National Testing Agency

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Modern Algebra

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Modern Algebra

Section Id :	709597388
Section Number :	1
Section type :	Online
Mandatory or Optional:	Mandatory
Number of Questions:	100
Number of Questions to be attempted:	100
Section Marks:	100
Display Number Panel:	Yes
Group All Questions:	No

Sub-Section Number:	1
Sub-Section Id:	709597488
Question Shuffling Allowed :	Yes

Question Number : 1 Question Id : 70959727435 Question Type : MCQ Option Shuffling : No Display Question Number : Yes Single Line Question Option : No Option Orientation : Vertical

Correct Marks : 1 Wrong Marks : 0

Which of the following is not a group under addition?

a) Set of Integers
b) Set of Natural Numbers
c) Set of Rational Numbers
d) Set of Real Numbers

Question Number : 2 Question Id : 70959727436 Question Type : MCQ Option Shuffling : No Display Question Number : Yes Single Line Question Option : No Option Orientation : Vertical

Correct Marks : 1 Wrong Marks : 0

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

a) Abelian Group
b) Non-abelian group
c) Not a group
d) None of the above

Question Number : 3 Question Id : 70959727437 Question Type : MCQ Option Shuffling : No Display Question Number : Yes Single Line Question Option : No Option Orientation : Vertical

Correct Marks : 1 Wrong Marks : 0

Which of the following binary operations is commutative?

a) Subtraction of positive integers
b) Function composition of polynomials with real coefficients
c) Multiplication of 2×2 matrices with integer entries
d) None of the above

Question Number : 4 Question Id : 70959727438 Question Type : MCQ Option Shuffling : No Display Question Number : Yes Single Line Question Option : No Option Orientation : Vertical

Correct Marks : 1 Wrong Marks : 0

Pick the wrong Statement,

a) $H \cap K$ is subgroup where H and K are subgroup of G
b) C(a) is subgroup of G
c) $\langle a \rangle$ is a subgroup
d) Integer modulo n under addition modulo is a subgroup of $\mathbb{Z}$ under addition

Question Number : 5 Question Id : 70959727439 Question Type : MCQ Option Shuffling : No Display Question Number : Yes Single Line Question Option : No Option Orientation : Vertical

Correct Marks : 1 Wrong Marks : 0

The centralizer of a in G is,

a) Set of all elements in G that commute with a
b) Set of all elements in G that doesn't commute with a
c) Set of all elements in G that doesn't commute and associative with a
d) None of the above

Question Number : 6 Question Id : 70959727440 Question Type : MCQ Option Shuffling : No Display Question Number : Yes Single Line Question Option : No Option Orientation : Vertical

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 $|M \cap N|$.

a) 1
b) 56
c) 14
d) 78

Question Number : 7 Question Id : 70959727441 Question Type : MCQ Option Shuffling : No Display Question Number : Yes Single Line Question Option : No Option Orientation : Vertical

Correct Marks : 1 Wrong Marks : 0

Let S be a subset of G. What is the subgroup generated by S?

a) G
b) S
c) The quotient group of G/S
d) The smallest possible subgroup of G which contains S.

Question Number : 8 Question Id : 70959727442 Question Type : MCQ Option Shuffling : No Display Question Number : Yes Single Line Question Option : No Option Orientation : Vertical

Correct Marks : 1 Wrong Marks : 0

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

a) Abelian
b) Non-abelian
c) Finite
d) Infinite

Question Number : 9 Question Id : 70959727443 Question Type : MCQ Option Shuffling : No Display Question Number : Yes Single Line Question Option : No Option Orientation : Vertical

Correct Marks : 1 Wrong Marks : 0

G is abelian if,

a) $x^2 = x$ for all x in G
b) $x^2 = e$ for some x in G
c) $x^2 = e$ for all x in G
d) $x^2 = x$ for some x in G

Question Number : 10 Question Id : 70959727444 Question Type : MCQ Option Shuffling : No Display Question Number : Yes Single Line Question Option : No Option Orientation : Vertical

Correct Marks : 1 Wrong Marks : 0

Let G be a group and let H be a subgroup of G. For any fixed x in G then,

a) xHx^{-1} is a subgroup of G.
b) If H is cyclic, then xHx^{-1} is cyclic.
c) If H is Abelian, then xHx^{-1} is Abelian.
d) All of the above.

Question Number : 11 Question Id : 70959727445 Question Type : MCQ Option Shuffling : No Display Question Number : Yes Single Line Question Option : No Option Orientation : Vertical

Correct Marks : 1 Wrong Marks : 0

Let G be a non-abelian group. Then, its order can be

a) 25
b) 19
c) 125
d) 35

Question Number : 12 Question Id : 70959727446 Question Type : MCQ Option Shuffling : No Display Question Number : Yes Single Line Question Option : No Option Orientation : Vertical

Correct Marks : 1 Wrong Marks : 0

S_n is non-abelian when

a) $n \geq 2$

b) $n \leq 2$

c) $n \leq 3$

d) $n \geq 3$

Question Number : 13 Question Id : 70959727447 Question Type : MCQ Option Shuffling : No Display Question Number : Yes Single Line Question Option : No Option Orientation : Vertical

Correct Marks : 1 Wrong Marks : 0

Pick the wrong statement

a) Every permutation in $S_n, n > 1$, is a product of $2-$cycles.

b) Every permutation can be written as a cycle or as a product of disjoint cycles.

c) The order of a permutation written in disjoint cycle form is the greatest common divisor of the lengths of the cycles.

d) A_n is a subgroup of S_n.

Question Number : 14 Question Id : 70959727448 Question Type : MCQ Option Shuffling : No Display Question Number : Yes Single Line Question Option : No Option Orientation : Vertical

Correct Marks : 1 Wrong Marks : 0

For $n > 0$, let $(\mathbb{Z}/n\mathbb{Z})^*$ be the group of units of $(\mathbb{Z}/n\mathbb{Z})$. Which of the following group is not cyclic?

a) $(\mathbb{Z}/10\mathbb{Z})^*$

b) $(\mathbb{Z}/23\mathbb{Z})^*$

c) $(\mathbb{Z}/100\mathbb{Z})^*$

d) $(\mathbb{Z}/163\mathbb{Z})^*$

Question Number : 15 Question Id : 70959727449 Question Type : MCQ Option Shuffling : No Display Question Number : Yes Single Line Question Option : No Option Orientation : Vertical

Correct Marks : 1 Wrong Marks : 0

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

a) ma+nb = 1

b) ma-nb = 0

c) ma+nb = -1

d) ma-nb = -1

Question Number : 16 Question Id : 70959727450 Question Type : MCQ Option Shuffling : No Display Question Number : Yes Single Line Question Option : No Option Orientation : Vertical

Correct Marks : 1 Wrong Marks : 0

$(\mathbb{Z}_n^*, \odot)$ is a group if and only if,

a) n is Integer

b) n is Prime

c) n is composite number

d) None of the above.

Question Number : 17 Question Id : 70959727451 Question Type : MCQ Option Shuffling : No Display Question Number : Yes Single Line Question Option : No Option Orientation : Vertical

Correct Marks : 1 Wrong Marks : 0

Product of all n^{th} root of unity is,

a) 1

b) 0

c) $(-1)^{n-1}$

d) $(-i)^{n-1}$

Question Number : 18 Question Id : 70959727452 Question Type : MCQ Option Shuffling : No Display Question Number : Yes Single Line Question Option : No Option Orientation : Vertical

Correct Marks : 1 Wrong Marks : 0

If ω is imaginary cube root of unity, then ω =

a) 1

b) 0

c) ω^{-2}

d) 2ω

Question Number : 19 Question Id : 70959727453 Question Type : MCQ Option Shuffling : No Display Question Number : Yes Single Line Question Option : No Option Orientation : Vertical

Correct Marks : 1 Wrong Marks : 0

square roots of unity are

a) 1, −1

b) 1, i

c) 1, −i

d) i and -i

Question Number : 20 Question Id : 70959727454 Question Type : MCQ Option Shuffling : No Display Question Number : Yes Single Line Question Option : No Option Orientation : Vertical

Correct Marks : 1 Wrong Marks : 0

$\mathbb{Z}_m \times \mathbb{Z}_n$ is cyclic if and only if,

a) $(m,n) = 2^n$

b) $(m,n) = 1$

c) $(m,n) = m$

d) $(m,n) = n$

Question Number : 21 Question Id : 70959727455 Question Type : MCQ Option Shuffling : No Display Question Number : Yes Single Line Question Option : No Option Orientation : Vertical

Correct Marks : 1 Wrong Marks : 0

The number of generators of cyclic group of order 219 is _____

a) 144

b) 124

c) 56

d) 218

Question Number : 22 Question Id : 70959727456 Question Type : MCQ Option Shuffling : No Display Question Number : Yes Single Line Question Option : No Option Orientation : Vertical

Correct Marks : 1 Wrong Marks : 0

The order of the element a^{32} in the cyclic group $G = \{1, a, a^2, \ldots, a^{37}\}$ is,

a) 10

b) 15

c) 20

d) 19

Question Number : 23 Question Id : 70959727457 Question Type : MCQ Option Shuffling : No Display Question Number : Yes Single Line Question Option : No Option Orientation : Vertical

Correct Marks : 1 Wrong Marks : 0

Let G benon cyclic. Then its order can be,

a) 5

b) 15

c) 7

d) 20

Question Number : 24 Question Id : 70959727458 Question Type : MCQ Option Shuffling : No Display Question Number : Yes Single Line Question Option : No Option Orientation : Vertical

Correct Marks : 1 Wrong Marks : 0

The order of $GL(3,\mathbb{Z}_3)$ is,

a) 12132

b) 5616

c) 5166

d) 11232

Question Number : 25 Question Id : 70959727459 Question Type : MCQ Option Shuffling : No Display Question Number : Yes Single Line Question Option : No Option Orientation : Vertical

Correct Marks : 1 Wrong Marks : 0

$A = \begin{pmatrix} 2 & 4 \\ 4 & 4 \end{pmatrix} \in GL(2,\mathbb{Z}_5)$. Then,

a) $A^{-1} = \begin{pmatrix} 2 & 3 \\ 3 & 1 \end{pmatrix}$

b) $A^{-1} = \begin{pmatrix} 2 & 4 \\ 3 & 1 \end{pmatrix}$

c) $A^{-1} = \begin{pmatrix} 5 & 3 \\ 3 & 1 \end{pmatrix}$

d) $A^{-1} = \begin{pmatrix} 2 & 3 \\ 3 & 0 \end{pmatrix}$

Question Number : 26 Question Id : 70959727460 Question Type : MCQ Option Shuffling : No Display Question Number : Yes Single Line Question Option : No Option Orientation : Vertical

Correct Marks : 1 Wrong Marks : 0

Pick the wrong statement

a) The general linear group is non-abelian for all $n \geq 2$

b) $GL(2,\mathbb{R})$ is an infinite group.

c) $\mathbb{R}$ is infinite.

d) $GL(2,\mathbb{R})$ is an abelian group.

Question Number : 27 Question Id : 70959727461 Question Type : MCQ Option Shuffling : No Display Question Number : Yes Single Line Question Option : No Option Orientation : Vertical

Correct Marks : 1 Wrong Marks : 0

Number of transposition in $(12345)(123)$ is,

a) 5

b) 7

c) 6

d) 3

Question Number : 28 Question Id : 70959727462 Question Type : MCQ Option Shuffling : No Display Question Number : Yes Single Line Question Option : No Option Orientation : Vertical

Correct Marks : 1 Wrong Marks : 0

Pick the wrong statement

a) The product of two even permutation is an even permutation
b) The product of two odd permutations is an even permutation
c) The product of even permutation and an odd one is odd
d) Identity permutation is an odd permutation.

Question Number : 29 Question Id : 70959727463 Question Type : MCQ Option Shuffling : No Display Question Number : Yes Single Line Question Option : No Option Orientation : Vertical

Correct Marks : 1 Wrong Marks : 0

The index of A_n in S_n is,

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

Question Number : 30 Question Id : 70959727464 Question Type : MCQ Option Shuffling : No Display Question Number : Yes Single Line Question Option : No Option Orientation : Vertical

Correct Marks : 1 Wrong Marks : 0

For $n \geq 2$, Minimum number of transpositions required to generate S_n is

a) $n-2$
b) n
c) $n-1$
d) $n-3$

Question Number : 31 Question Id : 70959727465 Question Type : MCQ Option Shuffling : No Display Question Number : Yes Single Line Question Option : No Option Orientation : Vertical

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,

a) $\left\{\begin{pmatrix} -1 & 0 \\ 0 & 1 \end{pmatrix}, \begin{pmatrix} 1 & 0 \\ 0 & -1 \end{pmatrix}\right\}$
b) $\left\{\begin{pmatrix} 1 & -1 \\ 0 & 1 \end{pmatrix}, \begin{pmatrix} 1 & 0 \\ 0 & 1 \end{pmatrix}\right\}$
c) $\left\{\begin{pmatrix} 1 & 1 \\ 0 & 1 \end{pmatrix}, \begin{pmatrix} -1 & 0 \\ 0 & 1 \end{pmatrix}\right\}$
d) $\left\{\begin{pmatrix} -1 & -1 \\ 0 & 1 \end{pmatrix}, \begin{pmatrix} -1 & 1 \\ 0 & 1 \end{pmatrix}\right\}$

Question Number : 32 Question Id : 70959727466 Question Type : MCQ Option Shuffling : No Display Question Number : Yes Single Line Question Option : No Option Orientation : Vertical

Correct Marks : 1 Wrong Marks : 0

Number of 3-cycles in $A_n, n \geq 3$ is,

a) $n!$
b) $\frac{n!}{2}$
c) $\frac{n(n-1)}{2}$
d) $\frac{n(n-1)(n-2)}{3}$

Question Number : 33 Question Id : 70959727467 Question Type : MCQ Option Shuffling : No Display Question Number : Yes Single Line Question Option : No Option Orientation : Vertical

Correct Marks : 1 Wrong Marks : 0

Pick the wrong statement

a) $H, K \leq G$, then $|K: H \cap K| \leq |G: H|$

b) $L \leq K \leq G$, then $|G: L| = |G: K||K: L|$

c) H and K are subgroup of G then $|G: H \cap K| \leq |G: H||G: K|$

d) H and K are subgroup of G then $|G: H \cap K| \geq |G: H||G: K|$

Question Number : 34 Question Id : 70959727468 Question Type : MCQ Option Shuffling : No Display Question Number : Yes Single Line Question Option : No Option Orientation : Vertical

Correct Marks : 1 Wrong Marks : 0

Lagrange's theorem specifies _____

a) The order of semigroup is finite

b) The order of the subgroup divides the order of the finite group

c) The order of an abelian group is infinite

d) The order of the semigroup is added to the order of the group

Question Number : 35 Question Id : 70959727469 Question Type : MCQ Option Shuffling : No Display Question Number : Yes Single Line Question Option : No Option Orientation : Vertical

Correct Marks : 1 Wrong Marks : 0

aH is a _____ coset of H.

a) Right

b) Left

c) Sub

d) Semi

Question Number : 36 Question Id : 70959727470 Question Type : MCQ Option Shuffling : No Display Question Number : Yes Single Line Question Option : No Option Orientation : Vertical

Correct Marks : 1 Wrong Marks : 0

A function f:(M,$*$)$\rightarrow$(N,$\times$) is a homomorphism if _____

a) f(a, b) = a*b

b) f(a, b) = a/b

c) f(a, b) = f(a)*f(b)

d) f(a, b) = f(a)$\times$f(a)

Question Number : 37 Question Id : 70959727471 Question Type : MCQ Option Shuffling : No Display Question Number : Yes Single Line Question Option : No Option Orientation : Vertical

Correct Marks : 1 Wrong Marks : 0

An isomorphism of a group onto itself is called ____

a) Homomorphism

b) Heteromorphism

c) Epimorphism

d) Automorphism

Question Number : 38 Question Id : 70959727472 Question Type : MCQ Option Shuffling : No Display Question Number : Yes Single Line Question Option : No Option Orientation : Vertical

Correct Marks : 1 Wrong Marks : 0

Let Z(G) be center, In(G) be inner automorphism group and Aut(G) be automorphism group of a group G. Then G is complete if,

a) $Z(G) = \{e\}$
b) $G \cong In(G) \cong Aut(G)$
c) $Z(G) = \{e\}\ and\ G \cong In(G) \cong Aut(G)$
d) Neither (a) nor (b)

Question Number : 39 Question Id : 70959727473 Question Type : MCQ Option Shuffling : No Display Question Number : Yes Single Line Question Option : No Option Orientation : Vertical

Correct Marks : 1 Wrong Marks : 0

Condition of semigroup homomorphism should be _____

a) f(x * x) = f(x * y)
b) f(x) = f(y)
c) f(x) * f(y) = f(y)
d) f(x * y) = f(x) * f(y)

Question Number : 40 Question Id : 70959727474 Question Type : MCQ Option Shuffling : No Display Question Number : Yes Single Line Question Option : No Option Orientation : Vertical

Correct Marks : 1 Wrong Marks : 0

Trivially Normal subgroups of a group G is,

(a) e
(b) G
(c) Both (a) and (b)
(d) None of the above.

Question Number : 41 Question Id : 70959727475 Question Type : MCQ Option Shuffling : No Display Question Number : Yes Single Line Question Option : No Option Orientation : Vertical

Correct Marks : 1 Wrong Marks : 0

Pick the wrong statement

a) The intersection of a family of normal subgroups is a normal subgroup.
b) A subgroup N of a group G is normal if and only if $xN = Nx$ for all elements x of G.
c) Every subgroup of index 2 in any group G must be a normal subgroup.
d) A subgroup H of G is normal in G if and only if $xHx^{-1} \subseteq G$ for all x in G.

Question Number : 42 Question Id : 70959727476 Question Type : MCQ Option Shuffling : No Display Question Number : Yes Single Line Question Option : No Option Orientation : Vertical

Correct Marks : 1 Wrong Marks : 0

If $N \lhd G$ and $M \lhd G$ and $MN = \{mn | m \in M, n \in N\}$. Then,

a) Either MN is a subgroup of G or $MN \lhd G$.
b) Neither MN is a subgroup of G nor $MN \lhd G$.
c) Both MN is a subgroup of G and $MN \lhd G$.
d) None of the above

Question Number : 43 Question Id : 70959727477 Question Type : MCQ Option Shuffling : No Display Question Number : Yes Single Line Question Option : No Option Orientation : Vertical

Correct Marks : 1 Wrong Marks : 0

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

a) Zero Matrix
b) $GL_n(\mathbb{R})$
c) $SL_n(\mathbb{R})$
d) Identity Matrix

Question Number : 44 Question Id : 70959727478 Question Type : MCQ Option Shuffling : No Display Question Number : Yes Single Line Question Option : No Option Orientation : Vertical

Correct Marks : 1 Wrong Marks : 0

Let ϕ be a group homomorphism from G to $\overline{G}$. Then,

a) $G/\phi(G) \cong Ker(G)$.
b) $G/Ker\phi \cong \phi(G)$.
c) $Ker\phi \cong \phi(G)$.
d) $G \cong \phi(G)$.

Question Number : 45 Question Id : 70959727479 Question Type : MCQ Option Shuffling : No Display Question Number : Yes Single Line Question Option : No Option Orientation : Vertical

Correct Marks : 1 Wrong Marks : 0

A group G is,

a) Finite Intersection of its conjugacy classes.
b) Intersection of its conjugacy classes.
c) The disjoint union of its conjugacy classes.
d) None of the above.

Question Number : 46 Question Id : 70959727480 Question Type : MCQ Option Shuffling : No Display Question Number : Yes Single Line Question Option : No Option Orientation : Vertical

Correct Marks : 1 Wrong Marks : 0

Pick the wrong statement

a) Conjugacy is an equivalence relation on G.
b) Conjugate elements have the different order.
c) A group G is Abelian if and only if all its conjugacy classes contain exactly one element of the group G.
d) A group G is the disjoint union of its conjugacy classes.

Question Number : 47 Question Id : 70959727481 Question Type : MCQ Option Shuffling : No Display Question Number : Yes Single Line Question Option : No Option Orientation : Vertical

Correct Marks : 1 Wrong Marks : 0

Conjugacy classes of the permutation group S_3.

a) {(1)};{(1, 2),(1, 3),(2, 3)},
b) {(1)}; {(1, 2), (2, 3)}; {(1, 2, 3)}
c) {(1)}; {(1, 2, 3),(1, 3, 2)}
d) {(1)}; {(1, 2),(1, 3),(2, 3)}; {(1, 2, 3),(1, 3, 2)}

Question Number : 48 Question Id : 70959727482 Question Type : MCQ Option Shuffling : No Display Question Number : Yes Single Line Question Option : No Option Orientation : Vertical

Correct Marks : 1 Wrong Marks : 0

If G is a finite group, then,

a) $C_a = \frac{o(G)}{o(Z(G))}$

b) $C_a = \frac{o(G)}{o(Z(a))}$

c) $C_a = \frac{o(G)}{o(N(a))}$

d) $C_a = o(G)$

Question Number : 49 Question Id : 70959727483 Question Type : MCQ Option Shuffling : No Display Question Number : Yes Single Line Question Option : No Option Orientation : Vertical

Correct Marks : 1 Wrong Marks : 0

$N(a) =$

a) $\{x \in G / xa \neq ax\}$

b) $\{x \in G / xa = 1\}$

c) $\{x \in G / xa \neq 1\}$

d) $\{x \in G / xa = ax\}$

Question Number : 50 Question Id : 70959727484 Question Type : MCQ Option Shuffling : No Display Question Number : Yes Single Line Question Option : No Option Orientation : Vertical

Correct Marks : 1 Wrong Marks : 0

What is the order of the element $(3,1)$ in $\mathbb{Z}_6 \times \mathbb{Z}_{10}$?

a) 7

b) 3

c) 1

d) 10

Question Number : 51 Question Id : 70959727485 Question Type : MCQ Option Shuffling : No Display Question Number : Yes Single Line Question Option : No Option Orientation : Vertical

Correct Marks : 1 Wrong Marks : 0

Which of the following element have largest order in $\mathbb{Z}_6 \times \mathbb{Z}_{10}$.

a) $(3,5)$

b) $(5,9)$

c) $(0,9)$

d) $(1,1)$

Question Number : 52 Question Id : 70959727486 Question Type : MCQ Option Shuffling : No Display Question Number : Yes Single Line Question Option : No Option Orientation : Vertical

Correct Marks : 1 Wrong Marks : 0

How many elements of order 9 are in $\mathbb{Z}_3 \oplus \mathbb{Z}_9$,

a) 18

b) 16

c) 19

d) 20

Question Number : 53 Question Id : 70959727487 Question Type : MCQ Option Shuffling : No Display Question Number : Yes Single Line Question Option : No Option Orientation : Vertical

Correct Marks : 1 Wrong Marks : 0

Let G be an Abelian group of prime-power order, $K = \{x \in G / x^{p^m} = e\}$ and let a be an element of maximum order in G. Then G can be,

a) $< a >$
b) K
c) $< a > \times K$
d) None of the above.

Question Number : 54 Question Id : 70959727488 Question Type : MCQ Option Shuffling : No Display Question Number : Yes Single Line Question Option : No Option Orientation : Vertical

Correct Marks : 1 Wrong Marks : 0

Consider G = A_4. Let $V = \{e, (12)(34), (13)(24), (14)(23)\}$ and $H = < (123) >$ are subgroups of G. Then,

a) H is normal and V is not normal in G.
b) V is normal and H is not normal in G.
c) Neither H nor V is normal in G.
d) Both H and V are normal in G.

Question Number : 55 Question Id : 70959727489 Question Type : MCQ Option Shuffling : No Display Question Number : Yes Single Line Question Option : No Option Orientation : Vertical

Correct Marks : 1 Wrong Marks : 0

Let G be a finite Abelian group of order $p^n m$, where p is a prime that does not divide m. Then $G = H \times K$, where

a) $H = \{x \in G / x^{p^n m} = e\}$ and $K = \{x \in G / x^{p^m} = x\}$
b) $H = \{x \in G / x^{p^n m} = e\}$ and $K = \{x \in G / x^{p^m} = e\}$
c) $H = \{x \in G / x^{p^n} = e\}$ and $K = \{x \in G / x^{p^m} = e\}$
d) $H = \{x \in G / x^{p^n} = e\}$ and $K = \{x \in G / x^{p^m} = x\}$

Question Number : 56 Question Id : 70959727490 Question Type : MCQ Option Shuffling : No Display Question Number : Yes Single Line Question Option : No Option Orientation : Vertical

Correct Marks : 1 Wrong Marks : 0

$\mathbb{Z} \times \mathbb{Z}$ is,

a) Cyclic with generator (1,1)
b) Cyclic with generator (0,1)
c) Cyclic with generator (1,0)
d) None of the above

Question Number : 57 Question Id : 70959727491 Question Type : MCQ Option Shuffling : No Display Question Number : Yes Single Line Question Option : No Option Orientation : Vertical

Correct Marks : 1 Wrong Marks : 0

Pick the wrong statement

a) Every finite group G of order n is isomorphic to a subgroup of S_n.
b) Any group G is isomorphic to a subgroup of Sym(G).
c) Union of two subgroups is a subgroup.
d) $\mathbb{Z} \times \mathbb{Z}$ is not cyclic.

Question Number : 58 Question Id : 70959727492 Question Type : MCQ Option Shuffling : No Display Question Number : Yes Single Line Question Option : No Option Orientation : Vertical

Correct Marks : 1 Wrong Marks : 0

The inverse of (1234) is,

a) (2134)
b) (4321)
c) (3214)
d) (1243)

Question Number : 59 Question Id : 70959727493 Question Type : MCQ Option Shuffling : No Display Question Number : Yes Single Line Question Option : No Option Orientation : Vertical

Correct Marks : 1 Wrong Marks : 0

The algebraic structure which is not a ring is_____

a) $(\mathbb{Z}, +, .)$
b) $(\mathbb{R}, +, .)$
c) $(\mathbb{Q}, +, .)$
d) $(\mathbb{R}, ., +)$

Question Number : 60 Question Id : 70959727494 Question Type : MCQ Option Shuffling : No Display Question Number : Yes Single Line Question Option : No Option Orientation : Vertical

Correct Marks : 1 Wrong Marks : 0

The algebraic structure which is a ring is_____

a) $(\rho(S), \cup, \cap)$
b) $(\rho(S), \cap, \cup)$
c) $(\rho(S), \Delta, \cap)$
d) $(\rho(S), \Delta, \cup)$

Question Number : 61 Question Id : 70959727495 Question Type : MCQ Option Shuffling : No Display Question Number : Yes Single Line Question Option : No Option Orientation : Vertical

Correct Marks : 1 Wrong Marks : 0

Let R be a ring with identity. Then for all $a, b \in R$ we have_____

a) $(a+b)^2 = a^2 + ab + ba + b^2$
b) $(a-b)^2 = a^2 + 2ab + b^2$
c) $(a+b)^2 = a^2 + 2ab + b^2$
d) $(a+b)(a-b) = a^2 - b^2$

Question Number : 62 Question Id : 70959727496 Question Type : MCQ Option Shuffling : No Display Question Number : Yes Single Line Question Option : No Option Orientation : Vertical

Correct Marks : 1 Wrong Marks : 0

In an integral domain if ab=0, then _____.

a) Either $a = 0$ *or* $b = 0$
b) Both $a = 0$ *and* $b = 0$
c) $a \neq 0, b \neq 0$
d) $a \neq 0$

Question Number : 63 Question Id : 70959727497 Question Type : MCQ Option Shuffling : No Display Question Number : Yes Single Line Question Option : No Option Orientation : Vertical

Correct Marks : 1 Wrong Marks : 0

Example of an integral domain is _____.

a) $\{0\}$
b) $\mathbb{Z}_{12}$
c) $n\mathbb{Z}, n > 1$
d) $\mathbb{Z}_7$

Question Number : 64 Question Id : 70959727498 Question Type : MCQ Option Shuffling : No Display Question Number : Yes Single Line Question Option : No Option Orientation : Vertical

Correct Marks : 1 Wrong Marks : 0

Which one is incorrect statement?

a) $\mathbb{Z}$ is a principal Ideal domain
b) Any field is a principal Ideal domain
c) $\mathbb{Q}$ is a principal Ideal domain
d) Any Euclidean domain is not a principal domain.

Question Number : 65 Question Id : 70959727499 Question Type : MCQ Option Shuffling : No Display Question Number : Yes Single Line Question Option : No Option Orientation : Vertical

Correct Marks : 1 Wrong Marks : 0

Find a finite commutative ring with identity which is not a integral domain?

a) $(\mathbb{Z}_4, \oplus, \odot)$
b) $(\mathbb{Z}_7, \oplus, \odot)$
c) $(\mathbb{Z}_5, \oplus, \odot)$
d) $(\mathbb{R}, +, .)$

Question Number : 66 Question Id : 70959727500 Question Type : MCQ Option Shuffling : No Display Question Number : Yes Single Line Question Option : No Option Orientation : Vertical

Correct Marks : 1 Wrong Marks : 0

Which is finite non-commutative ring in the following?

a) $(\mathbb{R}, +, .)$
b) $(\mathbb{Z}, +, .)$
c) $(\mathbb{Z}_n, \oplus, \odot)$
d) $M_2(\mathbb{Z}_3)$

Question Number : 67 Question Id : 70959727501 Question Type : MCQ Option Shuffling : No Display Question Number : Yes Single Line Question Option : No Option Orientation : Vertical

Correct Marks : 1 Wrong Marks : 0

Determine an infinite ring ?

a) $(\mathbb{Z}_4, \oplus, \odot)$
b) $M_2(\mathbb{Z}_3)$
c) $(\mathbb{Z}_n, \oplus, \odot)$
d) $(2\mathbb{Z}, +, .)$

Question Number : 68 Question Id : 70959727502 Question Type : MCQ Option Shuffling : No Display Question Number : Yes Single Line Question Option : No Option Orientation : Vertical

Correct Marks : 1 Wrong Marks : 0

The value of $i^2 = j^2 = k^2 = ijk$ is equal to

a) 1
b) 2
c) i
d) -1.

Question Number : 69 Question Id : 70959727503 Question Type : MCQ Option Shuffling : No Display Question Number : Yes Single Line Question Option : No Option Orientation : Vertical

Correct Marks : 1 Wrong Marks : 0

Which of the following hold in a quaternion's ring H.

a) $\overline{a+b} \neq \bar{a} + \bar{b}$

b) $\overline{ab} \neq \bar{b}\,\bar{a}$

c) $N(ab) = N(a)N(b)$

d) None of these

Question Number : 70 Question Id : 70959727504 Question Type : MCQ Option Shuffling : No Display Question Number : Yes Single Line Question Option : No Option Orientation : Vertical

Correct Marks : 1 Wrong Marks : 0

What is the additive inverse of the $a_0 + ia_1 + ja_2 + ka_3$ in the quaternion's ring H?

a) $-a_0 - ia_1 - ja_2 - ka_3$

b) $0 + 0i + 0j + 0k$

c) $-a_0 - ia_1$

d) No inverse elements in H

Question Number : 71 Question Id : 70959727505 Question Type : MCQ Option Shuffling : No Display Question Number : Yes Single Line Question Option : No Option Orientation : Vertical

Correct Marks : 1 Wrong Marks : 0

Let R be the ring of matrices. Identify the all the trivial subring of R _____

a) Zero ring and R

b) R only

c) Zero ring only

d) none of the above

Question Number : 72 Question Id : 70959727506 Question Type : MCQ Option Shuffling : No Display Question Number : Yes Single Line Question Option : No Option Orientation : Vertical

Correct Marks : 1 Wrong Marks : 0

$M_4(\mathbb{Z}_2)$ is a_____ring

a) Commutative ring

b) Infinite commutative

c) Infinite non-commutative ring

d) Finite non-commutative

Question Number : 73 Question Id : 70959727507 Question Type : MCQ Option Shuffling : No Display Question Number : Yes Single Line Question Option : No Option Orientation : Vertical

Correct Marks : 1 Wrong Marks : 0

Pick the incorrect statement.

a) For $n \geq 2$, the matrix ring $M_n(R)$ has zero divisors

b) The center of a matrix ring over a ring R consists of the matrices which are scalar multiples of the identity matrix, where the scalar belongs to the center of R

c) If R is nontrivial and $n \neq 2$ then $M_n(R)$ is commutative

d) All the above statements are correct

Question Number : 74 Question Id : 70959727508 Question Type : MCQ Option Shuffling : No Display Question Number : Yes Single Line Question Option : No Option Orientation : Vertical

Correct Marks : 1 Wrong Marks : 0

The set of all polynomials with coefficients in $\mathbb{R}$ is denoted by _____.

a) $\mathbb{R}[x]$
b) $\mathbb{R}$
c) $\mathbb{Q}$
d) $\mathbb{Q}[x]$

Question Number : 75 Question Id : 70959727509 Question Type : MCQ Option Shuffling : No Display Question Number : Yes Single Line Question Option : No Option Orientation : Vertical

Correct Marks : 1 Wrong Marks : 0

A ring which is not a principal ideal domain is _____.

a) $\mathbb{Z}$
b) $\mathbb{Z}_5$
c) $\mathbb{Z}[x]$
d) Any field

Question Number : 76 Question Id : 70959727510 Question Type : MCQ Option Shuffling : No Display Question Number : Yes Single Line Question Option : No Option Orientation : Vertical

Correct Marks : 1 Wrong Marks : 0

A polynomial in which the leading coefficient is 1 is called _____ polynomial.

a) Monic
b) Constant
c) Zero
d) Primitive

Question Number : 77 Question Id : 70959727511 Question Type : MCQ Option Shuffling : No Display Question Number : Yes Single Line Question Option : No Option Orientation : Vertical

Correct Marks : 1 Wrong Marks : 0

Let R be a ring and $a \in R$. Then aR is a _____ of R.

a) Right ideal
b) Left ideal
c) Ideal
d) Subring

Question Number : 78 Question Id : 70959727512 Question Type : MCQ Option Shuffling : No Display Question Number : Yes Single Line Question Option : No Option Orientation : Vertical

Correct Marks : 1 Wrong Marks : 0

Let R be a ring and $a \in R$. Then Ra is a _____ of R.

a) Right ideal
b) Left ideal
c) Ideal
d) Subring

Question Number : 79 Question Id : 70959727513 Question Type : MCQ Option Shuffling : No Display Question Number : Yes Single Line Question Option : No Option Orientation : Vertical

Correct Marks : 1 Wrong Marks : 0

An ideal of $\mathbb{Z}_4$ is _____.

a) {0,1}
b) {1,2}
c) {0,2}
d) {1,3}

Question Number : 80 Question Id : 70959727514 Question Type : MCQ Option Shuffling : No Display Question Number : Yes Single Line Question Option : No Option Orientation : Vertical

Correct Marks : 1 Wrong Marks : 0

The unique additive inverse of a is denoted by _____.

a) a

b) $-a$

c) $a+1$

d) $a-1$

Question Number : 81 Question Id : 70959727515 Question Type : MCQ Option Shuffling : No Display Question Number : Yes Single Line Question Option : No Option Orientation : Vertical

Correct Marks : 1 Wrong Marks : 0

In a division ring, the product of two non-zero elements is _____.

a) A non-zero element

b) Zero element

c) Neither (a) nor (b)

d) Both (a) and (b).

Question Number : 82 Question Id : 70959727516 Question Type : MCQ Option Shuffling : No Display Question Number : Yes Single Line Question Option : No Option Orientation : Vertical

Correct Marks : 1 Wrong Marks : 0

In the ring $(\mathbb{Q}, +, .)$, the elements in _____ are all units.

a) $\mathbb{Q}$

b) $\mathbb{Q}^*$

c) $\mathbb{Q}^+$

d) $\mathbb{Z}$

Question Number : 83 Question Id : 70959727517 Question Type : MCQ Option Shuffling : No Display Question Number : Yes Single Line Question Option : No Option Orientation : Vertical

Correct Marks : 1 Wrong Marks : 0

Which of the following map is a group homomorphisim but not a ring homomorphism on set of integers $\mathbb{Z}$?

a) $f(x) = x$

b) $f(x) = -x$

c) $f(x) = 2x$

d) $f(x) = 1$

Question Number : 84 Question Id : 70959727518 Question Type : MCQ Option Shuffling : No Display Question Number : Yes Single Line Question Option : No Option Orientation : Vertical

Correct Marks : 1 Wrong Marks : 0

Which of the following is not a ring homomorphism ?

a) $f: (Q, +, .)$ to $(Q, +, .)$ by $f(x) = x$, where Q is the set of rational numbers.

b) $f(x, y, z) = (x, 0)$ from $\mathbb{Z} \times \mathbb{Z} \times \mathbb{Z}$ to $\mathbb{Z} \times \mathbb{Z}$.

c) $f(x, y, z) = z$ from $\mathbb{Z} \times \mathbb{Z} \times \mathbb{Z}$ to $\mathbb{Z}$.

d) $f(x, y, z) = x + y$ from $\mathbb{Z} \times \mathbb{Z} \times \mathbb{Z}$ *to* $\mathbb{Z}$.

Question Number : 85 Question Id : 70959727519 Question Type : MCQ Option Shuffling : No Display Question Number : Yes Single Line Question Option : No Option Orientation : Vertical

Correct Marks : 1 Wrong Marks : 0

If f is a homomorphism of a ring R into another ring R' with ker(f), then which of the following is false?

a) ker(f) is an ideal.
b) ker(f) is a subgroup under addition.
c) ker(f)={0}.
d) ker(f) is a subset of R.

Question Number : 86 Question Id : 70959727520 Question Type : MCQ Option Shuffling : No Display Question Number : Yes Single Line Question Option : No Option Orientation : Vertical

Correct Marks : 1 Wrong Marks : 0

For ideals I and J of R,

(i) their sum is I+J={i+j such that i in I and j in J}

(ii) the product is the ideal generated by all products of the form ij with i in I and j in J.

Pick the correct statement,

a) (i) and (ii) are true.
b) Only (i) is true.
c) Only (ii) is true.
d) both (i) and (ii) are false.

Question Number : 87 Question Id : 70959727521 Question Type : MCQ Option Shuffling : No Display Question Number : Yes Single Line Question Option : No Option Orientation : Vertical

Correct Marks : 1 Wrong Marks : 0

The ideal generated by two nonzero integers n and m is

a) ⟨{m,n}⟩=⟨lcm({m,n})⟩.
b) ⟨{m,n}⟩=⟨g.c.d({m,n})⟩
c) ⟨{m,n}⟩=⟨mn⟩
d) ⟨{m,n}⟩=⟨m+n⟩

Question Number : 88 Question Id : 70959727522 Question Type : MCQ Option Shuffling : No Display Question Number : Yes Single Line Question Option : No Option Orientation : Vertical

Correct Marks : 1 Wrong Marks : 0

Collection of all ideals of a ring

a) Forms a complete lattice with respect to inclusion.
b) Forms a partially ordered set need not be a lattice.
c) Contains only empty set and full set.
d) Forms a chain.

Question Number : 89 Question Id : 70959727523 Question Type : MCQ Option Shuffling : No Display Question Number : Yes Single Line Question Option : No Option Orientation : Vertical

Correct Marks : 1 Wrong Marks : 0

Characteristic of the ring Z_8 is

a) 2
b) 8
c) 4
d) 0

Question Number : 90 Question Id : 70959727524 Question Type : MCQ Option Shuffling : No Display Question Number : Yes Single Line Question Option : No Option Orientation : Vertical

Correct Marks : 1 Wrong Marks : 0

Cancellation law for multiplication holds in

a) Any ring
b) Commutative ring
c) Finite ring
d) Integral domain

Question Number : 91 Question Id : 70959727525 Question Type : MCQ Option Shuffling : No Display Question Number : Yes Single Line Question Option : No Option Orientation : Vertical

Correct Marks : 1 Wrong Marks : 0

Which of the following can not be the characteristic of an integral domain

a) 2
b) 3
c) 4
d) 5

Question Number : 92 Question Id : 70959727526 Question Type : MCQ Option Shuffling : No Display Question Number : Yes Single Line Question Option : No Option Orientation : Vertical

Correct Marks : 1 Wrong Marks : 0

Let R be a field, then

a) R has atleast one proper nontrivial ideal.
b) R has no proper nontrivial ideal.
c) {0} is not a maximal ideal.
d) {0} is not a prime ideal.

Question Number : 93 Question Id : 70959727527 Question Type : MCQ Option Shuffling : No Display Question Number : Yes Single Line Question Option : No Option Orientation : Vertical

Correct Marks : 1 Wrong Marks : 0

A commutative ring R with identity is an integral domain if and only if

a) {0} is a prime ideal.
b) {0} is a maximal ideal.
c) {0} is not a maximal ideal.
d) {0} and R are the only ideals of R.

Question Number : 94 Question Id : 70959727528 Question Type : MCQ Option Shuffling : No Display Question Number : Yes Single Line Question Option : No Option Orientation : Vertical

Correct Marks : 1 Wrong Marks : 0

If R is a commutative ring with unity, then which of the following statement is true?

a) Every prime ideal of R is a maximal ideal.
b) Every maximal ideal of R is a prime ideal.
c) {0} is a prime ideal.
d) None of the above.

Question Number : 95 Question Id : 70959727529 Question Type : MCQ Option Shuffling : No Display Question Number : Yes Single Line Question Option : No Option Orientation : Vertical

Correct Marks : 1 Wrong Marks : 0

The units of the set Z[i] of Gaussian integers are

a) 1
b) ±1
c) ±1 and ±i
d) The set of all integers Z.

Question Number : 96 Question Id : 70959727530 Question Type : MCQ Option Shuffling : No Display Question Number : Yes Single Line Question Option : No Option Orientation : Vertical

Correct Marks : 1 Wrong Marks : 0

Every nonempty set of positive integers contains

a) A smallest member.
b) A largest mamber.
c) A smallest and a largest number.
d) None of the above

Question Number : 97 Question Id : 70959727531 Question Type : MCQ Option Shuffling : No Display Question Number : Yes Single Line Question Option : No Option Orientation : Vertical

Correct Marks : 1 Wrong Marks : 0

Which of the following statements are true

a) Every Euclidean domain is a field.
b) Every Principal ideal domain is a Euclidean domain.
c) Every Principal ideal domain is a field.
d) Every Euclidean domain is a principal ideal domain.

Question Number : 98 Question Id : 70959727532 Question Type : MCQ Option Shuffling : No Display Question Number : Yes Single Line Question Option : No Option Orientation : Vertical

Correct Marks : 1 Wrong Marks : 0

In ring of polynomials with rational coefficients, Q[x] the units are

a) The constant polynomials
b) The non constant polynomials
c) The non-zero polynomials
d) The non-zero constant polynomials

Question Number : 99 Question Id : 70959727533 Question Type : MCQ Option Shuffling : No Display Question Number : Yes Single Line Question Option : No Option Orientation : Vertical

Correct Marks : 1 Wrong Marks : 0

Let D be a UFD, and let p(x) and q(x) be in D[x]. Then the content of p(x)q(x) is equal to

a) The sum of the contents of p(x) and q(x).
b) The product of the contents of p(x) and q(x).
c) Content of p(x) - content of q(x)
d) None of the above

Question Number : 100 Question Id : 70959727534 Question Type : MCQ Option Shuffling : No Display Question Number : Yes Single Line Question Option : No Option Orientation : Vertical

Correct Marks : 1 Wrong Marks : 0

Associates of i in $\mathbb{Z}[i]$ are

a) Only i
b) i, -i
c) 1, -1, i, -i
d) All elements of $\mathbb{Z}[i]$.