Q.N.	**TYBSc(Mathematics)** **Subject : MTH 503: Algebra** **Question Bank**	Ans
1)	A subgroup H of a group G is called a normal subgroup of G if… a)$Ha = Ha^{-1}, \forall a \in G$ b)$Ha = aH, \forall a \in G$ c)$Ha = a^{-1}H, for\ some\ a \in G$ d) $Ha = aH^{-1}, \forall a \in G$	(B)
2)	Read the following statement and choose the correct option. Statement: The kernel of a group homomorphism is always a normal subgroup. This statement is (A) True (B) False (C) Not relevant (D) None of these	(A)
3)	A normal subgroup is also called … (A) invariant subgroup (B) self-conjugate subgroup (C) both (A) and (B) (D) none of these	(C)
(4)	A group $G \neq \{e\}$ is called a ………. if the only normal subgroups of G are $\{e\}$ and G. (A) simple group (B) finite group (C) infinite group (D) quotient group	(A)
(5)	Let G be a group. The subgroup of G whose members are finite products of elements of the form $aba^{-1}\,b^{-1}, a \in G$and $b \in G$ is called the …. (A) Commutative subgroup (B) Commutator subgroup (C) Non Commutator Subgroup (D) None of these	(B)
(6)	A group G is an abelian group if and only if the commutator subgroup of G is the … (A) Trivial group (B) Non-trivial group (C) Both (A) and (B) (D) None of these	(A)
(7)	Read the following statement and choose the correct option. **Statement:** The commutator subgroup of a group is a normal subgroup. This statement is (A) True (B) False (C) Irrelevant (D) None of these	(A)
(8)	Read the following statement and choose the correct option. **Statement:** The commutator subgroup of a group is not a normal subgroup. This statement is (A) True (B) False (C) Irrelevant (D) None of these	(B)
(9)	Let G be a group and G' the commutator subgroup of G . Then G/G' is… (A) Abelian group (B) Non abelian group	(A)

	(C) Not a quotient group (D) None of these	
(10)	Let H be a subgroup of a group G and $a \in G$. Then, the right coset of H in a group G is given by (A) $aH = \{ha/h \in H\}$ (B) $Ha = ah/h \in H$ (C) $Ha = \{he/h \in H, e \in G\}$ (D) $Ha = \{ha/h \in H\}$	(D)
(11)	Let $G = \mathbb{Z}$ (group) and its subgroup $H = 3$. Then the quotient group G/H is… (A) $\mathbb{Z}_3$ (B) $\mathbb{Z}$ (C) $3\mathbb{Z}$ (D) Not exist	(A)
(12)	Consider the group Z_{12} with addition modulo $\oplus_{12}$ and let H $=\{0,3,6,9\}$. Then H is a subgroup of G and the elements of left coset $8+H$ are… (A) $\{0,3,6,9\}$ (B) $\{0,1,2,3,4,5,6,7,8,9,10,11\}$ (C) $\{2,5,8,11\}$ (D) $\{8,11,14,17,0\}$	(C)
(13)	$a * H = H * a$ relation holds if H is (A) a semigroup of an abelian group (B) a cyclic group (C) a monoid of a group (D) a subgroup of an abelian group	(D)
(14)	If G is a finite group and N is a normal subgroup of G then $0\left({}^{G}/_{N}\right) = \ldots..$ (A) $\frac{o(G)}{o(N)}$ (B) $\frac{o(N)}{o(G)}$ (C) $\frac{o(G)}{o(H)}$ (D) does not exist	(A)
(15)	Read the following statements and choose the correct option. **Statement I:** If G is an abelian group then so would be any of its quotient group is an abelian group. **Statement II:** We can have an abelian quotient group, without the 'parent' group being an abelian. (A) Only statement I is true (B) Only statement II is true (C) Both (A) and (B) are true (D) None of these	(C)
(16)	Let G and G' be isomorphic. If G is an abelian group, so G' is… (A) non-abelian group (B) an abelian group (C) finite group (D) none of these	(B)
(17)	Let $\theta : G \to G'$ be an isomorphism of G onto G' . Let e and e' be the unit elements of G and G' respectively. Then (A) $\theta(e) = e'$ (B) $\theta(e) = e$ (C) $\theta(e) = 0$ (D) $\theta(0) = e'$	(A)
(18)	Let $\theta: G \to G'$ be an isomorphism of G onto G' . Let e and e' be the unit elements of G and G' respectively. Then for any $a \in G$, (A) $\theta(a^{-1}) = e$ (B) $\theta(a^{-1}) = e'$ (C) $\theta(a^{-1}) = a$ (D) $\theta(a^{-1}) = [\theta(a)]^{-1}$	(D)
(19)	Let $\theta: G \to G'$ be a homomorphism of G onto G' and let K $= \ker \theta$. Then K is a normal subgroup of G and $G/K = \ldots\ldots.$ (A) G' (B) G (C) K (D) None of these	(A)

(20)	Any infinite cyclic group is isomorphic to (A) Z (B) Z_n (C) Z/n (D) Z/nZ	(A)
(21)	If $f: G \to G'$ be an onto homomorphism with $K = Ker\, f$, then …. (A) $\frac{G}{K} \cong G$ (B) $\frac{G}{K} \cong G'$ (C) $\frac{G}{K} \neq G'$ (D) none of these	(B)
(22)	Let S be a non-empty set. Any….,….. mapping $f: S \to S$ is called a permutation. (A) one-one, onto (B) many-one, onto (C) one-one, into (D) many-one, into	(A)
(23)	An …….of G onto itself is called an ……of G, where G is a group. (A) automorphism, isomorphism (B) homomorphism, automorphism (C) isomorphism, automorphism (D) none of thes	(C)
(24)	Any finite cyclic group of order n is isomorphic to (A) Z (B) Z_n (C) Z/n(D) none of these	(B)
(25)	Permutation is a………mapping. (A) injective (B) surjective (C) bijective (D) only injective	(C)
(26)	A cycle of length two is called …. (A) identity permutation (B) transposition (C) orbit (D) odd permutation	(B)
(27)	In the following permutation on 4-symbols, what is the value of $\sigma(3)$? $$\sigma = \begin{pmatrix} 1 & 2 & 3 & 4 \\ 2 & 1 & 4 & 3 \end{pmatrix}$$ (A) 4 (B) 1 (C) 2 (D) 3	(A)
(28)	Statement:$\sigma = \begin{pmatrix} 1 & 2 & 3 & 4 \\ 1 & 3 & 4 & 1 \end{pmatrix}$is a permutation. This statement is…. (A) True (B) False (C) Can't say (D) None of these	(B)
(29)	The elements of a symmetric group S_3 can be interpreted as symmetries of a …. (A) square (B) tetrahedron (C) Triangle (equilateral) (D) None of these	(C)
(30)	The elements of a symmetric group S_4 can be interpreted as symmetries of a …. (A) square (B) tetrahedron (C) triangle (D) None of these	(B)
(31)	The elements of a symmetric group D_4 can be interpreted as symmetries of a ….	(A)

	(A) square (B) tetrahedron (C) triangle (D) None of these	
(32)	$O(S_n) = \cdots$, where S_n symmetric group of degree n. (A) $(n-1)!$ (B) $n!$ (C) $(n+1)!$ (D)$\frac{n!}{2}$	**(B)**
(33)	Cycle representation of $\sigma = \begin{pmatrix} 1 & 2 & 3 & 4 & 5 \\ 2 & 5 & 3 & 1 & 4 \end{pmatrix} \in S_n$ is… (A) $(1\ 2\ 5\ 4)$ (B) $(2\ 5\ 4\ 1)$ (C) $(4\ 1\ 2\ 5)$ (D) All of these	**(D)**
(34)	Two-line notation for a cycle $(1\ 3\ 5\ 4)$ in S_5 is….. (A)$\sigma = \begin{pmatrix} 1 & 2 & 3 & 4 & 5 \\ 2 & 5 & 3 & 1 & 4 \end{pmatrix}$ (B) $\sigma = \begin{pmatrix} 1 & 2 & 3 & 4 & 5 \\ 3 & 2 & 5 & 1 & 4 \end{pmatrix}$ (C))$\sigma = \begin{pmatrix} 1 & 2 & 3 & 4 & 5 \\ 5 & 2 & 3 & 1 & 4 \end{pmatrix}$ (D))$\sigma = \begin{pmatrix} 1 & 2 & 3 & 4 & 5 \\ 2 & 3 & 5 & 1 & 4 \end{pmatrix}$	**(B)**
(35)	$O(S_3)$..., where S_3 symmetric group of degree 3. (A) 2 (B) 4 (C) 6 (D) 3	**(C)**
(36)	Order of the permutation $\begin{pmatrix} 1 & 2 & 3 & 4 \\ 1 & 3 & 4 & 2 \end{pmatrix}$ is…. (A) 3 (B) 4 (C) 5 (D) 6	**(A)**
(37)	Let $\sigma = \begin{pmatrix} 1 & 2 & 3 & 4 \\ 2 & 1 & 4 & 3 \end{pmatrix}$ and $\tau = \begin{pmatrix} 1 & 2 & 3 & 4 \\ 3 & 2 & 1 & 4 \end{pmatrix}$ be two permutations on 4 symbols, then $\sigma\,\tau =$... (A) $\begin{pmatrix} 1 & 2 & 3 & 4 \\ 2 & 1 & 4 & 3 \end{pmatrix}$ (B) $\begin{pmatrix} 1 & 2 & 3 & 4 \\ 3 & 2 & 1 & 4 \end{pmatrix}$ (C) $\begin{pmatrix} 1 & 2 & 3 & 4 \\ 2 & 3 & 4 & 1 \end{pmatrix}$ (D) $\begin{pmatrix} 1 & 2 & 3 & 4 \\ 4 & 1 & 2 & 3 \end{pmatrix}$	**(D)**
(38)	Express the permutation $\sigma = \begin{pmatrix} 1 & 2 & 3 & 4 & 5 & 6 & 7 & 8 & 9 \\ 3 & 4 & 2 & 1 & 6 & 5 & 8 & 9 & 7 \end{pmatrix}$ as a product of disjoint cycles. (A) $(1324)(56)$ (B) $(1324)(789)$ (C) $(1324)(5)(6)(789)$ (D) $(1324)(56)(789)$	**(D)**
(39)	The single row representation of the permutation $\begin{pmatrix} 1 & 2 & 3 & 4 & 5 & 6 \\ 2 & 3 & 5 & 6 & 1 & 4 \end{pmatrix}$ is… (A) $(1235)(46)$ (B) (123456) (C) (123651) (D) $(125)(46)$	**(B)**
(40)	The group S_n is a finite group and is non-abelian if (A) $n \geq 2$ (B) $n > 2$ (C) $n \leq 2$ (D) $n < 2$	**(B)**

41)	The permutation $\sigma = \begin{pmatrix} 1\,2\,3\,4\,5\,6\,7 \\ 3\,4\,1\,5\,6\,7\,2 \end{pmatrix}$ is …. (A) an even permutation (B) an odd permutation (C) neither even nor odd permutation (D) None of these	**(B)**
42)	A permutation is called …….permutation if it can be expressed as a product of ……..number of transpositions. (A) even, odd (B) odd, even (C) odd, odd (D) none of these	**(C)**
43)	The group S_n of all permutations defined on n-symbols is called (A) the symmetric group (B) the non-symmetric group (C) transposition (D) abelian group	**(A)**
44)	A permutation is called …….permutation if it can be expressed as a product of ……..number of transpositions. (A) even, even (B) even, odd (C) odd, even (D) none of these	**(A)**
45)	If $S = \{1, 2, 3, 4\}$ then, in A_4 how many permutations are there? (A) 12 (B) 21 (C) 24 (D) 4	**(A)**
46)	The alternating group is the group of all …………permutations. (A) even (B) odd (C) both (A) and (B) (D) none of these	**(A)**
47)	$O(A_4) = ...$, where A_4 is the subgroup of S_4. (A) 21 (B) 12 (C) 24 (D) 6	**(B)**
49)	Identity permutation is always…….permutation. (A) even (B) odd (C) neither even nor odd permutation (D) none of these	**(A)**
50)	The inverse of an odd permutation is …….. permutation. (A) even (B) neither even nor odd permutation (C) odd (D) none of these	**(C)**
51)	The value of $\sigma(4)$ if $\sigma = (1\ 4\ 3\ 2)$ (A) 1 (B) 2 (C) 4 (D) 3	**(D)**
52)	The inverse of $(1\ 2\ 3\ 4)$ is (A) $(4\ 3\ 2\ 1)$ (B) $(2\ 3\ 4\ 1)$ (C) $(1\ 2\ 3\ 4)$ (D) $(1\ 4\ 3\ 2)$	**(A)**
53)	If R is a ring then trivial subrings of R are … (A) $\{0\}$ (B) R (C) $\{0\}$and R (D) none of these	**(C)**
54)	Let I_1 and I_2 are any two ideal of a ring R, then which of the following is incorrect? (A) $I1 \cup I2$ is an ideal of R	**(A)**

	(B) $I_1 \cap I_2$ is an ideal of R (C) $I_1 + I_2$ is an ideal of R (D) $I_1 I_2$ is an ideal of R	
55)	If I is an ideal in a ring R, then…. (A) $\frac{I}{R}$ is a ring (B) $\frac{R}{I}$ is a ring (C) RI is a ring (D) None of these	**(B)**
56)	If R is a commutative ring with unit element, M is an ideal of R and $\frac{R}{M}$ is a field, then (A) M is minimal ideal of R (B) M is maximal ideal of R (C) M is not a maximal ideal of R (D) None of these	**(B)**
57)	If R is a commutative ring with unit element, then (A) every maximal ideal is prime ideal (B) every prime ideal is maximal ideal (C) every ideal is prime ideal (D) every ideal is maximal ideal	**(A)**
58)	If R is a finite commutative ring, then (A) every maximal ideal is prime ideal (B) every prime ideal is maximal ideal (C) every ideal is prime ideal (D) every ideal is maximal ideal	**(B)**
59)	Let $H_4 = \{4n / n \in \mathbb{Z}\}$ is a……………….ideal in the ring of even integers. (A) maximal (B) prime (C) neither prime nor maximal (D) none of these	**(A)**
60)	Let $H_4 = \{4n / n \in \mathbb{Z}\}$ is a……………….ideal in the ring of integers. (A) maximal (B) prime (C) neither prime nor maximal (D) none of these	**(C)**
61)	If $R = \mathbb{Z}_6$ then $I = \{\overline{0}, \overline{3}\}$ is a… (A) ideal in $R = \mathbb{Z}_6$ (B) not ideal in $R = \mathbb{Z}_6$ (C) ideal in $R = \mathbb{Z}$ (D) None of these	**(A)**
62)	Choose the ideals in a ring $R = Z$. (A) $I = 2\mathbb{Z}$ (B) $I = 3\mathbb{Z}$ (C) $I = 5\mathbb{Z}$ (D) All of these	**(D)**
63)	Which of the following is prime ideal of a ring $R = \mathbb{Z}$. (A) $I = 4\mathbb{Z}$ (B) $I = 6\mathbb{Z}$ (C) $I = 5\mathbb{Z}$ (D) All of these	**(C)**
64)	A non-empty subset S of a ring R is a subring of R if and only if	**(C)**

	$a, b \in S$, then (A) only $ab \in S$ (B) only $a - b \in S$ (C) $ab \in S$ and $a - b \in S$ (D) none of these	
65)	Consider a quotient ring $\frac{\mathbb{Z}}{H_4} = \{H_4, H_4 + 1, H_4 + 2, H_4 + 3\}$, Where, $\{H_4 = 4n / n \in \mathbb{Z}\}$ and $(\mathbb{Z}, +, *)$ is the ring of integers. The additive identity in the quotient ring $\frac{\mathbb{Z}}{H_4}$ is…. (A) $H_4 + 1$ (B) H_4 (C) $H_4 + 2$ (D) $H_4 + 3$	**(B)**
66)	The ring $(\mathbb{Z}, +, *)$ has unity1, but its subring $(\mathrm{E}, +, *)$ of even integers has….. (A) unity1 (B) unity 2 (C) unity 0 (D) no unity	**(D)**
67)	If $R = Ring\ of$ integers, then characteristic of R is… (A) 0 (B) 1 (C) 2 (D) 3	**(A)**
68)	The characteristic of the ring of integers (R) and ring of even integers (E) is such that (A) $chR < chE$ (B) $chR \neq chE$ (C) $chR > chE$ (D) $chR = chE$	**(D)**
69)	What is the characteristic of the ring of even integers? (A) 6 (B) 4 (C) 2 (D) 0	**(D)**
70)	The characteristic of the ring $\mathbb{Z}_6$ is …. (A) 6 (B) 5 (C) 2 (D) 3	**(A)**
71)	If integral domain D is of finite characteristic, then its characteristic is….. (A) odd number (B) even number (C) prime number (D) natural number	**(C)**
72)	A non-empty subset I of a ring R is called a right ideal of R if (A) $a, b \in I \Rightarrow a - b \in I$ (B) $a \in I,\ r \in R \Rightarrow ar \in I$ (C) $a \in I,\ r \in R \Rightarrow ra \in I$ (D) both (A) and (B)	**(B)**
73)	Read the following statements and choose the correct option. **Statement I:** An ideal is always a subring. **Statement II:** A subring may not be an ideal. (A) Only statement I is true (B) Only statement II is true (C) Both (A) and (B) are true (D) None of these	**(C)**
74)	If $\theta : R \to R'$ be a homomorphism (where R and R' be the two rings with $0, 0'$ as zeros respectively) then (A) $\theta(0) = 0', \theta(-a) = -a$ (B) $\theta(0) = 0, \theta(-a) = -a$ (C) $\theta(0) = 0', \theta(-a) = a$ (D) $\theta(0') = 0, \theta(-a) = -a$	**(A)**

75)	Let $(R, +, *)$, $(R', *, o)$ be two rings. A mapping $\theta : R \to R'$ is called a homomorphism if for any $a, b \in R$. (A) $\theta(a+b) = \theta(a) + \theta(b)$ $\theta(a*b) = \theta(a) * \theta(b)$ (B) $\theta(a+b) = \theta(a) * \theta(b)$ $\theta(a*b) = \theta(a)\ o\ \theta(b)$ (C) $\theta(a+b) = \theta(a) + \theta(b)$ (D) $\theta(a*b) = \theta(a)\ o\ \theta(b)$	**(B)**
76)	Let f: $R \to R'$ be a homomorphism of R onto R' with $\ker f = 0$.Then f is…. (A) an endomorphism (B) an isomorphism (C) an automorphism (D) none of these	**(B)**
77)	Let f: $R \to R'$ be a homomorphism of R in R'. Then f is a one-one map if and only if (A) $\ker f > 0$ (B) $\ker f < 0$ (C) $\ker f = 0$ (D) none of these	**(C)**
78)	Read the following statement and choose the correct option. **Statement:** Let $R = Z$ (ring) and $P = pZ$ (ideal), where, p is a prime. Then P is a prime ideal in the ring R. (A) False (B) True (C) Can't say (D) None of these	**(B)**
79)	Read the following statement and choose the correct option. **Statement:** For any ideals I and J of a ring R, the sum $I + J$ and the product IJ are ideals in a ring R. (A) True (B) False (C) Can't say (D) None of these	**(A)**
80)	Two polynomials $f(x) = a_0 + a_1x + a_2x^2 + \cdots + a_nx^n$, $a_n \neq 0$ and $g(x) = b_0 + b_1x + b_2x^2 + \cdots + b_nx^n$, $b_n \neq 0$ will be equal if and only if (A) $m = n$ (B) $a_i = b_i\ \forall i$ (C) both (A) and (B) (D) none of these	**(C)**
81)	If the ring R is an integral domain, then (A) $R[x]$ is an integral domain (B) $R[x]$ is not an integral domain (C) $R[x]$ is a field (D) $R[x]$ is a commutative division ring	**(A)**
82)	Read the following statements and choose the correct option. Let $R[x]$ be the ring of polynomials over a ring R then **Statement I:** R is commutative if and only if $R[x]$ is commutative. **Statement II:** R has unity if and if $R[x]$ has unity. (A) Only statement I is true (B) Only statement II is true (C) Both (A) and (B) are true (D) None of these	**(C)**
83)	Over the field of real numbers the polynomial $x^2 + 25$ is ….. (A) irreducible (B) reducible	**(A)**

	(C) neither reducible nor reducible (D) none of these	
84)	Let $f(x) = 1 + 2x - 2x^2$ and $g(x) = 2 + 3x + 2x^2$ be two members of $Z[x]$, then degree of $f(x) + g(x) = ...$ (A) 0 (B) 1 (C) 4 (D) 5	**(B)**
85)	Consider the ring $R = \{0, 1, 2, 3, 4, 5\}$ modulo6 and $f(x) = 1 + 2x^3$, $g(x) = 2 + x - 3x^2$ be two polynomials in $R[x]$ of degree 3 and 2 respectively. Then degree of $f(x) + g(x) = ...$ (A) 0 (B) 1 (C) 5 (D) 4	**(D)**
86)	Which of the following polynomials of $Z[x]$ are irreducible over Z. (A) $x^2 + 1$ (B) $x^2 + 4$ (C) $x^2 + 25$ (D) All of these	**(D)**
87)	$f(x) \in F[x]$ a polynomial of degree 2 or 3 is reducible if and only if $a \in F$ such that (A) $f(a) = 0$ (B) $f(a) \neq 0$ (C) $f(a) > 0$ (D) $f(a) < 0$	**(A)**
88)	The fact that $f(a) = 0$ is also expressed by saying that a is .... (A) a root of the polynomial $f(x)$. (B) a factor of the polynomial $f(x)$. (C) both (A) and (B) (D) None of these	**(A)**
89)	The polynomial $1 + x + 2x^2$ in $Z_3[x]$ (A) is irreducible (B) is reducible (C) is neither reducible nor reducible (D) none of these	**(A)**
90)	Over the field of complex numbers the polynomial $x^2 + 16$ is ..... (A) irreducible (B) reducible (C) neither reducible nor reducible (D) none of these	**(B)**
91)	Over the field of rational numbers the polynomial $x^2 + 2$ is ..... (A) irreducible (B) reducible (C) neither reducible nor reducible (D) none of these	**(A)**
92)	Which of the following(s) is/are reducible over. (A) $x^2 + 16$ (B) $x^2 + 25$ (C) $x^2 + 1$ (D) All of these	**(D)**
93)	Which of the following is irreducible over $\mathbb{Z}$. (A) $x^2 - 5x + 6$ (B) $x^2 - 7x + 12$ (C) $x^2 - 9x + 20$ (D) None of these	**(D)**

94)	Read the following statement and choose the correct option. Any polynomial of degree 1 is irreducible over a field F. (A) False (B) True (C) Can't say (D) None of these	**(B)**
95)	Which of the following(s) is/are reducible over $\mathbb{Z}$. (A) $x^2 - 5x + 6$ (B) $x^2 - 7x + 12$ (C) $x^2 - 9x + 20$ (D) None of these.	**(D)**
96)	The polynomial $x^4 + x + 1$ in $Z_2[x]$ (A) is irreducible (B) is reducible (C) is neither reducible nor reducible (D) none of these	**(B)**
97)	Let $f(x) = a_0 + a_1x + a_2x^2 + \cdots + a_nx^n$ be a polynomial with integer's coefficients (i.e. $f(x) \in R[x]$). Suppose that for some prime number p, $p\|a_0, p\|a_1, \ldots, p\|a_{n-1}, p\|a_n, p^2\|$ then $f(x)$ is …….. polynomial over the ring of rationals. (A) neither reducible nor reducible (B) reducible (C) irreducible (D) none of these	**(C)**
98)	Let $f(x) = a_0 + a_1x + a_2x^2 + \cdots + a_mx^m$ be any non-zero polynomial in $R[x]$. Then $f(x)$ has degree m if (A) $a_m \neq 0, a_i = 0\ \forall i > m$ (B) $a_m = 0, a_i \neq 0\ \forall i > m$ (C) $a_m = 0, a_i = 0\ \forall i > m$ (D) $a_m \neq 0, a_i \neq 0\ \forall i > m$	**(A)**
99)	The polynomial $a_0 + a_1x + a_2x^2 = 2 + 4x + x^2$ is irreducible over Q, if we take (A) $p = 2$ (B) $p = 3$ (C) $p = 7$ (D) $p = 4$	**(A)**
100)	The polynomial $f(x)$ is divisible by $x - a$ then f (a) = … (A) 2 (B) 5 (C) 0 (D) a	**(C)**
101)	If $f(x) = 1 + 2x + 3x^2$ and $g(x) = 7x + 2x^2 + 3x^3$ are two polynomials over $(\mathbb{Z}_6, +_6, *_6)$ then $\deg(f(x) + g(x)) =$ .... (A) 2 (B) 3 (C) 5 (D) 4	**(B)**
102)	The zeros of the polynomial $x^2 - 4x - 12$ over field of real numbers are (A) $3, -4$ (B) $6, -2$ (C) $-6, 2$ (D) $-3, 4$	**(B)**
103)	The characteristic of the ring $(3\mathbb{Z}, +, \times)$ is…. (A) 3 (B) n	**(C)**

	(C) 0 (D) none of these	
104)	If F is a field then $F[x]$ is… (A) an integral domain (B) a field (C) may not be field (D) none of these	**(A)**
105)	The zeros of the polynomial $x^2 - 4x - 12$ over the field of real numbers are…. (A) $1, 2$ (B) $2, 3$ (C) $4, 3$ (D) $-4, -3$	**(C)**
106)	The characteristic of ring integers $(\mathbb{Z}, +, *)$ is…. (A) 2 (B) a prime number (C) zero (D) none of these	**(C)**
107)	If $f(x) = 2x^3 + x^2 + 3x - 2$ and $g(x) = 3x^4 + 2x + 4$ be two polynomials over $\mathbb{Z}_6$, then $\deg(f(x) * g(x)) =$ .... (A) 5 (B) 6 (C) 7 (D) none of these	**(A)**
108)	Let $f(x) = 2x^3 + 4x^2 + 3x + 3$ be a polynomial over $\mathbb{Z}_5$ then $f(4) =$... (A) 0 (B) 2 (C) 4 (D) 1	**(B)**
109)	The characteristic of Boolean ring is… (A) 0 (B) 2 (C) 4 (D) 1	**(B)**
110)	If $f(x) \in F[x]$ and $a \in F$, for a field F , then $x - a$ divides $f(x)$ if and only if (A) $f(a) = 0$ (B) $f(a) \neq 0$ (C) $f(a) = 1$ (D) $f(a) = \infty$	**(A)**