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Modern Algebra

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Modern Algebra-1

Section Id :	512452909
Section Number :	1
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Mandatory or Optional :	Mandatory
Number of Questions :	100

Number of Questions to be attempted :	100
Section Marks :	100
Mark As Answered Required? :	Yes
Sub-Section Number :	1
Sub-Section Id :	5124521071
Question Shuffling Allowed :	Yes

Question Number : 1 Question Id : 51245219059 Question Type : MCQ Option Shuffling : No Is Question Mandatory : No Correct Marks : 1 Wrong Marks : 0

Pick the correct statement:

1. Set of natural under addition is semi group
2. Set of natural numbers under multiplication is monoid
3. Both (1) and (2)
4. Neither (1) nor (2)

Options :

51245262687. 1
51245262688. 2
51245262689. 3
51245262690. 4

Question Number : 2 Question Id : 51245219060 Question Type : MCQ Option Shuffling : No Is Question Mandatory : No Correct Marks : 1 Wrong Marks : 0

A set $\{1, \omega, \omega^2, \omega^3\}$ under multiplication is:

1. Abelian Group
2. Non-abelian group
3. Not a group
4. None of the above

Options :

51245262691. 1
51245262692. 2
51245262693. 3
51245262694. 4

Question Number : 3 Question Id : 51245219061 Question Type : MCQ Option Shuffling : No Is Question Mandatory : No Correct Marks : 1 Wrong Marks : 0

What is the inverse of an element a if $(\mathbb{Z}, *)$ is a group with $a * b = a + b + 1 \ \forall \ a, b \in \mathbb{Z}$?

1. -2
2. 0
3. -a-2
4. a-2

Options :
51245262695. 1
51245262696. 2
51245262697. 3
51245262698. 4

Question Number : 4 Question Id : 51245219062 Question Type : MCQ Option Shuffling : No Is Question Mandatory : No Correct Marks : 1 Wrong Marks : 0

Pick the wrong Statement:

1. The subset of even integers in the group of all integers $\mathbb{Z}$ under addition is a subgroup
2. Let $H = \{x \in \mathbb{R} : x = 1 \ or \ x \ is \ irrational\}$. Then H is a subgroup of $\mathbb{R}$
3. Let $H = \{x \in \mathbb{R}: x \geq 1\}$. Then H is not a subgroup of $\mathbb{R}$
4. Integer modulo n under addition modulo is not a subgroup of $\mathbb{Z}$ under addition

Options :
51245262699. 1
51245262700. 2

51245262701. 3
51245262702. 4

Question Number : 5 Question Id : 51245219063 Question Type : MCQ Option Shuffling : No Is Question Mandatory : No Correct Marks : 1 Wrong Marks : 0

Let K be a group with 8 elements. Let H be a subgroup of K and $H < K$. It is known that the size of H is at least 3. The size of H is,

1. 8
2. 2
3. 3
4. 4

Options :
51245262703. 1
51245262704. 2
51245262705. 3
51245262706. 4

Question Number : 6 Question Id : 51245219064 Question Type : MCQ Option Shuffling : No Is Question Mandatory : No Correct Marks : 1 Wrong Marks : 0

Let G be a simple group of order 168. What is the number of subgroups of G of order 7?

1. 1
2. 7
3. 8
4. 28

Options :
51245262707. 1
51245262708. 2
51245262709. 3
51245262710. 4

Question Number : 7 Question Id : 51245219065 Question Type : MCQ Option Shuffling : No Is Question Mandatory : No Correct Marks : 1 Wrong Marks : 0

Let G be a finite group with two sub groups M & N such that |M|=56 and |N|=123. Determine the value of |M∩N|

1. 1
2. 56
3. 14
4. 78

Options :

51245262711. 1
51245262712. 2
51245262713. 3
51245262714. 4

Question Number : 8 Question Id : 51245219066 Question Type : MCQ Option Shuffling : No Is Question Mandatory : No Correct Marks : 1 Wrong Marks : 0

Let $g \in G$ and g have order n. Then $g^k = e$ if and only if,

1. k divides n
2. n divides k
3. $n - 1$ divides k
4. k divides $n - 1$

Options :

51245262715. 1
51245262716. 2
51245262717. 3
51245262718. 4

Question Number : 9 Question Id : 51245219067 Question Type : MCQ Option Shuffling : No Is Question Mandatory : No Correct Marks : 1 Wrong Marks : 0

Every element of a group G has finite order. If G is,

1. Abelian
2. Non-abelian
3. Finite
4. Infinite

Options :

51245262719. 1
51245262720. 2
51245262721. 3
51245262722. 4

Question Number : 10 Question Id : 51245219068 Question Type : MCQ Option Shuffling : No Is Question Mandatory : No Correct Marks : 1 Wrong Marks : 0

If G is a finite abelian group of size n then,

1. $g^n = e$ for all $g \in G$
2. $g^n = e$ for exactly one $g \in G$
3. $g^{n-1} = e$ for all $g \in G$
4. None of the above

Options :

51245262723. 1
51245262724. 2
51245262725. 3
51245262726. 4

Question Number : 11 Question Id : 51245219069 Question Type : MCQ Option Shuffling : No Is Question Mandatory : No Correct Marks : 1 Wrong Marks : 0

Let G denotes the set of all $n \times n$ non-singular matrices with rational numbers as entries. Then under multiplication G is an,

1. Subgroup
2. Finite abelian group
3. Infinite, non-abelian group
4. Infinite, abelian group

Options :
51245262727. 1
51245262728. 2
51245262729. 3
51245262730. 4

Question Number : 12 Question Id : 51245219070 Question Type : MCQ Option Shuffling : No Is Question Mandatory : No Correct Marks : 1 Wrong Marks : 0

Which of the following is the smallest nonabelian group?

1. S_3
2. A_3
3. S_5
4. A_5

Options :
51245262731. 1
51245262732. 2
51245262733. 3
51245262734. 4

Question Number : 13 Question Id : 51245219071 Question Type : MCQ Option Shuffling : No Is Question Mandatory : No Correct Marks : 1 Wrong Marks : 0

A group contains the set of all invertible matrices having determinant one, such a group is called.....?

1. Special linear group
2. General linear group
3. Dihedral group
4. None of the above

Options :
51245262735. 1
51245262736. 2
51245262737. 3
51245262738. 4

Question Number : 14 Question Id : 51245219072 Question Type : MCQ Option Shuffling : No Is Question Mandatory : No Correct Marks : 1 Wrong Marks : 0

Pick the wrong statement,

1. $[a] \in \mathbb{Z}_n$ has a multiplicative inverse if and only if $(a, n) = 1$
2. $(a, b) = 1$ if and only if $ma + nb = 1$ for some integers m and n
3. $\mathbb{Z}_n$ has a multiplicative inverse if and only if n is a prime
4. $(\mathbb{Z}^*, \odot)$ is a group

Options :
51245262739. 1
51245262740. 2
51245262741. 3
51245262742. 4

Question Number : 15 Question Id : 51245219073 Question Type : MCQ Option Shuffling : No Is Question Mandatory : No Correct Marks : 1 Wrong Marks : 0

$[a]_n$

1. $\{ b \in \mathbb{Z} \mid n \mid b - a \}$
2. $\{b \in \mathbb{Z} \mid b = a + qn \; for \; some \; q \in \mathbb{Z} \}$
3. Both (1) and (2)
4. None of the above

Options :
51245262743. 1
51245262744. 2
51245262745. 3
51245262746. 4

Question Number : 16 Question Id : 51245219074 Question Type : MCQ Option Shuffling : No Is Question Mandatory : No Correct Marks : 1 Wrong Marks : 0

$(a, b) = 1$ if and only if, there exist two integers m, n such that,

1. $ma + nb = 1$
2. $ma - nb = 0$
3. $ma + nb = -1$
4. $ma - nb = -1$

Options :
51245262747. 1
51245262748. 2
51245262749. 3
51245262750. 4

Question Number : 17 Question Id : 51245219075 Question Type : MCQ Option Shuffling : No Is Question Mandatory : No Correct Marks : 1 Wrong Marks : 0

Demorvie's Theorem is,

1. $(cos\,\theta + isin\,\theta)^n = (cos\,\theta + isin\,\theta)$
2. $(cos\,\theta + isin\,\theta)^n = (cos\,n\theta - isin\,n\theta)$
3. $(cos\,\theta + isin\,\theta)^n = (ncos\,\theta + i\,nsin\,\theta)$
4. $(cos\,\theta + isin\,\theta)^n = (cos\,n\theta + isin\,n\theta)$

Options :

51245262751. 1
51245262752. 2
51245262753. 3
51245262754. 4

Question Number : 18 Question Id : 51245219076 Question Type : MCQ Option Shuffling : No Is Question Mandatory : No Correct Marks : 1 Wrong Marks : 0

$sin\,(\frac{\pi}{7})\,sin\,(\frac{2\pi}{7})\,sin\,(\frac{3\pi}{7}) =$

1. $\frac{\sqrt{7}}{2^5}$
2. $\frac{\sqrt{7}}{2^7}$
3. $\frac{\sqrt{7}}{2^3}$
4. $\frac{\sqrt{7}}{2^2}$

Options :

51245262755. 1
51245262756. 2
51245262757. 3
51245262758. 4

Question Number : 19 Question Id : 51245219077 Question Type : MCQ Option Shuffling : No Is Question Mandatory : No Correct Marks : 1 Wrong Marks : 0

Let ω be the nth root of unity. Then pick the wrong statement:

1. $1 + z + \cdots + z^{n-2} + z^{n-1} = (z - \omega)(z - \omega^2) \cdots (z - \omega^{n-1})$
2. $\overline{\omega^i} = \omega^{n-i}$ where $1 \leq i \leq n - 1$
3. $1, \omega, \omega^2, \ldots, \omega^{n-1}$ are roots of $z^n = 1$
4. None of the above

Options :
51245262759. 1
51245262760. 2
51245262761. 3
51245262762. 4

Question Number : 20 Question Id : 51245219078 Question Type : MCQ Option Shuffling : No Is Question Mandatory : No Correct Marks : 1 Wrong Marks : 0

The number of generators of the cyclic group of order 219 is,

1. 144
2. 124
3. 56
4. 218

Options :
51245262763. 1
51245262764. 2
51245262765. 3
51245262766. 4

Question Number : 21 Question Id : 51245219079 Question Type : MCQ Option Shuffling : No Is Question Mandatory : No Correct Marks : 1 Wrong Marks : 0

Consider the following statements,

Statement A: All cyclic groups are Abelian.

Statement B: The order of a cyclic group is the same as the order of its Generator.

Choose the correct statement.

1. Both A and B are false
2. A is true, B is false
3. B is true, A is false
4. A and B are true

Options :
51245262767. 1
51245262768. 2
51245262769. 3
51245262770. 4

Question Number : 22 Question Id : 51245219080 Question Type : MCQ Option Shuffling : No Is Question Mandatory : No Correct Marks : 1 Wrong Marks : 0

Let G be a finite group of order. Pick correct statement

1. If d divides n, there exist a subgroup of G of order d.
2. If d divides n, there exist an element of order d
3. If every proper subgroup of G is cyclic, then G is cyclic.
4. None of the above

Options :
51245262771. 1
51245262772. 2
51245262773. 3

51245262774. 4

Question Number : 23 Question Id : 51245219081 Question Type : MCQ Option Shuffling : No Is Question Mandatory : No Correct Marks : 1 Wrong Marks : 0

$|GL(n, \mathbb{Z}_p)| =$

1. $\prod_{k=1}^{n-1}(p^n - p^k)$
2. $\prod_{k=0}^{n-1}(p^n - p^k)$
3. $\prod_{k=0}^{n}(p^n - p^k)$
4. $\prod_{k=1}^{n}(p^n - p^k)$

Options :

51245262775. 1
51245262776. 2
51245262777. 3
51245262778. 4

Question Number : 24 Question Id : 51245219082 Question Type : MCQ Option Shuffling : No Is Question Mandatory : No Correct Marks : 1 Wrong Marks : 0

$GL(n, \mathbb{R})$ is nonabelian for,

1. $n > 2$
2. $n \geq 1$
3. $n \geq 2$
4. $n > 3$

Options :

51245262779. 1

51245262780. 2

51245262781. 3

51245262782. 4

Question Number : 25 Question Id : 51245219083 Question Type : MCQ Option Shuffling : No Is Question Mandatory : No Correct Marks : 1 Wrong Marks : 0

If A be an invertible matrix and inverse of $7A$ is $\begin{bmatrix} -1 & 2 \\ 4 & 7 \end{bmatrix}$ then matrix A is,

1. $\begin{bmatrix} -1 & \frac{2}{7} \\ \frac{4}{7} & \frac{1}{7} \end{bmatrix}$
2. $\begin{bmatrix} 7 & 2 \\ 4 & 1 \end{bmatrix}$
3. $\begin{bmatrix} 1 & -\frac{4}{7} \\ -\frac{2}{7} & \frac{1}{7} \end{bmatrix}$
4. $\begin{bmatrix} 7 & 4 \\ 2 & 1 \end{bmatrix}$

Options :

51245262783. 1

51245262784. 2

51245262785. 3

51245262786. 4

Question Number : 26 Question Id : 51245219084 Question Type : MCQ Option Shuffling : No Is Question Mandatory : No Correct Marks : 1 Wrong Marks : 0

The order of A_n is,

1. $\frac{n!}{3}$
2. $\frac{n!}{n}$
3. $\frac{n!}{2}$
4. $\frac{n!}{2n}$

Options :

51245262787. 1
51245262788. 2
51245262789. 3
51245262790. 4

Question Number : 27 Question Id : 51245219085 Question Type : MCQ Option Shuffling : No Is Question Mandatory : No Correct Marks : 1 Wrong Marks : 0

The permutation $\begin{bmatrix} 1 & 2 & 3 & 4 & 5 & 6 & 7 & 8 & 9 \\ 2 & 3 & 4 & 5 & 1 & 6 & 7 & 9 & 8 \end{bmatrix}$

1. Has 7 transposition
2. Has 4 transposition
3. Is even permutation
4. Is odd permutation

Options :

51245262791. 1
51245262792. 2
51245262793. 3
51245262794. 4

Question Number : 28 Question Id : 51245219086 Question Type : MCQ Option Shuffling : No Is Question Mandatory : No Correct Marks : 1 Wrong Marks : 0

The index of A_n in S_n is,

1. 2
2. 1
3. 3
4. 0

Options :
51245262795. 1
51245262796. 2
51245262797. 3
51245262798. 4

Question Number : 29 Question Id : 51245219087 Question Type : MCQ Option Shuffling : No Is Question Mandatory : No Correct Marks : 1 Wrong Marks : 0

For $n \geq 2, S_n$ is generated by _____transpositions.

1. n-2
2. n
3. n-1
4. n-3

Options :
51245262799. 1
51245262800. 2
51245262801. 3
51245262802. 4

Question Number : 30 Question Id : 51245219088 Question Type : MCQ Option Shuffling : No Is Question Mandatory : No Correct Marks : 1 Wrong Marks : 0

The generating set of infinite abelian matrix group $G = \left\{\begin{pmatrix} a & b \\ 0 & 1 \end{pmatrix} : a = +1, -1, b \in \mathbb{Z}\right\}$ is,

1. $\left\{\begin{pmatrix} -1 & 0 \\ 0 & 1 \end{pmatrix}, \begin{pmatrix} 1 & 0 \\ 0 & -1 \end{pmatrix}\right\}$
2. $\left\{\begin{pmatrix} 1 & -1 \\ 0 & 1 \end{pmatrix}, \begin{pmatrix} 1 & 0 \\ 0 & 1 \end{pmatrix}\right\}$
3. $\left\{\begin{pmatrix} 1 & 1 \\ 0 & 1 \end{pmatrix}, \begin{pmatrix} -1 & 0 \\ 0 & 1 \end{pmatrix}\right\}$
4. $\left\{\begin{pmatrix} -1 & -1 \\ 0 & 1 \end{pmatrix}, \begin{pmatrix} -1 & 1 \\ 0 & 1 \end{pmatrix}\right\}$

Options :
51245262803. 1
51245262804. 2
51245262805. 3
51245262806. 4

Question Number : 31 Question Id : 51245219089 Question Type : MCQ Option Shuffling : No Is Question Mandatory : No Correct Marks : 1 Wrong Marks : 0

The elements of order 5 in S_7 are,

1. 120
2. 21
3. 504
4. 24

Options :
51245262807. 1
51245262808. 2
51245262809. 3
51245262810. 4

Question Number : 32 Question Id : 51245219090 Question Type : MCQ Option Shuffling : No Is Question Mandatory : No Correct Marks : 1 Wrong Marks : 0

Size of the generating set $(ij)'s$ of , $S_n, n \geq 3$

1. $(n-1)(n-2)$
2. $\frac{n(n-1)}{2}$
3. $n-1$
4. $n(n-1)(n-2)$

Options :

51245262811. 1
51245262812. 2
51245262813. 3
51245262814. 4

Question Number : 33 Question Id : 51245219091 Question Type : MCQ Option Shuffling : No Is Question Mandatory : No Correct Marks : 1 Wrong Marks : 0

Generating set of $SL_2(\mathbb{Z})$ is,

1. $\left\{\begin{pmatrix}-1 & 0\\ 0 & -1\end{pmatrix}, \begin{pmatrix}1 & 1\\ 0 & 1\end{pmatrix}\right\}$
2. $\left\{\begin{pmatrix}-1 & 0\\ 0 & 0\end{pmatrix}, \begin{pmatrix}1 & -1\\ 0 & 1\end{pmatrix}\right\}$
3. $\left\{\begin{pmatrix}0 & -1\\ 1 & 0\end{pmatrix}, \begin{pmatrix}1 & 1\\ 0 & 1\end{pmatrix}\right\}$
4. $\left\{\begin{pmatrix}-1 & 0\\ 1 & -1\end{pmatrix}, \begin{pmatrix}-1 & 1\\ 0 & 1\end{pmatrix}\right\}$

Options :

51245262815. 1
51245262816. 2
51245262817. 3
51245262818. 4

Question Number : 34 Question Id : 51245219092 Question Type : MCQ Option Shuffling : No Is Question Mandatory : No Correct Marks : 1 Wrong Marks : 0

Let $(H,*)$ be a subgroup of $(G,*)$ then which of the following is incorrect?

1. Ha and aH both are subsets of G for $a \in G$.
2. $a \in H \Leftrightarrow aH = H$
3. If G is non-Abelian then every subgroup of G is non-Abelian
4. None of the above

Options :
51245262819. 1
51245262820. 2
51245262821. 3
51245262822. 4

Question Number : 35 Question Id : 51245219093 Question Type : MCQ Option Shuffling : No Is Question Mandatory : No Correct Marks : 1 Wrong Marks : 0

If $H = \{0, 3\}$ and $G = (\mathbb{Z}_6, +_6)$ then how many distinct left cosets of H in G?

1. 1
2. 2
3. 3
4. 4

Options :
51245262823. 1
51245262824. 2
51245262825. 3
51245262826. 4

Question Number : 36 Question Id : 51245219094 Question Type : MCQ Option Shuffling : No Is Question Mandatory : No Correct Marks : 1 Wrong Marks : 0

If H is a subgroup of G then H is normal in G, if

1. H is a subgroup of index 3 in G
2. H is a subgroup of index 5 in G
3. H is a subgroup of index 7 in G
4. H is a subgroup of index 2 in G

Options :
51245262827. 1
51245262828. 2
51245262829. 3
51245262830. 4

Question Number : 37 Question Id : 51245219095 Question Type : MCQ Option Shuffling : No Is Question Mandatory : No Correct Marks : 1 Wrong Marks : 0

Let a mapping $f: G \to G$ defined by $f(x) = x^{-1}$, then which of the following is true,

1. f is injective
2. f is surjective
3. f is homomorphism as well as automorphism
4. None of the above

Options :
51245262831. 1
51245262832. 2
51245262833. 3
51245262834. 4

Question Number : 38 Question Id : 51245219096 Question Type : MCQ Option Shuffling : No Is Question Mandatory : No Correct Marks : 1 Wrong Marks : 0

Find the total number of non-isomorphic abelian group of order 32?

1. 5
2. 6
3. 7
4. 8

Options :

51245262835. 1
51245262836. 2
51245262837. 3
51245262838. 4

Question Number : 39 Question Id : 51245219097 Question Type : MCQ Option Shuffling : No Is Question Mandatory : No Correct Marks : 1 Wrong Marks : 0

A group is complete if,

1. $Z(G) = \{e\}$
2. $G \cong In(G) \cong Aut(G)$
3. $Z(G) = \{e\}\ and\ G \cong In(G) \cong Aut(G)$
4. None of the above

Options :

51245262839. 1
51245262840. 2
51245262841. 3
51245262842. 4

Question Number : 40 Question Id : 51245219098 Question Type : MCQ Option Shuffling : No Is Question Mandatory : No Correct Marks : 1 Wrong Marks : 0

The normal subgroups of a simple group G are:

1. {e}, Where e is the identity element of G
2. G
3. Both (1) and (2)
4. None of the above

Options :
51245262843. 1
51245262844. 2
51245262845. 3
51245262846. 4

Question Number : 41 Question Id : 51245219099 Question Type : MCQ Option Shuffling : No Is Question Mandatory : No Correct Marks : 1 Wrong Marks : 0

A subgroup H of a group G is said to be normal subgroup of G if $\forall\, a \in G \; and \; \forall\, h \in H$ such that,

1. $xHx^{-1} \in H$
2. $xHx^{-1} = H$
3. $xH = Hx$
4. All of the above

Options :
51245262847. 1
51245262848. 2
51245262849. 3
51245262850. 4

Question Number : 42 Question Id : 51245219100 Question Type : MCQ Option Shuffling : No Is Question Mandatory : No Correct Marks : 1 Wrong Marks : 0

Pick the correct statement,

1. $SL_n(R) \not\lhd GL_n(R)$
2. The intersection of a family of normal subgroups is need not be normal
3. $In(G) \lhd Aut(G)$
4. None of the above

Options :
51245262851. 1
51245262852. 2
51245262853. 3
51245262854. 4

Question Number : 43 Question Id : 51245219101 Question Type : MCQ Option Shuffling : No Is Question Mandatory : No Correct Marks : 1 Wrong Marks : 0

Let $\phi : GL_n(\mathbb{R}) \to \mathbb{R} \setminus \{0\}$, $\phi(A) = det\ (A)$. Then $Ker\ (\phi)$:

1. Zero Matrix
2. $GL_n(\mathbb{R})$
3. $SL_n(\mathbb{R})$
4. Identity Matrix

Options :
51245262855. 1
51245262856. 2
51245262857. 3
51245262858. 4

Question Number : 44 Question Id : 51245219102 Question Type : MCQ Option Shuffling : No Is Question Mandatory : No Correct Marks : 1 Wrong Marks : 0

Let G be a group of order 72 and H be a normal subgroup of order 6. Denote the quotient group by G/H

1. G/H has order 24
2. G/H has order 12
3. The number of left coset of H in G is 12
4. None of the above

Options :
51245262859. 1
51245262860. 2
51245262861. 3
51245262862. 4

Question Number : 45 Question Id : 51245219103 Question Type : MCQ Option Shuffling : No Is Question Mandatory : No Correct Marks : 1 Wrong Marks : 0

Let G be a group and let H and K be normal subgroups of G with $H \leq K$. Then,

1. $K/H \trianglelefteq G/H$ and $\cong (G/H)/(K/H) \cong G/K$.
2. $K/H \trianglelefteq G/H$ or $(G/H)/(K/H) \cong G/K$.
3. $K/H \trianglelefteq G/H$ or $\cong (G/H)/(K/H) \cong G/K$
4. $K/H \trianglelefteq G/H$ and $(G/H)/(K/H) \cong G/K$

Options :
51245262863. 1
51245262864. 2
51245262865. 3
51245262866. 4

Question Number : 46 Question Id : 51245219104 Question Type : MCQ Option Shuffling : No Is Question Mandatory : No Correct Marks : 1 Wrong Marks : 0

The quotient of a cyclic group G is,

1. Cyclic
2. Non-abelian
3. Non-cyclic
4. None of the above

Options :
51245262867. 1
51245262868. 2
51245262869. 3
51245262870. 4

Question Number : 47 Question Id : 51245219105 Question Type : MCQ Option Shuffling : No Is Question Mandatory : No Correct Marks : 1 Wrong Marks : 0

Conjugacy classes of S_3 is,

1. {(1)}
2. {(123), (132)}
3. {(12), (13), (23)}
4. All of the above

Options :
51245262871. 1
51245262872. 2
51245262873. 3
51245262874. 4

Question Number : 48 Question Id : 51245219106 Question Type : MCQ Option Shuffling : No Is Question Mandatory : No Correct Marks : 1 Wrong Marks : 0

Class equation of D_4 is

1. 2+2+4
2. 1+1+2+2+2
3. 2+2+2+2
4. 1+1+1+1+2+2

Options :
51245262875. 1
51245262876. 2
51245262877. 3
51245262878. 4

Question Number : 49 Question Id : 51245219107 Question Type : MCQ Option Shuffling : No Is Question Mandatory : No Correct Marks : 1 Wrong Marks : 0

Number of Conjugate class of D_{11}

1. 5
2. 7
3. 3
4. 1

Options :
51245262879. 1
51245262880. 2
51245262881. 3
51245262882. 4

Question Number : 50 Question Id : 51245219108 Question Type : MCQ Option Shuffling : No Is Question Mandatory : No Correct Marks : 1 Wrong Marks : 0

$N(a)$ =

1. $\{x \in G / xa \neq ax\}$
2. $\{x \in G / xa = 1\}$
3. $\{x \in G / xa \neq 1\}$
4. None of the above

Options :
51245262883. 1
51245262884. 2
51245262885. 3
51245262886. 4

Question Number : 51 Question Id : 51245219109 Question Type : MCQ Option Shuffling : No Is Question Mandatory : No Correct Marks : 1 Wrong Marks : 0

Let G be a finite Abelian group of order 75. Then $G = H \times K$, where

1. $H = \{x \in G / x^{75} = e\}$ and $K = \{x \in G / x^{125} = x\}$
2. $H = \{x \in G / x^{75} = e\}$ and $K = \{x \in G / x^{125} = e\}$
3. $H = \{x \in G / x^{25} = e\}$ and $K = \{x \in G / x^{125} = e\}$
4. $H = \{x \in G / x^{25} = e\}$ and $K = \{x \in G / x^{125} = x\}$

Options :
51245262887. 1
51245262888. 2
51245262889. 3
51245262890. 4

Question Number : 52 Question Id : 51245219110 Question Type : MCQ Option Shuffling : No Is Question Mandatory : No Correct Marks : 1 Wrong Marks : 0

Let G be a finite Abelian group of order 18. Then:

1. $G = H/K$ and $|H| = 9$.
2. $G = H \times K$ and $|H| = 18$.
3. $G = H / K$ and $|H| = 18$
4. $G = H \times K$ and $|H| = 9$.

Options :
51245262891. 1
51245262892. 2
51245262893. 3
51245262894. 4

Question Number : 53 Question Id : 51245219111 Question Type : MCQ Option Shuffling : No Is Question Mandatory : No Correct Marks : 1 Wrong Marks : 0

D_4 is isomorphic to:

1. A proper subgroup of S_4
2. S_4
3. Quaternion group
4. S_3

Options :
51245262895. 1
51245262896. 2
51245262897. 3
51245262898. 4

Question Number : 54 Question Id : 51245219112 Question Type : MCQ Option Shuffling : No Is Question Mandatory : No Correct Marks : 1 Wrong Marks : 0

Let S_n denote the permutation group of n symbols and A_n be the subgroup of even permutations. Which of the following is true?

1. There exists a finite group which is not a subgroup of S_n for any $n \geq 1$.
2. Every finite group is a subgroup of A_n for some $n \geq 1$
3. Every finite group is a quotient of A_n for some $n \geq 1$
4. No finite abelian group is a quotient of S_n for any $n > 3$

Options :
51245262899. 1
51245262900. 2
51245262901. 3
51245262902. 4

Question Number : 55 Question Id : 51245219113 Question Type : MCQ Option Shuffling : No Is Question Mandatory : No Correct Marks : 1 Wrong Marks : 0

The algebraic structure which is not a ring is:

1. $(\mathbb{Z}, +, .)$
2. $(\mathbb{Q}, +, .)$
3. Set of all odd integers under usual addition and multiplication
4. Set of all even integers under usual addition and multiplication

Options :
51245262903. 1
51245262904. 2
51245262905. 3
51245262906. 4

Question Number : 56 Question Id : 51245219114 Question Type : MCQ Option Shuffling : No Is Question Mandatory : No Correct Marks : 1 Wrong Marks : 0

$(\mathbb{Z}_{12}, \oplus, \odot)$ is

1. An integral domain but not a field
2. A field but not an integral domain
3. Both an integral domain and a field
4. Neither an integral domain nor a field

Options :
51245262907. 1
51245262908. 2
51245262909. 3
51245262910. 4

Question Number : 57 Question Id : 51245219115 Question Type : MCQ Option Shuffling : No Is Question Mandatory : No Correct Marks : 1 Wrong Marks : 0

The characteristic of a Boolean ring is:

1. 0
2. 1
3. 2
4. infinity

Options :
51245262911. 1
51245262912. 2
51245262913. 3
51245262914. 4

Question Number : 58 Question Id : 51245219116 Question Type : MCQ Option Shuffling : No Is Question Mandatory : No Correct Marks : 1 Wrong Marks : 0

An example of a non-commutative ring with identity is:

1. $(\mathbb{Z}, +, .)$
2. $(2\mathbb{Z}, +, .)$
3. Set of all real numbers under usual addition and multiplication
4. Set of all 2×2 matrices under matrix addition and multiplication

Options :
51245262915. 1
51245262916. 2
51245262917. 3
51245262918. 4

Question Number : 59 Question Id : 51245219117 Question Type : MCQ Option Shuffling : No Is Question Mandatory : No Correct Marks : 1 Wrong Marks : 0

The set of integers $\mathbb{Z}$ is NOT

1. An integral domain
2. A commutative ring
3. A field
4. A ring with identity

Options :
51245262919. 1
51245262920. 2
51245262921. 3
51245262922. 4

Question Number : 60 Question Id : 51245219118 Question Type : MCQ Option Shuffling : No Is Question Mandatory : No Correct Marks : 1 Wrong Marks : 0

In the ring $M_2(\mathbb{R})$, which of the following is TRUE?

1. $\begin{pmatrix} 1 & 1 \\ 1 & 1 \end{pmatrix}$ is a unit
2. $\begin{pmatrix} 0 & 0 \\ 0 & 0 \end{pmatrix}$ is a unit
3. $\begin{pmatrix} 2 & 4 \\ 2 & 4 \end{pmatrix}$ is a unit
4. $\begin{pmatrix} 4 & 2 \\ 2 & 4 \end{pmatrix}$ is a unit

Options :
51245262923. 1
51245262924. 2
51245262925. 3
51245262926. 4

Question Number : 61 Question Id : 51245219119 Question Type : MCQ Option Shuffling : No Is Question Mandatory : No Correct Marks : 1 Wrong Marks : 0

Number of nonzero zero divisors of any field is:

1. 0
2. 2
3. 3
4. 5

Options :
51245262927. 1
51245262928. 2
51245262929. 3
51245262930. 4

Question Number : 62 Question Id : 51245219120 Question Type : MCQ Option Shuffling : No Is Question Mandatory : No Correct Marks : 1 Wrong Marks : 0

The value of ij in quaternion ring is equal to:

1. 1
2. -1
3. k
4. -k

Options :
51245262931. 1
51245262932. 2
51245262933. 3
51245262934. 4

Question Number : 63 Question Id : 51245219121 Question Type : MCQ Option Shuffling : No Is Question Mandatory : No Correct Marks : 1 Wrong Marks : 0

Let $f: G \to G'$ be a homomorphism. Then,

1. f is 1-1 iff $\ker f = \{e\}$
2. f is onto iff $\ker f = \{e\}$
3. f is 1-1 iff $\ker f = G$
4. f is an isomorphism iff $ker\, f = \{e\}$

Options :
51245262935. 1
51245262936. 2
51245262937. 3
51245262938. 4

Question Number : 64 Question Id : 51245219122 Question Type : MCQ Option Shuffling : No Is Question Mandatory : No Correct Marks : 1 Wrong Marks : 0

Let R be a commutative ring. Then for all $a, b \in R$, which of the following is TRUE?

1. $(a+b)^2 = a^2 + 2ab + b^2$
2. $(a+b)^2 = a^2 + b^2$
3. $(a-b)^2 = a^2 - b^2$
4. None of the above

Options :
51245262939. 1
51245262940. 2
51245262941. 3
51245262942. 4

Question Number : 65 Question Id : 51245219123 Question Type : MCQ Option Shuffling : No Is Question Mandatory : No Correct Marks : 1 Wrong Marks : 0

An example of an isomorphism from $\mathbb{Q} \to \mathbb{Q}$ is:

1. $f(x) = x \; \forall \; x \in \mathbb{Q}$
2. $f(x) = 0 \; \forall \; x \in \mathbb{Q}$
3. $f(x) = x^2 \; \forall \; x \in \mathbb{Q}$
4. $f(x) = 1 + x^2 \; \forall \; x \in \mathbb{Q}$

Options :
51245262943. 1
51245262944. 2
51245262945. 3
51245262946. 4

Question Number : 66 Question Id : 51245219124 Question Type : MCQ Option Shuffling : No Is Question Mandatory : No Correct Marks : 1 Wrong Marks : 0

The characteristic of the ring Z_{11} is:

1. 0
2. 1
3. 11
4. 121

Options :
51245262947. 1
51245262948. 2
51245262949. 3
51245262950. 4

Question Number : 67 Question Id : 51245219125 Question Type : MCQ Option Shuffling : No Is Question Mandatory : No Correct Marks : 1 Wrong Marks : 0

Which of the following is a finite commutative ring with identity?

1. $(\mathbb{Z}_4, \oplus, \odot)$
2. $(\mathbb{Z}, +, .)$
3. $(M_2(\mathbb{R}), +, .)$
4. $(M_3(\mathbb{Z}_6), +, .)$

Options :
51245262951. 1
51245262952. 2
51245262953. 3
51245262954. 4

Question Number : 68 Question Id : 51245219126 Question Type : MCQ Option Shuffling : No Is Question Mandatory : No Correct Marks : 1 Wrong Marks : 0

A finite commutative ring without zero divisors may not be a/an:

1. Field
2. Skew field
3. Integral Domain
4. PID

Options :
51245262955. 1
51245262956. 2
51245262957. 3
51245262958. 4

Question Number : 69 Question Id : 51245219127 Question Type : MCQ Option Shuffling : No Is Question Mandatory : No Correct Marks : 1 Wrong Marks : 0

Which of the following is CORRECT?

1. Every integral domain is a field
2. Every field is an integral domain
3. Every integral domain is a principal ideal domain
4. Every integral domain is a skew field

Options :
51245262959. 1
51245262960. 2
51245262961. 3
51245262962. 4

Question Number : 70 Question Id : 51245219128 Question Type : MCQ Option Shuffling : No Is Question Mandatory : No Correct Marks : 1 Wrong Marks : 0

Which of the following is CORRECT?

1. $\mathbb{Z}_5$ is a field
2. $\mathbb{Z}_{15}$ is a field
3. $\mathbb{Z}$ is a field
4. $M_2(\mathbb{R})$ is a field

Options :
51245262963. 1
51245262964. 2
51245262965. 3
51245262966. 4

Question Number : 71 Question Id : 51245219129 Question Type : MCQ Option Shuffling : No Is Question Mandatory : No Correct Marks : 1 Wrong Marks : 0

Let F be a finite field with n elements. Then,

1. $a^n = e \ \forall \ a \in F$
2. $a^n = a \ \forall \ a \in F$
3. There exists unique $a \in F$ such that $a^n = e$
4. There does not exist an element $a \in F$ such that $a^n = a$

Options :
51245262967. 1
51245262968. 2
51245262969. 3
51245262970. 4

Question Number : 72 Question Id : 51245219130 Question Type : MCQ Option Shuffling : No Is Question Mandatory : No Correct Marks : 1 Wrong Marks : 0

The characteristic of an integral domain is:

1. Always zero
2. Always a prime number
3. Either zero or a prime number
4. Neither zero or a prime number

Options :
51245262971. 1
51245262972. 2
51245262973. 3
51245262974. 4

Question Number : 73 Question Id : 51245219131 Question Type : MCQ Option Shuffling : No Is Question Mandatory : No Correct Marks : 1 Wrong Marks : 0

Which of the following is the ring of Gaussian integers?

1. $\{a + ib / a, b \in \mathbb{Z}\}$
2. $\{a + ib / a, b \in \mathbb{Q}\}$
3. $\{a + ib / a, b \in \mathbb{R}\}$
4. $\{a + ib / a, b \in \mathbb{C}\}$

Options :
51245262975. 1
51245262976. 2
51245262977. 3
51245262978. 4

Question Number : 74 Question Id : 51245219132 Question Type : MCQ Option Shuffling : No Is Question Mandatory : No Correct Marks : 1 Wrong Marks : 0

The map $f: \mathbb{Z} \to \mathbb{Z}$ defined $f(x) = x^2 + 3$ is,

1. A ring homomorphism
2. Not a ring homomorphism
3. A ring epimorphism
4. None of the above

Options :
51245262979. 1
51245262980. 2
51245262981. 3
51245262982. 4

Question Number : 75 Question Id : 51245219133 Question Type : MCQ Option Shuffling : No Is Question Mandatory : No Correct Marks : 1 Wrong Marks : 0

Which of the following statements are TRUE?

1. 1 is the only unit of $\mathbb{Z}(x)$.
2. 1 and -1 are the only units of $\mathbb{Z}(x)$.
3. $\mathbb{Z}(x)$ have infinite number of units.
4. All polynomials in $\mathbb{Z}(x)$ are monic.

Options :
51245262983. 1
51245262984. 2
51245262985. 3
51245262986. 4

Question Number : 76 Question Id : 51245219134 Question Type : MCQ Option Shuffling : No Is Question Mandatory : No Correct Marks : 1 Wrong Marks : 0

The degree of any non-zero polynomial is:

1. Greater than or equal to zero
2. Greater than zero
3. Zero
4. Infinity

Options :
51245262987. 1
51245262988. 2
51245262989. 3
51245262990. 4

Question Number : 77 Question Id : 51245219135 Question Type : MCQ Option Shuffling : No Is Question Mandatory : No Correct Marks : 1 Wrong Marks : 0

Cyclotomic polynomials are:

1. Polynomials whose complex roots are roots of unity
2. Reducible over $\mathbb{Q}$
3. Polynomials whose complex roots are primitive roots of unity
4. None of the above

Options :
51245262991. 1
51245262992. 2
51245262993. 3
51245262994. 4

Question Number : 78 Question Id : 51245219136 Question Type : MCQ Option Shuffling : No Is Question Mandatory : No Correct Marks : 1 Wrong Marks : 0

The centre of the ring $(\mathbb{Z}, +, .)$ is,

1. $\mathbb{Q}$
2. $\mathbb{R}$
3. $\mathbb{Z}^+$
4. $\mathbb{Z}$

Options :
51245262995. 1
51245262996. 2
51245262997. 3
51245262998. 4

Question Number : 79 Question Id : 51245219137 Question Type : MCQ Option Shuffling : No Is Question Mandatory : No Correct Marks : 1 Wrong Marks : 0

Which of the following statements are TRUE?

1. The set of even integers $2\mathbb{Z}$ is a subring of $\mathbb{Z}$
2. The integers $\mathbb{Z}$ is subring of $\mathbb{Q}$
3. The rational numbers $\mathbb{Q}$ is subring of $\mathbb{R}$
4. All of the above

Options :
51245262999. 1
51245263000. 2
51245263001. 3
51245263002. 4

Question Number : 80 Question Id : 51245219138 Question Type : MCQ Option Shuffling : No Is Question Mandatory : No Correct Marks : 1 Wrong Marks : 0

Which of the following are co-maximal ideals of $\mathbb{Z}$?

1. $2\mathbb{Z}$ and $3\mathbb{Z}$
2. $2\mathbb{Z}$ and $4\mathbb{Z}$
3. $2\mathbb{Z}$ and $6\mathbb{Z}$
4. $2\mathbb{Z}$ and $8\mathbb{Z}$

Options :
51245263003. 1
51245263004. 2
51245263005. 3
51245263006. 4

Question Number : 81 Question Id : 51245219139 Question Type : MCQ Option Shuffling : No Is Question Mandatory : No Correct Marks : 1 Wrong Marks : 0

The zero-divisors of $\mathbb{Z}_6$ are:

1. {0, 2, 3, 4}
2. {2, 3, 4}
3. {0,2, 4}
4. {0, 3}

Options :
51245263007. 1
51245263008. 2
51245263009. 3
51245263010. 4

Question Number : 82 Question Id : 51245219140 Question Type : MCQ Option Shuffling : No Is Question Mandatory : No Correct Marks : 1 Wrong Marks : 0

The number of units in the ring $\mathbb{Z}_p$ with the operations addition and multiplication modulo p is:

1. p
2. $p+1$
3. $p-1$
4. 1

Options :
51245263011. 1
51245263012. 2
51245263013. 3
51245263014. 4

Question Number : 83 Question Id : 51245219141 Question Type : MCQ Option Shuffling : No Is Question Mandatory : No Correct Marks : 1 Wrong Marks : 0

Which of the following statements are TRUE?

1. If A is an ideal and f is an onto homomorphism from a ring R to a ring S, then $f(A)$ is an ideal of S
2. If A is an ideal and f is a one-one homomorphism from a ring R to a ring S, then $f(A)$ is an ideal of S
3. If A is an ideal and f is a homomorphism from a ring R to a ring S, then $f(A)$ is an ideal of S
4. All of the above

Options :
51245263015. 1
51245263016. 2
51245263017. 3
51245263018. 4

Question Number : 84 Question Id : 51245219142 Question Type : MCQ Option Shuffling : No Is Question Mandatory : No Correct Marks : 1 Wrong Marks : 0

Which of the following statements are FALSE?

1. If f is a homomorphism from A onto S, then $f(A) = \{f(a) | a \in A\}$ is a subring of S
2. If R is commutative, then $f(R)$ is commutative
3. If f is a homomorphism from R onto S, then f^{-1} is a homomorphism from S onto R
4. None of the above

Options :
51245263019. 1
51245263020. 2
51245263021. 3
51245263022. 4

Question Number : 85 Question Id : 51245219143 Question Type : MCQ Option Shuffling : No Is Question Mandatory : No Correct Marks : 1 Wrong Marks : 0

Let I and J be ideals of a ring. Then,

1. $I + J$ and $I \cap J$ are also ideals
2. The factor rings $(I + J)/J$ and $I/(I \cap J)$ are isomorphic
3. $I + J$ is the smallest ideal containing I and J
4. All of the above

Options :
51245263023. 1
51245263024. 2
51245263025. 3
51245263026. 4

Question Number : 86 Question Id : 51245219144 Question Type : MCQ Option Shuffling : No Is Question Mandatory : No

Correct Marks : 1 Wrong Marks : 0

The kernel of an injective homomorphism from $\mathbb{Z} \to \mathbb{Z}$ is:

1. 0
2. $2\mathbb{Z}$
3. $\mathbb{Z}$
4. $\mathbb{Z}^+$

Options :
51245263027. 1
51245263028. 2
51245263029. 3
51245263030. 4

Question Number : 87 Question Id : 51245219145 Question Type : MCQ Option Shuffling : No Is Question Mandatory : No Correct Marks : 1 Wrong Marks : 0

Let R be a ring and define $f: R \to R$ by $f(x) = x$ for every $x \in R$:

1. $ker(f) = \{0\}$
2. $ker(f) = R$
3. $ker(f) = R^+$
4. $ker(f) = \{0,1,-1\}$

Options :
51245263031. 1
51245263032. 2
51245263033. 3
51245263034. 4

Question Number : 88 Question Id : 51245219146 Question Type : MCQ Option Shuffling : No Is Question Mandatory : No Correct Marks : 1 Wrong Marks : 0

Let I and J be any two ideals of a ring R, Then,

1. $J + K = \langle J \cup K \rangle$
2. $J + K = \langle J \cap K \rangle$
3. $J + K = J \cup K$
4. $J + K = J \cap K$

Options :
51245263035. 1
51245263036. 2
51245263037. 3
51245263038. 4

Question Number : 89 Question Id : 51245219147 Question Type : MCQ Option Shuffling : No Is Question Mandatory : No Correct Marks : 1 Wrong Marks : 0

The ring $K[x]$ of polynomials over a field K, the units are:

1. The constant polynomials
2. The non-zero polynomials
3. Only **1**
4. The non-zero constant polynomials

Options :
51245263039. 1
51245263040. 2
51245263041. 3
51245263042. 4

Question Number : 90 Question Id : 51245219148 Question Type : MCQ Option Shuffling : No Is Question Mandatory : No Correct Marks : 1 Wrong Marks : 0

Characteristic of the ring $\mathbb{Z}_2 \times \mathbb{Z}_2 \times \mathbb{Z}_2$ is?

1. 2
2. 3
3. 8
4. 4

Options :
51245263043. 1
51245263044. 2
51245263045. 3
51245263046. 4

Question Number : 91 Question Id : 51245219149 Question Type : MCQ Option Shuffling : No Is Question Mandatory : No Correct Marks : 1 Wrong Marks : 0

Which of the following statements are TRUE?

1. The Cancellation Law of multiplication holds in an integral domain
2. The characteristic of an integral domain is always 0
3. The characteristic of an integral domain is either 0 or 1
4. None of the above

Options :
51245263047. 1
51245263048. 2
51245263049. 3
51245263050. 4

Question Number : 92 Question Id : 51245219150 Question Type : MCQ Option Shuffling : No Is Question Mandatory : No Correct Marks : 1 Wrong Marks : 0

If R is a division ring. Then,

1. $Z(R)$ is a field, where $Z(R)$ is the center of R
2. R is a field
3. R is a field when the cardinality of R is finite
4. Both (1) and (2)

Options :
51245263051. 1
51245263052. 2
51245263053. 3
51245263054. 4

Question Number : 93 Question Id : 51245219151 Question Type : MCQ Option Shuffling : No Is Question Mandatory : No Correct Marks : 1 Wrong Marks : 0

Let R be a commutative ring with 1. Then,

1. Every prime ideal is a maximal ideal
2. R has at least one maximal ideal
3. R has unique maximal ideal
4. None of the above

Options :
51245263055. 1
51245263056. 2
51245263057. 3
51245263058. 4

Question Number : 94 Question Id : 51245219152 Question Type : MCQ Option Shuffling : No Is Question Mandatory : No Correct Marks : 1 Wrong Marks : 0

Assume R is commutative. The ideal M is a maximal ideal if and only if:

1. The quotient ring R/M is a field
2. The quotient ring R/M is an integral domain
3. The quotient ring R/M is a PID
4. The quotient ring R/M is a UFD

Options :
51245263059. 1
51245263060. 2
51245263061. 3
51245263062. 4

Question Number : 95 Question Id : 51245219153 Question Type : MCQ Option Shuffling : No Is Question Mandatory : No Correct Marks : 1 Wrong Marks : 0

A proper ideal I of a ring R is maximal ideal and A be an ideal with $A \cap I = \emptyset$,then:

1. $A + I = A$
2. $A + I = R\backslash\{0\}$
3. $A + I = R$
4. $A + I = I$

Options :
51245263063. 1
51245263064. 2
51245263065. 3
51245263066. 4

Question Number : 96 Question Id : 51245219154 Question Type : MCQ Option Shuffling : No Is Question Mandatory : No Correct Marks : 1 Wrong Marks : 0

If F is a field, then the polynomial ring $F[x]$ is a:

1. Euclidean domain
2. Unique factorization domain
3. Principle ideal domain
4. All of the above

Options :

51245263067. 1
51245263068. 2
51245263069. 3
51245263070. 4

Question Number : 97 Question Id : 51245219155 Question Type : MCQ Option Shuffling : No Is Question Mandatory : No Correct Marks : 1 Wrong Marks : 0

Options :

51245263071. 1
51245263072. 2
51245263073. 3
51245263074. 4

Question Number : 98 Question Id : 51245219156 Question Type : MCQ Option Shuffling : No Is Question Mandatory : No Correct Marks : 1 Wrong Marks : 0

Options :

51245263075. 1
51245263076. 2
51245263077. 3
51245263078. 4

Question Number : 99 Question Id : 51245219157 Question Type : MCQ Option Shuffling : No Is Question Mandatory : No Correct Marks : 1 Wrong Marks : 0

Options :

51245263079. 1

51245263080. 2

51245263081. 3

51245263082. 4

Question Number : 100 Question Id : 51245219158 Question Type : MCQ Option Shuffling : No Is Question Mandatory : No Correct Marks : 1 Wrong Marks : 0

Options :

51245263083. 1

51245263084. 2

51245263085. 3

51245263086. 4