

Among the integers from 1 to 300, how many are divisible by 3, but not by 5 nor by 7?

- a) 100 b) 14 c) 68 d) 138

Question Number : 3 Question Id : 4165297383 Question Type : MCQ Option Shuffling : No Display Question Number : Yes
Single Line Question Option : No Option Orientation : Vertical

Correct Marks : 2 Wrong Marks : 0

The question paper of Discrete Mathematics contains ten questions divided into two groups of five questions each. In how many ways can a candidate answer six questions taking at least two questions from each group.

- a) 50 b) 100 c) 150 d) 200

Question Number : 4 Question Id : 4165297384 Question Type : MCQ Option Shuffling : No Display Question Number : Yes
Single Line Question Option : No Option Orientation : Vertical

Correct Marks : 2 Wrong Marks : 0

In how many ways can a group of 4 boys and 4 girls be seated in a circular table so that no 2 boys are adjacent?

- a) 6 b) 24 c) 144 d) 36

Question Number : 5 Question Id : 4165297385 Question Type : MCQ Option Shuffling : No Display Question Number : Yes
Single Line Question Option : No Option Orientation : Vertical

Correct Marks : 2 Wrong Marks : 0

How many students must be there in a class to guarantee that at least 5 them receive the same score in an exam which is graded on the scale from 0 to 25 points?

- a) 105 b) 101 c) 125 d) 126

Question Number : 6 Question Id : 4165297386 Question Type : MCQ Option Shuffling : No Display Question Number : Yes
Single Line Question Option : No Option Orientation : Vertical

Correct Marks : 2 Wrong Marks : 0

In the poset $(P(\{a,b,c\}), \subseteq)$, the number of subsets non comparable to $\{a\}$ is

- a) 4 b) 3 c) 2 d) 1

Question Number : 7 Question Id : 4165297387 Question Type : MCQ Option Shuffling : No Display Question Number : Yes
Single Line Question Option : No Option Orientation : Vertical

Correct Marks : 2 Wrong Marks : 0

Among the relations 'not equal to' and 'less than' defined on the set Z of integers

- a) Both are partially ordered b) Only the second is partially ordered
c) Only the first one is partially ordered d) Both are not partially ordered

Question Number : 8 Question Id : 4165297388 Question Type : MCQ Option Shuffling : No Display Question Number : Yes
Single Line Question Option : No Option Orientation : Vertical

Correct Marks : 2 Wrong Marks : 0

In the lattice $\{1, 2, 4, 5, 10, 20\}$ with the relation 'divisibility', the complement of 10 is

- a) 2 b) 5 c) 4 d) does not exist

Question Number : 9 Question Id : 4165297389 Question Type : MCQ Option Shuffling : No Display Question Number : Yes
Single Line Question Option : No Option Orientation : Vertical

Correct Marks : 2 Wrong Marks : 0

If the function $f : Z_5 \rightarrow Z_5$ is defined by $f(x) = 2x$ then $f^{-1}(3)$ is

- a) 1 b) 2 c) 3 d) 4

Question Number : 10 Question Id : 4165297390 Question Type : MCQ Option Shuffling : No Display Question Number : Yes
Single Line Question Option : No Option Orientation : Vertical

Correct Marks : 2 Wrong Marks : 0

The relation R on the set of integers Z defined by $R = \{(x, y) : x \leq y + 1\}$ is

- a) symmetric
b) transitive
c) reflexive and transitive
d) reflexive

Question Number : 11 Question Id : 4165297391 Question Type : MCQ Option Shuffling : No Display Question Number : Yes
Single Line Question Option : No Option Orientation : Vertical

Correct Marks : 2 Wrong Marks : 0

For any two real numbers θ and ϕ , we define $\theta R \phi$ if and only if $\sec^2 \theta - \tan^2 \phi = 1$.

Then R is

- a) Reflexive
b) Transitive
c) Symmetric
d) All of the options

Question Number : 12 Question Id : 4165297392 Question Type : MCQ Option Shuffling : No Display Question Number : Yes
Single Line Question Option : No Option Orientation : Vertical

Correct Marks : 2 Wrong Marks : 0

There exists a simple graph with 7 vertices having the degree sequence (1, 3, 3, 4, 5, 6, 6).

- a) True
b) False

Question Number : 13 Question Id : 4165297393 Question Type : MCQ Option Shuffling : No Display Question Number : Yes
Single Line Question Option : No Option Orientation : Vertical

Correct Marks : 2 Wrong Marks : 0

A connected planar graph with 10 edges and 5 regions has _____ no. of vertices.

- a) 7
b) 8
c) 10
d) 5

Question Number : 14 Question Id : 4165297394 Question Type : MCQ Option Shuffling : No Display Question Number : Yes
Single Line Question Option : No Option Orientation : Vertical

Correct Marks : 2 Wrong Marks : 0

The number of pendant vertices in a binary tree with n vertices is

- a) $\frac{n+1}{2}$
b) $\frac{n-1}{2}$
c) $\frac{n(n+1)}{2}$
d) $\frac{n}{2}$

Question Number : 15 Question Id : 4165297395 Question Type : MCQ Option Shuffling : No Display Question Number : Yes
Single Line Question Option : No Option Orientation : Vertical

Correct Marks : 2 Wrong Marks : 0

The number of internal vertices of a complete binary tree T is 12. Then the number of pedant vertices of T is

- a) 11
b) 12
c) 13
d) 14

Question Number : 16 Question Id : 4165297396 Question Type : MCQ Option Shuffling : No Display Question Number : Yes
Single Line Question Option : No Option Orientation : Vertical

Correct Marks : 2 Wrong Marks : 0

The particular solution of the recurrence relation $a_{n+2} - 5a_{n+1} + 6a_n = 5^n$ is

- a) $\frac{5^n}{6}$
b) $\frac{5^n}{2}$
c) $\frac{5^{-n}}{6}$
d) 6.5^n

Question Number : 17 Question Id : 4165297397 Question Type : MCQ Option Shuffling : No Display Question Number : Yes
Single Line Question Option : No Option Orientation : Vertical

Correct Marks : 2 Wrong Marks : 0

The solution of the recurrence relation $a_{n+1} - 2a_n = 5, n \geq 0, a_0 = 1$ is

- a) $6.2^n - 5$ b) $5 - 6.2^n$ c) $2^{n+1} - 1$ d) $1 - 2^{n+1}$

Question Number : 18 Question Id : 4165297398 Question Type : MCQ Option Shuffling : No Display Question Number : Yes
Single Line Question Option : No Option Orientation : Vertical

Correct Marks : 2 Wrong Marks : 0

If $G(x)$ is the generating function for the sequence a_0, a_1, a_2, \dots , then $xG(x)$ is the generating function of

- a) a_1, a_2, a_3, \dots b) a_2, a_3, a_4, \dots c) $0, a_0, a_1, \dots$ d) $0, a_1, a_2, \dots$

Question Number : 19 Question Id : 4165297399 Question Type : MCQ Option Shuffling : No Display Question Number : Yes
Single Line Question Option : No Option Orientation : Vertical

Correct Marks : 2 Wrong Marks : 0

The sequence corresponding to the generating function $(3+x)^3$ is

- a) (9, 18, 18, 1, 0, 0, 0, ...) b) (27, 27, 9, 1, 0, 0, 0, ...)
c) (0, 0, 0, 27, 27, 9, ...) d) (1, 9, 27, 27, 0, 0, 0, ...)

Question Number : 20 Question Id : 4165297400 Question Type : MCQ Option Shuffling : No Display Question Number : Yes
Single Line Question Option : No Option Orientation : Vertical

Correct Marks : 2 Wrong Marks : 0

The closed form of the generating function of the sequence (0, 1, 0, 0, 1, 0, 0, 1, ...) is

- a) $\frac{x^3}{(1-x)}$ b) $\frac{x}{(1-x)^3}$ c) $\frac{1}{(1-x)^3}$ d) $\frac{(1-x)^3}{x}$

Question Number : 21 Question Id : 4165297401 Question Type : MCQ Option Shuffling : No Display Question Number : Yes
Single Line Question Option : No Option Orientation : Vertical

Correct Marks : 2 Wrong Marks : 0

If L_1 and L_2 are context free languages and R is a regular set, which one of the following languages are not necessarily a context free language?

- a) L_1L_2 b) $L_1 \cap L_2$ c) $L_1 \cup R$ d) $L_1 \cup L_2$

Question Number : 22 Question Id : 4165297402 Question Type : MCQ Option Shuffling : No Display Question Number : Yes
Single Line Question Option : No Option Orientation : Vertical

Correct Marks : 2 Wrong Marks : 0

If $L = \{a^n b^n : n \geq 0\}$ then L^2 is

- a) $\{a^n b^n a^n b^n : n \geq 0\}$ b) $\{a^{2n} b^{2n} : n \geq 0\}$
c) $\{a^n b^n a^m b^m : n, m \geq 0\}$ d) $\{a^n b^n : n \geq 0\}$

Question Number : 23 Question Id : 4165297403 Question Type : MCQ Option Shuffling : No Display Question Number : Yes
Single Line Question Option : No Option Orientation : Vertical

Correct Marks : 2 Wrong Marks : 0

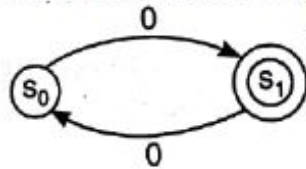
Let L denote the language generated by the grammar $S \rightarrow 0S0100$, then

- a) $L = 0^*$ b) L is context free but not regular
c) L is regular but not 0^* d) L is not context free

Question Number : 24 Question Id : 4165297404 Question Type : MCQ Option Shuffling : No Display Question Number : Yes
Single Line Question Option : No Option Orientation : Vertical

Correct Marks : 2 Wrong Marks : 0

The given transition diagram of a Finite Automata recognises the language



- a) $L = \{0^n : n \text{ is even}\}$ b) $L = \{0^{n+1} : n \geq 0\}$
c) $L = \{0^n : n \text{ is odd}\}$ d) $L = \{0\}^*$

Question Number : 25 Question Id : 4165297405 Question Type : MCQ Option Shuffling : No Display Question Number : Yes
Single Line Question Option : No Option Orientation : Vertical

Correct Marks : 2 Wrong Marks : 0

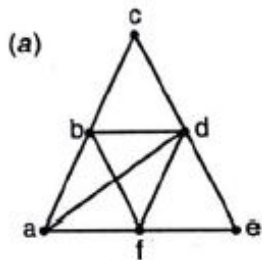
Let $L \subseteq \Sigma^*$ where $\Sigma = \{a, b\}$. Which of the following is true?

- a) $L = \{x : x \text{ has equal no. of } a\text{'s and } b\text{'s}\}$ is regular
b) $L = \{x : x \text{ has more no. of } a\text{'s than } b\text{'s}\}$ is regular
c) $L = \{a^n b^n : n > 1\}$ is regular
d) $L = \{a^m b^n : m \geq 1, n \geq 1\}$ is regular

Question Number : 26 Question Id : 4165297406 Question Type : MCQ Option Shuffling : No Display Question Number : Yes
Single Line Question Option : No Option Orientation : Vertical

Correct Marks : 2 Wrong Marks : 0

The given graph is



- a) Eulerian and Hamiltonian b) Eulerian but not Hamiltonian
c) Not Eulerian but Hamiltonian d) neither Eulerian nor Hamiltonian

Question Number : 27 Question Id : 4165297407 Question Type : MCQ Option Shuffling : No Display Question Number : Yes
Single Line Question Option : No Option Orientation : Vertical

Correct Marks : 2 Wrong Marks : 0

If a ring $(R, +, \cdot)$ is such that $a^2 = a, \forall a \in R$ then R is called a

- a) Integral domain b) Division ring c) Boolean ring d) Field

Question Number : 28 Question Id : 4165297408 Question Type : MCQ Option Shuffling : No Display Question Number : Yes
Single Line Question Option : No Option Orientation : Vertical

Correct Marks : 2 Wrong Marks : 0

In a ring $(Z_8, +_8, \times_8)$ the number of zero divisors are

- a) 3 b) 4 c) 5 d) 6

Question Number : 29 Question Id : 4165297409 Question Type : MCQ Option Shuffling : No Display Question Number : Yes
Single Line Question Option : No Option Orientation : Vertical

Correct Marks : 2 Wrong Marks : 0

Which of the following statements are true?

(i) Every field is an integral domain

(ii) In a finite field F , $a^2 + b^2 = 0 \Rightarrow a = 0, b = 0, \forall a, b \in F$.

(iii) The characteristic of an infinite ring is always zero.

(iv) Every field is a division ring

a) (i) and (ii) b) (ii) and (iii) c) (i) and (iv) d) (iii) and (iv)

Question Number : 30 Question Id : 4165297410 Question Type : MCQ Option Shuffling : No Display Question Number : Yes
Single Line Question Option : No Option Orientation : Vertical

Correct Marks : 2 Wrong Marks : 0

Which of the algebraic structures is a semi-group but not a group

a) $(\mathbb{N}, +)$ b) $(\mathbb{R}, +)$ c) $(\mathbb{Z}, +)$ d) $(\mathbb{C}, +)$

Question Number : 31 Question Id : 4165297411 Question Type : MCQ Option Shuffling : No Display Question Number : Yes
Single Line Question Option : No Option Orientation : Vertical

Correct Marks : 2 Wrong Marks : 0

If a cyclic group G contains 11 distinct elements, then it has how many generators?

a) 2 b) 7 c) 9 d) 10

Question Number : 32 Question Id : 4165297412 Question Type : MCQ Option Shuffling : No Display Question Number : Yes
Single Line Question Option : No Option Orientation : Vertical

Correct Marks : 2 Wrong Marks : 0

Index of a subgroup is 5 and its order is 3. The order of the group is

a) 3 b) 5 c) 15 d) 8

Question Number : 33 Question Id : 4165297413 Question Type : MCQ Option Shuffling : No Display Question Number : Yes
Single Line Question Option : No Option Orientation : Vertical

Correct Marks : 2 Wrong Marks : 0

Let $(G, *)$ is a group where the binary operation $*$ is defined as

$a * b = a + b + 3, \forall a, b \in G$. Then the inverse of $a \in G$ is given by

a) $-3 - a$ b) $3 - a$ c) $6 - a$ d) $-6 - a$

Question Number : 34 Question Id : 4165297414 Question Type : MCQ Option Shuffling : No Display Question Number : Yes
Single Line Question Option : No Option Orientation : Vertical

Correct Marks : 2 Wrong Marks : 0

There are four candidates A, B, C, D for president. Suppose A is twice as likely to be elected as B, B is three times as likely as C, and C and D are equally likely to be elected.

What is the probability that the candidate C is elected?

a) $\frac{1}{11}$ b) $\frac{6}{11}$ c) $\frac{3}{11}$ d) $\frac{2}{11}$

Question Number : 35 Question Id : 4165297415 Question Type : MCQ Option Shuffling : No Display Question Number : Yes
Single Line Question Option : No Option Orientation : Vertical

Correct Marks : 2 Wrong Marks : 0

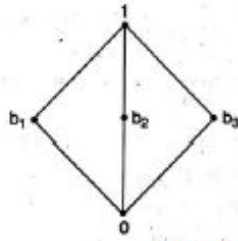
Which of the following sets under the relation 'divisibility' is a Boolean algebra?

a) D_{40} b) D_{385} c) D_{75} d) D_{60}

Question Number : 36 Question Id : 4165297416 Question Type : MCQ Option Shuffling : No Display Question Number : Yes
Single Line Question Option : No Option Orientation : Vertical

Correct Marks : 2 Wrong Marks : 0

The lattice given below is



- a) Modular and distributive
 b) Distributive but not modular
 c) Modular but not distributive
 d) Neither distributive nor modular

Question Number : 37 Question Id : 4165297417 Question Type : MCQ Option Shuffling : No Display Question Number : Yes Single Line Question Option : No Option Orientation : Vertical

Correct Marks : 2 Wrong Marks : 0

What logic function is produced by adding an inverter to the output of an AND gate?

- a) NOR
 b) NAND
 c) XOR
 d) OR

Question Number : 38 Question Id : 4165297418 Question Type : MCQ Option Shuffling : No Display Question Number : Yes Single Line Question Option : No Option Orientation : Vertical

Correct Marks : 2 Wrong Marks : 0

The number of two-input NAND gate required to produce two-input OR function is

- a) 1
 b) 2
 c) 3
 d) 4

Question Number : 39 Question Id : 4165297419 Question Type : MCQ Option Shuffling : No Display Question Number : Yes Single Line Question Option : No Option Orientation : Vertical

Correct Marks : 2 Wrong Marks : 0

The sum of products form of the Boolean expression $ab + bc'$ is

- a) $abc + abc' + a'bc'$
 b) $abc' + a'bc' + a'b'c'$
 c) $abc + abc' + a'b'c'$
 d) $abc' + a'bc' + a'b'c'$

Question Number : 40 Question Id : 4165297420 Question Type : MCQ Option Shuffling : No Display Question Number : Yes Single Line Question Option : No Option Orientation : Vertical

Correct Marks : 2 Wrong Marks : 0

Consider the set $A = \{2, 3, 6, 12, 24, 36\}$ with the relation 'divisibility'. The greatest and least element of this poset are respectively

- a) 2, 36
 b) 3, 24
 c) 2, 3
 d) does not exist

Question Number : 41 Question Id : 4165297421 Question Type : MCQ Option Shuffling : No Display Question Number : Yes Single Line Question Option : No Option Orientation : Vertical

Correct Marks : 2 Wrong Marks : 0

If $f : \mathbb{R} \rightarrow \mathbb{R}$ defined by $f(x) = \begin{cases} 3x-4, & x > 0 \\ -3x+2, & x \leq 0 \end{cases}$ then $f^{-1}(2)$ is

- a) $\{0\}$
 b) $\{2\}$
 c) $\{0, 2\}$
 d) \emptyset

Question Number : 42 Question Id : 4165297422 Question Type : MCQ Option Shuffling : No Display Question Number : Yes Single Line Question Option : No Option Orientation : Vertical

Correct Marks : 2 Wrong Marks : 0

The inverse of the permutation $\begin{pmatrix} 1 & 2 & 3 & 4 \\ 3 & 1 & 4 & 2 \end{pmatrix}$ is

- a) $\begin{pmatrix} 1 & 2 & 3 & 4 \\ 1 & 2 & 3 & 4 \end{pmatrix}$
 b) $\begin{pmatrix} 1 & 2 & 3 & 4 \\ 4 & 3 & 2 & 1 \end{pmatrix}$
 c) $\begin{pmatrix} 1 & 2 & 3 & 4 \\ 2 & 4 & 1 & 3 \end{pmatrix}$
 d) $\begin{pmatrix} 1 & 2 & 3 & 4 \\ 4 & 2 & 3 & 1 \end{pmatrix}$

Question Number : 43 Question Id : 4165297423 Question Type : MCQ Option Shuffling : No Display Question Number : Yes
Single Line Question Option : No Option Orientation : Vertical

Correct Marks : 2 Wrong Marks : 0

The solution of the recurrence relation $a_n = 4(a_{n-1} - a_{n-2})$ with the initial conditions

$a_0 = a_1 = 1$ is

- a) $(1-n)2^n$ b) $(1-\frac{1}{2}n)2^n$ c) $(1+n)2^n$ d) $(1+\frac{1}{2}n)2^n$

Question Number : 44 Question Id : 4165297424 Question Type : MCQ Option Shuffling : No Display Question Number : Yes
Single Line Question Option : No Option Orientation : Vertical

Correct Marks : 2 Wrong Marks : 0

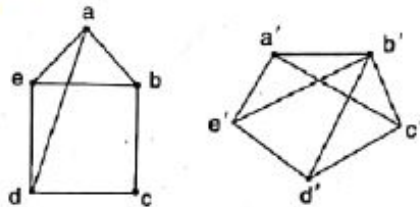
The function $\frac{2}{1-2x} + \frac{1}{1-x}$ generates the sequence $\{a_n\}$ where a_n is

- a) $2^{n+1} + 1$ b) $2^n + 1$ c) $2^{n+1} - 1$ d) $2^n - 1$

Question Number : 45 Question Id : 4165297425 Question Type : MCQ Option Shuffling : No Display Question Number : Yes
Single Line Question Option : No Option Orientation : Vertical

Correct Marks : 2 Wrong Marks : 0

The given graphs are isomorphic.



- a) True b) False

Question Number : 46 Question Id : 4165297426 Question Type : MCQ Option Shuffling : No Display Question Number : Yes
Single Line Question Option : No Option Orientation : Vertical

Correct Marks : 2 Wrong Marks : 0

The complexity of Fibonacci series is

- a) $O(2^n)$ b) $O(\log n)$ c) $O(n^2)$ d) $O(n \log n)$

Question Number : 47 Question Id : 4165297427 Question Type : MCQ Option Shuffling : No Display Question Number : Yes
Single Line Question Option : No Option Orientation : Vertical

Correct Marks : 2 Wrong Marks : 0

The type of grammar which consists of the following productions is

$S \rightarrow aA, A \rightarrow aAB, B \rightarrow b, A \rightarrow a.$

- a) Type 0 b) Type 1 c) Type 2 d) Type 3

Question Number : 48 Question Id : 4165297428 Question Type : MCQ Option Shuffling : No Display Question Number : Yes
Single Line Question Option : No Option Orientation : Vertical

Correct Marks : 2 Wrong Marks : 0

How many different numbers lying between 100 and 1000 can be formed with the digits

1, 2, 3, 4 and 5, no number being repeated?

- a) 240 b) 24 c) 120 d) 60

Question Number : 49 Question Id : 4165297429 Question Type : MCQ Option Shuffling : No Display Question Number : Yes
Single Line Question Option : No Option Orientation : Vertical

Correct Marks : 2 Wrong Marks : 0

Let $A = \{a, b, c, d\}$ and R is a relation on A whose matrix is $M_R = \begin{bmatrix} 1 & 0 & 0 & 0 \\ 0 & 1 & 1 & 0 \\ 0 & 1 & 1 & 0 \\ 0 & 0 & 0 & 1 \end{bmatrix}$.

Then R is

- a) Reflexive but not symmetric
- b) Reflexive and symmetric
- c) Symmetric but not reflexive
- d) Neither reflexive nor symmetric

Question Number : 50 Question Id : 4165297430 Question Type : MCQ Option Shuffling : No Display Question Number : Yes
Single Line Question Option : No Option Orientation : Vertical

Correct Marks : 2 Wrong Marks : 0

Every tree with two or more vertices is

- a) 0-chromatic
- b) 1-chromatic
- c) 2-chromatic
- d) 3-chromatic