 3007$, $\phi(n) = 2880$, prime factor of n greater than 50

Sol^n

$n = p \times q = 3007$

$\phi(n) = (p-1)(q-1) = 2880$

Using RSA algo

$n = 31 \times 97 = 3007$

greater than 50 → ~~31~~ 97 ✓

So $\boxed{97}$ Ans

55 ⇒

1

P

X	Y	Z
x_1	y_1	z_1
x_1	y_1	z_{2_3}
x_2	$\boxed{y_2}$	z_2
x_2	y_4	z_4

Q

X	Y	T
x_2	y_4	2
x_1	y_2	5
x_1	y_1	6
x_3	y_3	1

R

Y	V
y_1	V_1
y_3	V_2
y_2	V_3
$\boxed{y_2}$	V_2

How many tuples returned

$$\Pi\left(\sigma_{(P.Y = R.Y \wedge R.V = V_2)}(P \times R)\right) - \Pi\left(\sigma_{(Q.Y = R.Y \wedge Q.T > 2)}(Q \times R)\right)$$

Sol^n

$$= \frac{X}{x_2} - \frac{X}{x_1}$$

$$\Rightarrow \frac{X}{x_2}$$

No of tuples in 1st is 1 Ans