

Question Bank for PG Course

অঙ্ক (Mathematics)

প্রথম(ক) পত্র (Paper - IA)

Abstract Algebra : PGMT-IA

1. What are the generators of the cyclic group Z of integers?
2. Determine whether, the ring of integers modulo p i.e., Z_p (p is prime) is a field or skew field or ring with unity .
3. How many disjoint cycles do yield the permutation $\begin{pmatrix} 1 & 2 & 3 & 4 & 5 & 6 \\ 2 & 5 & 1 & 6 & 4 & 3 \end{pmatrix}$ as their product?
4. If Z be the set of integers, then number of elements of the quotient group $Z/3Z$ is
5. Let G be a group and $a \in G$, $b \in G$. Then the derived group of G is the subgroup of G generated by elements of some form .Find that form
6. Let R^* be the multiplicative group of non- zero real numbers. Find the kernel of the group homomorphism $f: R^* \rightarrow R^*$ given by $f(x) = |x|$, $\forall x \in R^*$.
7. What is the characteristic of an integral domain?
8. Let M be a maximal ideal of a non- zero commutative ring R with unity. Then determine whether R/M is an integral domain or field.
9. Let R be the ring of 2×2 matrices of the form $\begin{pmatrix} a & b \\ 0 & 0 \end{pmatrix}$, where $a \in F$, $b \in F$, F being a field. Then what may be said about the ideal $M = \left\{ \begin{pmatrix} 0 & b \\ 0 & 0 \end{pmatrix} : b \in F \right\}$?
10. Let the field K be a finite extension of degree n over a finite field F with m elements. Then how many elements does K have?
11. What may be said about the multiplicative group of all non-zero elements of a finite field?
12. Let G_1 be a finite extension field over a field F and G_2 be a finite extension field over the field F . Then find $[G_2:F]$.

13. What is the degree of extension of the splitting field $x^3 - 2 \in \mathbb{Q}[x]$ over \mathbb{Q} , where \mathbb{Q} is the field of rational numbers?
14. Which of the following field is a prime field:
(a) field of rational numbers \mathbb{Q} ,
(b) field of real numbers \mathbb{R} ;
(c) field of complex numbers \mathbb{C} ;
(d) none of these.
15. Let G be a finite extension field over a field F of degree m . Then what is the dimension of the vector space G over the field F ?