National Testing Agency

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Algebra and Trigonometry

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Algebra and Trigonometry

Section Id :	416529103
Section Number :	1
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Group All Questions:	No

Sub-Section Number:	1
Sub-Section Id:	416529112
Question Shuffling Allowed :	Yes

Question Number : 1 Question Id : 4165298156 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 sets $A = \{1, 2, 3\}$ and $B = \{a, b\}$. The number of relations from A to B is ________________

(a) 6^2
(b) 6
(c) 12
(d) 2^6

Question Number : 2 Question Id : 4165298157 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 the relations R and S be represented by the matrices

$$M_R = \begin{bmatrix} 1 & 0 & 1 \\ 1 & 0 & 0 \\ 0 & 1 & 0 \end{bmatrix} \text{ and } M_S = \begin{bmatrix} 1 & 0 & 1 \\ 0 & 1 & 1 \\ 1 & 0 & 0 \end{bmatrix}.$$

Which are the matrices representing $R \cup S$ and $R \cap S$?

(a) $M_{R\cup S} = \begin{bmatrix} 1 & 1 & 1 \\ 1 & 0 & 1 \\ 1 & 1 & 0 \end{bmatrix}$ and $M_{R\cap S} = \begin{bmatrix} 1 & 0 & 1 \\ 0 & 0 & 0 \\ 0 & 0 & 0 \end{bmatrix}$

(b) $M_{R\cup S} = \begin{bmatrix} 1 & 0 & 1 \\ 1 & 1 & 1 \\ 1 & 1 & 0 \end{bmatrix}$ and $M_{R\cap S} = \begin{bmatrix} 1 & 1 & 1 \\ 0 & 1 & 0 \\ 0 & 0 & 0 \end{bmatrix}$

(c) $M_{R\cup S} = \begin{bmatrix} 1 & 0 & 1 \\ 1 & 1 & 0 \\ 1 & 1 & 0 \end{bmatrix}$ and $M_{R\cap S} = \begin{bmatrix} 1 & 0 & 1 \\ 0 & 0 & 0 \\ 0 & 0 & 0 \end{bmatrix}$

(d) $M_{R\cup S} = \begin{bmatrix} 1 & 0 & 1 \\ 1 & 1 & 1 \\ 1 & 1 & 0 \end{bmatrix}$ and $M_{R\cap S} = \begin{bmatrix} 1 & 0 & 1 \\ 0 & 0 & 0 \\ 0 & 0 & 0 \end{bmatrix}$

Question Number : 3 Question Id : 4165298158 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 $f : \square \to \square$ be defined by $f(x) = 2x - 3$. Then f^{-1} is given by the formula ________.

(a) $f^{-1}(x) = \dfrac{2}{x-3}$

(b) $f^{-1}(x) = \dfrac{2}{x+3}$

(c) $f^{-1}(x) = \dfrac{x-3}{2}$

(d) $f^{-1}(x) = \dfrac{x+3}{2}$

Question Number : 4 Question Id : 4165298159 Question Type : MCQ Option Shuffling : No Display Question Number : Yes
Single Line Question Option : No Option Orientation : Vertical

Correct Marks : 2 Wrong Marks : 0

With $n = 12$, in J_n, $[7]_{12} + [9]_{12} =$ ________________.

(a) $[16]_{12}$

(b) $[4]_{12}$

(c) $[28]_{12}$

(d) All of the options

Question Number : 5 Question Id : 4165298160 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 relation R from $A = \{1, 2, 3\}$ to $B = \{x, y, z\}$ given by $R = \{(1, x), (2, y), (3, z)\}$. Then R^{-1} is the relation from B to A given by ____________

(a) $R^{-1} = \{(x, 1), (y, 2), (z, 3)\}$.
(b) $R^{-1} = \{(x, 1), (z, 3)\}$.
(c) $R^{-1} = \{(x, 1), (y, 2)\}$.
(d) None of the option

Question Number : 6 Question Id : 4165298161 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 universal relation on a set A is ______________

(a) A
(b) $A \times A$
(c) Φ
(d) None of the option

Question Number : 7 Question Id : 4165298162 Question Type : MCQ Option Shuffling : No Display Question Number : Yes Single Line Question Option : No Option Orientation : Vertical
Correct Marks : 2 Wrong Marks : 0

R is a relation on a set A such that aRa for every $a \in A$. Then R is a ______________ relation.

(a) Symmetric Relation
(b) Transitive Relation
(c) Reflexive Relation
(d) Equivalence Relation

Question Number : 8 Question Id : 4165298163 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 relation $R = \{(1, 1), (1, 2), (2, 3), (4, 4)\}$ on the set $A = \{1, 2, 3, 4\}$. Then R is _______________

(a) reflexive
(b) symmetric,
(c) antisymmetric
(d) transitive

Question Number : 9 Question Id : 4165298164 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 R be the following equivalence relation on the set $A = \{1, 2, 3, 4, 5, 6\}$:

$R = \{(1, 1), (1, 5), (2, 2), (2, 3), (2, 6), (3, 2), (3, 3), (3, 6), (4,4),$
$(5, 1), (5, 5), (6, 2), (6, 3), (6, 6)\}$. Find the equivalence classes of R.

(a) $[\{1,5\}, \{2,3,6\}, \{4\}]$
(b) $[\{1\}, \{5\}, \{2,3,6\}, \{4\}]$
(c) limit doesn't exist
(d) None of these

Question Number : 10 Question Id : 4165298165 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 domain of the real-valued function $f(x) = \sqrt{25 - x^2}$ is ___________

(a) $\{x \in R : 0 \le x \le 5\}$
(b) $\{x \in R : -5 \le x \le 5\}$
(c) $\{x \in R : -5 \le x \le 0\}$
(d) $\{x \in R : 0 \le x \le 25\}$

Question Number : 11 Question Id : 4165298166 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 remainder obtained upon dividing the sum $1!+2!+3!+4!+\cdots+99!+100!$ by 12 is ______________.

(a) 6
(b) 7
(c) 8
(d) 9

Question Number : 12 Question Id : 4165298167 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 conjugate of the matrix $A=\begin{bmatrix} 7+2i & -i \\ 7 & 3-2i \end{bmatrix}$ is ________.

(a) $\overline{A}=\begin{bmatrix} 7-2i & -i \\ 7 & 3+2i \end{bmatrix}$

(b) $\overline{A}=\begin{bmatrix} 7-2i & i \\ 7 & 3+2i \end{bmatrix}$

(c) $\overline{A}=\begin{bmatrix} 7+2i & i \\ 7 & 3+2i \end{bmatrix}$

(d) None of the option

Question Number : 13 Question Id : 4165298168 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 cofactor of the element $a_{23} = 6$ in the matrix $A = \begin{bmatrix} 1 & 2 & 3 \\ 4 & 5 & 6 \\ 7 & 8 & 9 \end{bmatrix}$ is ________.

(a) -6
(b) 6
(c) 5
(d) None of the option

Question Number : 14 Question Id : 4165298169 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 is an orthogonal matrix, then ________

(a) $|A| = 0$

(b) $|A| = -1$

(c) $|A| = 1$

(d) $|A| = \pm 1$

Question Number : 15 Question Id : 4165298170 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 rank of the matrix $A = \begin{bmatrix} 1 & 2 & 3 \\ 2 & 4 & 6 \end{bmatrix}$ is ________

(a) 0
(b) 1
(c) 2
(d) 3

Question Number : 16 Question Id : 4165298171 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 one of the following is false.

(a) Interchange of a pair of columns does not change the rank.

(b) Multiplication of the elements of a column by any non-zero number does not change the rank.

(c) Addition to the elements of a column the product by any number k of the corresponding elements of any other column does not change the rank.

(d) None of the option

Question Number : 17 Question Id : 4165298172 Question Type : MCQ Option Shuffling : No Display Question Number : Yes Single Line Question Option : No Option Orientation : Vertical

Correct Marks : 2 Wrong Marks : 0

It is given that rank of the matrix

$$A = \begin{bmatrix} 2 & -2 & 0 & 6 \\ 4 & 2 & 0 & 2 \\ 1 & -1 & 0 & 3 \\ 1 & -2 & 1 & 2 \end{bmatrix}$$

is 3. Then its equivalent normal form is ________________.

(a) $\begin{bmatrix} I_2 & 0 \\ 0 & 0 \end{bmatrix}$

(b) $\begin{bmatrix} I_3 & 0 \\ 0 & 0 \end{bmatrix}$

(c) $\begin{bmatrix} I_4 & 0 \\ 0 & 0 \end{bmatrix}$

(d) $\begin{bmatrix} I_1 & 0 \\ 0 & 0 \end{bmatrix}$

Question Number : 18 Question Id : 4165298173 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 normal form of the matrix $A=\begin{bmatrix} 1 & 2 & 1 \\ -1 & 0 & 2 \\ 2 & 1 & -3 \end{bmatrix}$ is ______________

(a) $\begin{bmatrix} 1 & 0 & 0 \\ 0 & 1 & 0 \\ 0 & 0 & 1 \end{bmatrix}$

(b) $\begin{bmatrix} 1 & 0 & 0 \\ 0 & 1 & 0 \\ 0 & 0 & 0 \end{bmatrix}$

(c) $\begin{bmatrix} 1 & 0 & 0 \\ 0 & 0 & 0 \\ 0 & 0 & 1 \end{bmatrix}$

(d) $\begin{bmatrix} 1 & 0 & 0 \\ 1 & 1 & 0 \\ 0 & 0 & 1 \end{bmatrix}$

Question Number : 19 Question Id : 4165298174 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 is not in row echelon form.

(a) $\begin{bmatrix} 0 & 2 & 1 \\ 0 & 0 & 2 \\ 0 & 0 & 0 \end{bmatrix}$

(b) $\begin{bmatrix} 1 & 3 & 1 & 0 \\ 0 & 4 & 3 & 3 \\ 0 & 0 & 0 & 1 \end{bmatrix}$

(c) $\begin{bmatrix} 1 & 0 & 0 & 0 \\ 0 & 5 & 3 & 2 \\ 0 & 0 & 5 & 0 \\ 0 & 0 & 0 & 7 \end{bmatrix}$

(d) $\begin{bmatrix} 0 & 3 & 1 \\ 0 & 0 & 2 \\ 5 & 0 & 0 \end{bmatrix}$

Question Number : 20 Question Id : 4165298175 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 matrix $A = \begin{bmatrix} 7 & 2 & 1 \\ 0 & 3 & -1 \\ -3 & 4 & -2 \end{bmatrix}$ is ________________

(a) $A^{-1} = \begin{bmatrix} -2 & 8 & -5 \\ 3 & -11 & 7 \\ 9 & -34 & 21 \end{bmatrix}$

(b) $A^{-1} = \begin{bmatrix} -2 & 8 & -5 \\ 13 & -21 & 17 \\ 9 & -34 & 21 \end{bmatrix}$

(c) $A^{-1} = \begin{bmatrix} -2 & 8 & -5 \\ 3 & -11 & 7 \\ 19 & -4 & 20 \end{bmatrix}$

(d) $A^{-1} = \begin{bmatrix} 2 & -8 & -5 \\ 3 & -11 & 7 \\ 9 & -34 & 21 \end{bmatrix}$

Question Number : 21 Question Id : 4165298176 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 elementary matrix $E_{13}(k)$ obtained from the 4-square identity matrix is ___________

(a) $\begin{bmatrix} 1 & 0 & 0 & 0 \\ 0 & k & 0 & 0 \\ 0 & 0 & 1 & 0 \\ 0 & 0 & 0 & 1 \end{bmatrix}$

(b) $\begin{bmatrix} 1 & 0 & k & 0 \\ 0 & 1 & 0 & 0 \\ 0 & 0 & 1 & 0 \\ 0 & 0 & 0 & 1 \end{bmatrix}$

(c) $\begin{bmatrix} 1 & 0 & 0 & 0 \\ 0 & 1 & 0 & 0 \\ 0 & 0 & k & 0 \\ 0 & 0 & 0 & 1 \end{bmatrix}$

(d) None of the option

Question Number : 22 Question Id : 4165298177 Question Type : MCQ Option Shuffling : No Display Question Number : Yes Single Line Question Option : No Option Orientation : Vertical

Correct Marks : 2 Wrong Marks : 0

Suppose we have to multiply second row of a 3 x 3 matrix by 100. Then the elementary matrix that we need is

(a) $\begin{bmatrix} 1 & 0 & 0 \\ 0 & 1 & 0 \\ 0 & 0 & 100 \end{bmatrix}$

(b) $\begin{bmatrix} 1 & 0 & 0 \\ 0 & 100 & 0 \\ 0 & 0 & 1 \end{bmatrix}$

(c) $\begin{bmatrix} 100 & 0 & 0 \\ 0 & 1 & 0 \\ 0 & 0 & 1 \end{bmatrix}$

(d) None of the above.

Question Number : 23 Question Id : 4165298178 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 $\rho(A)$ denotes the rank of a matrix A, then $\rho(AB)$ is equal to:

(a) $\rho(A)$

(b) $\rho(B)$

(c) less than or equal to $\min\{\rho(A), \rho(B)\}$

(d) greater than $\min\{\rho(A), \rho(B)\}$

Question Number : 24 Question Id : 4165298179 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 non-homogeneous system of equations is not consistent?

(a) $2x+3y=5; \quad 2x+3y=7.$

(b) $2x+3y=5; \quad 2x-3y=-1.$

(c) $2x+3y=5; \quad 4x+6y=10.$

(d) $2x+3y=5; \quad 3x+2y=7.$

Question Number : 25 Question Id : 4165298180 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 $m \times n$ homogeneous linear system $AX = 0$, where $M = [A \;\; 0]$ is the augmented matrix then ______________

(a) rank (A) < rank (M)

(b) rank (A) > rank (M)

(c) rank (A) = rank (M)

(d) none of the above

Question Number : 26 Question Id : 4165298181 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 eigen values of the matrix $\begin{bmatrix} 3 & 0 & 0 \\ 5 & 4 & 0 \\ 3 & 6 & 1 \end{bmatrix}$ are _________

(a) 3, 3, 3
(b) 1, 3, 4
(c) 3, 3, 5
(d) 0, 4, 6

Question Number : 27 Question Id : 4165298182 Question Type : MCQ Option Shuffling : No Display Question Number : Yes Single Line Question Option : No Option Orientation : Vertical

Correct Marks : 2 Wrong Marks : 0

Fill in the blanks: If λ is a characteristic root of a non-singular matrix A, then __________ is a characteristic root of adj$A$.

(a) $\lambda|A|$

(b) $\frac{|A|}{\lambda}$

(c) $\lambda + |A|$

(d) $\lambda - |A|$

Question Number : 28 Question Id : 4165298183 Question Type : MCQ Option Shuffling : No Display Question Number : Yes Single Line Question Option : No Option Orientation : Vertical

Correct Marks : 2 Wrong Marks : 0

Pick the most appropriate answer to the following: Which of the following matrix satistfies its characteristic equation?

(a) $\begin{bmatrix} 2 & 1 & 1 \\ 3 & -1 & 3 \\ 2 & -1 & 1 \end{bmatrix}$

(b) $\begin{bmatrix} \sqrt{2} & 10 \\ 3 & -1 \end{bmatrix}$

(c) $\begin{bmatrix} 3 & -1 & 1 \\ -1 & -1 & 0 \\ 2 & 0 & -1 \end{bmatrix}$

(d) All the above.

Question Number : 29 Question Id : 4165298184 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 equation with rational coefficients, one of whose roots is $\sqrt{5}+\sqrt{2}$ is given by ______

(a) $x^4+14x^2+9=0.$
(b) $x^4-14x^2+9=0.$
(c) $x^4-14x^2-9=0.$
(d) $x^4+14x^2-9=0.$

Question Number : 30 Question Id : 4165298185 Question Type : MCQ Option Shuffling : No Display Question Number : Yes Single Line Question Option : No Option Orientation : Vertical

Correct Marks : 2 Wrong Marks : 0

Find out the false statement.

(a) If $\alpha, \beta, \gamma, \ldots$ are the roots of $f(x)=0$, then the roots of the equation $f(-x)=0$ are $-\alpha, -\beta, -\gamma, \ldots$

(b) If $\alpha_1, \alpha_2, \ldots, \alpha_n$ are the roots of the equation

$$a_0x^n + a_1x^{n-1} + \cdots + a_{n-1}x + a_n = 0 \text{ then } \sum \alpha_1\alpha_2 = \frac{a_2}{a_0}$$

(c) If $\alpha_1, \alpha_2, \ldots, \alpha_n$ are the roots of the equation $x^n + p_1x^{n-1} + p_2x^{n-2} + \cdots + p_n = 0$, then $\alpha_1 + \alpha_2 + \ldots + \alpha_n = -p_1$

(d) If $\alpha_1, \alpha_2, \ldots, \alpha_n$ are the roots of the equation $x^n + p_1x^{n-1} + p_2x^{n-2} + \cdots + p_n = 0$, then $\alpha_1 + \alpha_2 + \ldots + \alpha_n = p_1$

Question Number : 31 Question Id : 4165298186 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 α, β, γ are roots of $x^3 + px^2 + qx + r = 0$, then $\sum \frac{1}{\alpha} =$ ___________.

(a) qr

(b) $\frac{q}{r}$

(c) $-\frac{q}{r}$

(d) $-\frac{r}{q}$

Question Number : 32 Question Id : 4165298187 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 V be the set of all vectors in space. Then which of the following is not a binary operation on V.

(a) vector addition.

(b) vector subtraction.

(c) cross product of vectors.

(d) dot product of vectors.

Question Number : 33 Question Id : 4165298188 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 binary structure is isomorphic to $\langle \square_4, +_4 \rangle$

(a) $\langle U_4, \cdot \rangle$.

(b) $\langle \square_4, +_3 \rangle$

(c) $\langle \square_3, \times_3 \rangle$

(d) $\langle \square_4, \times_4 \rangle$

Question Number : 34 Question Id : 4165298189 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 subset of the complex numbers is a not subgroup under the operation addition of the group of complex numbers.

(a) the set of integers

(b) the set of pure imaginary numbers including 0

(c) the set $\{\pi^n : n \text{ is an integer}\}$

(d) the set of rational multiples of π

Question Number : 35 Question Id : 4165298190 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 one of the following statements is true.

(a). Every cyclic group of order >2 has at least two distinct generators

(b). Every abelian group is cyclic

(c). The set of rational numbers under addition is a cyclic group

(d). Every element of every cyclic group generates the group

Question Number : 36 Question Id : 4165298191 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 $\mu = \begin{pmatrix} 1 & 2 & 3 & 4 & 5 & 6 \\ 5 & 2 & 4 & 3 & 1 & 6 \end{pmatrix}$, then $\mu^{100} =$ __________.

(a). $\begin{pmatrix} 1 & 2 & 3 & 4 & 5 & 6 \\ 5 & 2 & 4 & 3 & 1 & 6 \end{pmatrix}$

(b). $\begin{pmatrix} 1 & 2 & 3 & 4 & 5 & 6 \\ 1 & 2 & 3 & 4 & 5 & 6 \end{pmatrix}$

(c). $\begin{pmatrix} 1 & 2 & 3 & 4 & 5 & 6 \\ 2 & 5 & 4 & 3 & 1 & 6 \end{pmatrix}$

(d). None of the above.

Question Number : 37 Question Id : 4165298192 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 order of the cycle (1, 4, 5, 7) in S_8 is ____________________ .

(a) 1

(b) 2

(c) 3

(d) 4.

Question Number : 38 Question Id : 4165298193 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 Z be the group of integers under the operation addition and $G = \{1, -1\}$ be the group under multiplication. Kernel of the homomorphism $\phi : Z \to G$ defined by

$$\phi(x) = \begin{cases} 1 & \text{if } x \text{ is even} \\ -1 & \text{if } x \text{ is odd} \end{cases}$$

is ____________.

(a) the set of integers

(b) the set of even integers

(c) $\{1\}$

(d) $\{1, -1\}$

Question Number : 39 Question Id : 4165298194 Question Type : MCQ Option Shuffling : No Display Question Number : Yes Single Line Question Option : No Option Orientation : Vertical

Correct Marks : 2 Wrong Marks : 0

Pick out the false statement:

(a) Multiplication in a field is commutative.

(b) Addition in every ring is commutative.

(c) Multiplication in every ring is commutative.

(d) Every element in a ring has an additive inverse.

Question Number : 40 Question Id : 4165298195 Question Type : MCQ Option Shuffling : No Display Question Number : Yes Single Line Question Option : No Option Orientation : Vertical

Correct Marks : 2 Wrong Marks : 0

$$\frac{e^{i\theta} - e^{-i\theta}}{2} = \_\_\_\_\_\_\_\_\_\_$$

(a) $\cos\theta$

(b) $\sin\theta$

(c) $i\cos\theta$

(d) $i\sin\theta$

Question Number : 41 Question Id : 4165298196 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 $(\sqrt{3}+i)^6 = x+iy$ then the values of x and y are ________

a) $x=-64,\ y=0$ b) $x=-64,\ y=1$

c) $x=-64,\ y=3$ d) None of the option

Question Number : 42 Question Id : 4165298197 Question Type : MCQ Option Shuffling : No Display Question Number : Yes Single Line Question Option : No Option Orientation : Vertical

Correct Marks : 2 Wrong Marks : 0

Pick the false statement.

(a) $\cosh(x+y)=\cosh x\cosh y+\sinh x\sinh y.$

(b) $\cosh(x-y)=\cosh x\cosh y-\sinh x\sinh y.$

(c) $\sinh(x+y)=\sinh x\cosh y+\cosh x\sinh y.$

(d) $\sinh(x-y)=\sinh x\cosh y+\cosh x\sinh y.$

Question Number : 43 Question Id : 4165298198 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 value of $\log_e i$ is ____________

(a) $\frac{i\pi}{2}$

(b) $-\frac{i\pi}{2}$

(c) $\frac{\pi}{2}$

(d) $-\frac{\pi}{2}$

Question Number : 44 Question Id : 4165298199 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 Maclaurin series of $\log(1+x)$ is ___________

(a) $x-\frac{x^2}{2}+\frac{x^3}{3}-\frac{x^4}{4}+\frac{x^5}{5}-\cdots$

(b) $-x-\frac{x^2}{2}+\frac{x^3}{3}-\frac{x^4}{4}+\frac{x^5}{5}-\cdots$

(c) $x+\frac{x^2}{2}+\frac{x^3}{3}+\frac{x^4}{4}+\frac{x^5}{5}+\cdots$

(d) $-x-\frac{x^2}{2}-\frac{x^3}{3}-\frac{x^4}{4}-\frac{x^5}{5}-\cdots$

Question Number : 45 Question Id : 4165298200 Question Type : MCQ Option Shuffling : No Display Question Number : Yes Single Line Question Option : No Option Orientation : Vertical

Correct Marks : 2 Wrong Marks : 0

$$\sum_{k=1}^{100} k = \_\_\_\_\_\_\_\_\_\_$$

a) 5050
b) 5000
c) 5500
d) None of the option

Question Number : 46 Question Id : 4165298201 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 field F, if $a, b \in F$ such that $a^2 = b^2$, then __________

(a) either $a = b$ or $a = -b$
(b) either $a = 0$ or $a = -b$
(c) either $a = b$ or $a = 0$
(d) None of the option

Question Number : 47 Question Id : 4165298202 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 Gaussian integer is a complex number $a + ib$, with a and b being integers.

The set of Gaussian integers is a ________________

(a) commutative ring with no unity

(b) ring with unity, but not commutative

(c) ring that is neither commutative nor has a unity

(d) commutative ring with unity

Question Number : 48 Question Id : 4165298203 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 $A = \begin{bmatrix} 1 & 0 & 0 \\ 1 & 0 & 1 \\ 0 & 1 & 0 \end{bmatrix}$, then $A^{20} =$ ________

(a) $\begin{bmatrix} 1 & 0 & 0 \\ 10 & 10 & 0 \\ 10 & 0 & 1 \end{bmatrix}$

(b) $\begin{bmatrix} 1 & 0 & 0 \\ -10 & 1 & 0 \\ -10 & 0 & 1 \end{bmatrix}$

(c) $\begin{bmatrix} -1 & 1 & 10 \\ 10 & 1 & 0 \\ 10 & 0 & 1 \end{bmatrix}$

(d) $\begin{bmatrix} 1 & 0 & 0 \\ 10 & 1 & 0 \\ 10 & 0 & 1 \end{bmatrix}$

Question Number : 49 Question Id : 4165298204 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 characteristic vectors of the matrix

$$A=\begin{bmatrix} a & h & g \\ 0 & b & 0 \\ 0 & 0 & c \end{bmatrix}$$

are

(a) the characteristic vector corresponding to the root $\lambda = a$ is $\begin{bmatrix} k_1 \\ 0 \\ 0 \end{bmatrix}$ (where k_1 is arbitrary),

the characteristic vector corresponding to the root $\lambda = b$ is $\begin{bmatrix} k_2 \\ \frac{b}{h}k_2 \\ 0 \end{bmatrix}$ (k_2 is arbitrary) and

the characteristic vector corresponding to the root $\lambda = c$ is $\begin{bmatrix} k_3 \\ 0 \\ \frac{(c-a)}{g}k_3 \end{bmatrix}$ (k_3 is arbitrary)

(b) the characteristic vector corresponding to the root $\lambda = a$ is $\begin{bmatrix} k_1 \\ 0 \\ 0 \end{bmatrix}$ (where k_1 is arbitrary), the characteristic vector corresponding to the root $\lambda = b$ is $\begin{bmatrix} k_2 \\ \frac{(b-a)}{h}k_2 \\ 0 \end{bmatrix}$ (k_2 is arbitrary) and the characteristic vector corresponding to the root $\lambda = c$ is $\begin{bmatrix} k_3 \\ 0 \\ \frac{c}{g}k_3 \end{bmatrix}$ (k_3 is arbitrary)

(c) the characteristic vector corresponding to the root $\lambda = a$ is $\begin{bmatrix} k_1 \\ 0 \\ 0 \end{bmatrix}$ (where k_1 is arbitrary),

the characteristic vector corresponding to the root $\lambda = b$ is $\begin{bmatrix} k_2 \\ \frac{b}{h}k_2 \\ 0 \end{bmatrix}$ (k_2 is arbitrary) and

the characteristic vector corresponding to the root $\lambda = c$ is $\begin{bmatrix} k_3 \\ 0 \\ \frac{c}{g}k_3 \end{bmatrix}$ (k_3 is arbitrary)

(d) the characteristic vector corresponding to the root $\lambda = a$ is $\begin{bmatrix} k_1 \\ 0 \\ 0 \end{bmatrix}$ (where k_1 is arbitrary), the characteristic vector corresponding to the root $\lambda = b$ is $\begin{bmatrix} k_2 \\ \frac{(b-a)}{h}k_2 \\ 0 \end{bmatrix}$ (k_2 is arbitrary) and the characteristic vector corresponding to the root $\lambda = c$ is $\begin{bmatrix} k_3 \\ 0 \\ \frac{(c-a)}{g}k_3 \end{bmatrix}$

(k_3 is arbitrary)

Question Number : 50 Question Id : 4165298205 Question Type : MCQ Option Shuffling : No Display Question Number : Yes Single Line Question Option : No Option Orientation : Vertical

Correct Marks : 2 Wrong Marks : 0

All the solutions of the equation $x^2 + 2x + 2 = 0$ in $\mathbb{Z}_6$ are ___________

(a). 1 and 2

(b). 0 and 1

(c). 2 and 3

(d). None of the option