

FBQ1: Let  $G = \{1, -1, i, -i\}$ . Then  $G$  is a group under usual multiplication of complex numbers, in this group, the order of  $i$  is \_\_\_\_.

Answer: 4

FBQ2:

Answer:  $(4,1)$

FBQ3:

Answer: N

FBQ4: The order of  $(12)$  in is \_\_\_\_\_.

Answer: 2

FBQ5: In a permutation, any cycle of length two is called \_\_\_\_\_.

Answer: Transposition

FBQ6: A field  $K$  is called \_\_\_\_\_ of  $F$  if  $F$  is a subfield of  $K$ , thus  $Q$  is a subfield of  $R$  and  $R$  is a field extension of  $Q$

Answer: Field extension

FBQ7:

Answer: Proper subfield

FBQ8:

Answer: Primitive

FBQ9: We call an integral domain  $R$  a \_\_\_\_\_ if every non - zero element of  $R$  which is not a unit in  $R$  can be uniquely expressed as a product of a finite number of irreducible elements of  $R$

Answer: Unique factorization domain

FBQ10:

Answer: Greatest Common divisor

FBQ11: Given two elements  $a$  and  $b$  in a ring  $R$ , we say that  $c$  is a \_\_\_\_\_ of  $a$  and  $b$  if  $c|a$  and  $c|b$ .

Answer: Common divisor

FBQ12: We call an integral domain  $R$  a \_\_\_\_\_ if every ideal in  $R$  is a principal ideal.

Answer: Principal ideal

FBQ13: \_\_\_\_\_.

Answer: 2

FBQ14: Let  $R$  be an integral domain, an element  $a \in R$  is called a unit or an \_\_\_\_\_ in  $R$  if we can find  $b \in R$  such that  $ab = 1$  i.e if  $a$  has a multiplicative inverse

Answer: Invertible element

FBQ15: A domain on which we can define a Euclidean valuation is called \_\_\_\_\_.

Answer: Euclidean domain

FBQ16:

Answer: Euclidean Evaluation

FBQ17:

Answer: Root of multiplicity  $m$

FBQ18: Let  $F$  be a field and  $f(x) \in F[x]$  we say that an element  $a \in F$  is a \_\_\_\_\_ (or zero) of  $f(x)$  if  $f(a) = 0$

Answer: Factor

FBQ19: If  $S$  is set, an object ' $a$ ' in the collection  $S$  is called

an \_\_\_\_\_ of  $S$

Answer: Element

FBQ20: A set with \_\_\_\_\_ element in  $S$  is called an empty set

Answer: No

FBQ21: \_\_\_\_\_ method is sometimes used to list the element of a large set

Answer: Roster

FBQ22: The set of rational numbers and the set of real numbers are respectively represented by the symbol \_\_\_\_\_ and \_\_\_\_\_.

Answer:  $Q$  and  $R$

FBQ23: The symbol  $\exists$  denotes \_\_\_\_\_.

Answer: There exist

FBQ24: If  $A$  and  $B$  are two subsets of a set  $S$ , we can collect the element that are common to both  $A$  and  $B$ , we call this set the \_\_\_\_\_ of  $A$  and  $B$ .

Answer: Intersection

FBQ25: A relation  $R$  defined on a set  $S$  is said to be \_\_\_\_\_ if we have

Answer: Reflexive

FBQ26: A relation  $R$  defined on a set  $S$  is said to be \_\_\_\_\_ if

Answer: Symmetric

FBQ27: A relation  $R$  defined on a set  $S$  is said to be \_\_\_\_\_ if  $a R b$  and

Answer: Transitive

FBQ28: A relation  $R$  defined on a set  $S$  that is reflexive, symmetric and transitive is called \_\_\_\_\_ relation

Answer: Equivalence

FBQ29: A \_\_\_\_\_  $f$  from a non - empty set  $A$  to a non - empty set  $B$  is a rule which associates with every element of  $A$  exactly one element of  $B$

Answer: Function

FBQ30: A function is called \_\_\_\_\_ if it associates different elements of  $A$  with different elements of  $B$

Answer: Injective

FBQ31: A function is called \_\_\_\_\_ if the range of  $f$  is  $B$ .

Answer: Onto

FBQ32:

Answer: Projection

FBQ33: A function that is both one to one and onto is called \_\_\_\_\_

Answer: Bijective

FBQ34: \_\_\_\_\_ set.

Answer: Finite

FBQ35: A set that is not \_\_\_\_\_ is called infinite set

Answer: Finite

FBQ36: \_\_\_\_\_

Answer: Bijective

FBQ37:  $1$  and  $p$

Answer: Prime

FBQ38: \_\_\_\_\_ number

Answer: Composite

FBQ39: \_\_\_\_\_ on A.

Answer: Identity function

FBQ40: \_\_\_\_\_ on S.

Answer: Binary operation

FBQ41:

Answer: Closed

FBQ42:

Answer: Associative

FBQ43:

Answer: Commutative

FBQ44: \_\_\_\_\_.

Answer: Distributive over

FBQ45:

Answer: Identity element

FBQ46: The Cayley table is named after the famous mathematician

Answer: Arthur Cayley

FBQ47: \_\_\_\_\_ system consists of a set with a binary operation which satisfies certain properties is called a group

Answer: Algebraic

FBQ48:

Answer: The integral power

FBQ49: is an equivalence relation, and hence partition Z into disjoint equivalence classes called \_\_\_\_\_ modulo n.

Answer: Congruence class

FBQ50: If the set X is finite, say  $X = \{1, 2, 3, \dots, n\}$  then we denote  $S(x)$  by and each of is called a \_\_\_\_\_ on n symbols

Answer: Permutation

MCQ1: In a principle ideal Domain an element is prime if and only if it is

Answer: Reducible

MCQ2:

Answer: I only

MCQ3:

Answer:  $3x+1$

MCQ4:

Answer: II only

MCQ5:

Answer: II only

MCQ6:

Answer:

MCQ7:

Answer: 1

MCQ8:

Answer:  $f(a) = 1$

MCQ9: Express  $x^4 + x^3 + 5x^2 - x$  as  $(x^2 + x + 1) + rx$  in  $\mathbb{Q}[x]$

Answer: None of the options

MCQ10: Let  $F$  be a field. Let  $f(x)$  and  $g(x)$  be two polynomials in  $F[x]$  with  $g(x) \neq 0$ . Then I There exist two polynomials  $q(x)$  and  $r(x)$  in  $F[x]$  such that  $f(x) = q(x)g(x) + r(x)$ , where  $\deg(r(x)) < \deg(g(x))$ . II The polynomials  $q(x)$  and  $r(x)$  are unique, which of the following is a properties of Division Algorithm

Answer: I only

MCQ11: Which of the following polynomial ring is free from zero divisor

Answer:  $\mathbb{Z}_6$

MCQ12: . Let  $R$  be a ring and  $f(x)$  and  $g(x)$  be two non - zero element of  $R[x]$ . Then  $\deg(f(x)g(x)) \leq \deg f(x) + \deg g(x)$  with equality if

Answer:  $R$  does not have a zero divisor

MCQ13: If  $p(x), q(x) \in \mathbb{Z}[x]$  then the  $\deg(p(x).q(x))$  is

Answer:  $\max(\deg p(x), \deg q(x))$

MCQ14: If  $f(x) = a_0 + a_1x + \dots + a_nx^n$  and  $g(x) = b_0 + b_1x + \dots + b_mx^m$  are two polynomials in  $R[x]$ , we define their product  $f(x).g(x) = c_0 + c_1x + \dots + c_{m+n}x^{m+n}$  where  $c_i$  is

Answer:  $a_i b_j \forall i = 0, 1, \dots, m+n$

MCQ15: Consider the two polynomials  $p(x), q(x)$  in  $\mathbb{Z}[x]$  by  $p(x) = 1 + 2x + 3x^2$ ,  $q(x) = 4 + 5x + 7x^3$ . Then  $p(x) + q(x)$  is

Answer:  $5 + 7x + 3x^2 + 7x^3$

MCQ16: Determine the degree and the leading coefficient of the polynomial  $1 + x^3 + x^4 + 0.x^5$  is

Answer:  $(3, 1)$

MCQ17: The Degree of a polynomial written in this form  $\deg(\sum_{i=0}^n a_i x^i)$  if  $a_n \neq 0$  is

Answer:  $n$

MCQ18: Let  $R$  be a domain and  $x \in R$  be nilpotent then  $x^n = 0$  for some  $n \in \mathbb{N}$ . Since  $R$  has no zero divisors this implies that

Answer:  $x = 0$

MCQ19: An ideal  $m$  of  $\mathbb{Z}$  is maximal if and only if  $m$  is

Answer: A prime number

MCQ20: Every maximal ideal of a ring with identity is

Answer: A prime ideal

MCQ21: Let  $R$  be a ring with identity. An ideal  $M$  in  $R$  is Maximal if and only if  $R/M$  is

Answer: A field

MCQ22: An ideal  $p$  of a ring  $R$  with identity is a prime ideal of  $R$  if and only if the quotient ring is

Answer: An integral domain

MCQ23: The characteristics of a field is either

Answer: None of the options

MCQ24:  $\mathbb{Z}_n$  is a field if and only if

Answer:  $n$  is a prime number

MCQ25: Which of the following is an axioms of a field

Answer: Is commutative

MCQ26: Let  $R$  be a ring, the least positive integer  $n$  such that  $nx = 0 \forall x \in R$

is called

Answer: The order of  $R$

MCQ27: Which of the following is not a property of an integral domain

Answer: Is a commutative ring

MCQ28: A non - zero element in a ring  $R$  is called zero divisor in  $R$  if there exist a non - zero element  $b$  in  $R$  such that

Answer:  $ab = 0$

MCQ29: If  $H$  is a subgroup of a group  $G$  and  $a, b \in G$  then which of the following statement is true

Answer:  $Ha = H$  Iff  $a \in H$

MCQ30: Let  $G$  be a group and  $a \in G$  such that  $O(a) = t$ , then  $a^n = a^m$ , if and only if

Answer: None of the options

MCQ31: Which of these does not hold for  $\times$  distributive over  $+$  and  $-$

Answer:  $A \times (B + C) = A \times B + A \times C$

MCQ32: The symmetric difference of two given sets  $A$  and  $B$ , denoted by  $A \Delta B$  is defined by

Answer:  $A \Delta B = (A - B) \cup (B - A)$

MCQ33: The (relative) complement (or difference) of a set  $A$  with respect to a set  $B$  denoted by  $B - A$  (or  $B \setminus A$ ) is the set

Answer:  $B - A = \{x \in B : x \notin A\}$

MCQ34: Which of the following is of the operations and

Answer: Associative  $A(BC) = (AB)C$  and  $A(BC) = (AB)C$  for three sets  $A, B, C$

MCQ35: The intersection of two sets  $A$  and  $B$  written as  $AB$  is

Answer: The set  $AB = \{x : x \in A \text{ and } x \in B\}$

MCQ36: A set  $X$  of  $n$  elements has

Answer:  $2^n$  subsets

MCQ37: If  $G$  is a finite group such that  $O(G)$  is neither 1 nor a prime, then  $G$  has

Answer: Non - trivial proper subgroup

MCQ38: Which of the following is not the definition of Euler Phi - function

MCQ39: Every group of prime order is

Answer: Non - abelian

MCQ40: An element is of infinite order if and only if all its power are

Answer: Real

MCQ41: Consider the following set of  $8 \times 8$  matrices over  $\mathbb{C}$ .  $Q_8 = \{\pm I, \pm A, \pm B, \pm C\}$  where  $I = \begin{pmatrix} 1 & 0 \\ 0 & 1 \end{pmatrix}$ ,  $A = \begin{pmatrix} i & 0 \\ 0 & -i \end{pmatrix}$ ,  $B = \begin{pmatrix} 0 & 1 \\ -1 & 0 \end{pmatrix}$ ,  $C = \begin{pmatrix} 0 & i \\ 1 & 0 \end{pmatrix}$  and  $i = \sqrt{-1}$ . If  $H = \langle A \rangle$  is a subgroup, how many distinct right cosets does it have in  $Q_8$

Answer: 8

MCQ42: Let  $H = 4\mathbb{Z}$ . How many distinct right coset of  $H$  in  $\mathbb{Z}$  do we have?

Answer: 2

MCQ43: A function  $f : A \rightarrow B$  is called one - one if and only if different element of  $A$  some time is called

Answer: Bijective

MCQ44: Let  $G$  be a group,  $g \in G$  and  $m, n \in \mathbb{Z}$ . which of the following does not hold

Answer:  $(gm)^n = gmn$

MCQ45: Let  $G$  be a group. If there exist  $g \in G$  has the form  $x = g^n$  for some  $n \in \mathbb{Z}$  then  $G$  is

Answer: A cyclic group

MCQ46: Let  $H = \{I, (1, 2)\}$  be a subgroup of  $S_3$ . The distinct left cosets of  $H$  in  $S_3$  are

Answer:  $H, (123)H, (12)H$

MCQ47: The order of \_\_\_\_\_ in  $Q_8$  is \_\_\_\_\_;

Answer: 4

MCQ48: The order of  $(12)$  in  $S_3$  is

Answer: 2

MCQ49: A group generated by  $g$  is given by  $\langle g \rangle = \{e, g, g^2, \dots, g^{m-1}\}$  the order of  $g$  is

Answer:  $m$

MCQ50: Let  $H$  be a subgroup of a finite group  $G$ . We call the number of distinct of  $H$  in  $G$  \_\_\_\_\_.

Answer: index