V.P. AND R.P.T.P. SCIENCE COLLEGE , V.V.NAGAR
B.Sc.(MATHEMATICS) SEMESTER - 5
Multiple Choice Question Of US05CMTH23
(Group Theory)

....

Unit-1

Que. Fill in the following blanks.

(1) Additive inverse of 2 in Z_6 is ....
(a) 1 (b) 3 (c) 2 **(d)** 4
(2) Multiplicative inverse of 5 in ${Z_7}^*$ is ....
(a) 3 (b) 6 (c) 2 (d) 1
(3) Multiplicative inverse of 6 in ${Z_7}^*$ is ....
(a) 3 **(b)** 6 (c) 2 (d) 1
(4) Multiplicative inverse of 2 in ${Z_7}^*$ is ....
(a) 3 (b) 2 **(c)** 4 (d) 1
(5) In Klein 4-group $G = \{e, a, b, c\}$,$ab =$ ....
(a) e (b) b **(c)** c (d) a
(6) In Klein 4-group $G = \{e, a, b, c\}$, $b^2 =$ ....
(a) e (b) b (c) c (d) a
(7) In Klein 4-group $G = \{e, a, b, c\}$, $abc =$ ....
(a) c **(b)** e (c) b (d) a
(8) In group G , $(ab)^{-1} =$ ....
(a) ab **(b)** $b^{-1}a^{-1}$ (c) $a^{-1}b^{-1}$ (d) $a^{-1} + b^{-1}$
(9) In group G , $(aba^{-1})^{-1} =$ ....
(a) aba^{-1} (b) $a^{-1}b^{-1}a$ **(c)** $ab^{-1}a^{-1}$ (d) $a^{-1}ba$
(10) Every nonempty group has atleast .... subgroups.
(a) 3 (b) 4 **(c)** 2 (d) 1
(11) ${Z_n}^*$ forms a group if n is ....
(a) 6 **(b)** prime (c) 4 (d) 1
(12) ${Z_n}^*$ forms a group if n is ....
(a) 6 **(b)** 7 (c) 4 (d) 1
(13) Centre of $\mathbb{Z}$ is ....
(a) $\mathbb{Z}$ (b) 2 (c) N (d) 1
(14) .... is called trivial subgroup of group G .
(a) G **(b)** $\{e\}$ (c) $\{e, G\}$ (d) $\{0\}$
(15) .... is subgroup of $(\mathbb{Q}, +)$.
(a) $\mathbb{C}$ (b) $\mathbb{R}$ **(c)** $\mathbb{Z}$ (d) $\mathbb{N}$
(16) .... is subgroup of group $\{z \in \mathbb{C} \ / \ |z| = 1\}$.
(a) $\{\pm 1, \pm 2i\}$ (b) $\{\pm 2, \pm i\}$ (c) $\{-1, -i\}$ **(d)** $\{\pm 1, \pm i\}$
(17) A nonempty subset H of group $(G, +)$ is a subgroup of G iff ....
(a) $a - b \in H$ (b) $a + b \in H$ (c) $ab^{-1} \in H$ (d) $a - b \in G$
(18) A nonempty subset H of finite group $(G, +)$ is a subgroup of G iff ....
(a) $(ab)^{-1} \in H$ **(b)** $a + b \in H$ (c) $ab^{-1} \in H$ (d) $ab \in G$
(19) A nonempty subset H of group G is a subgroup of G iff ....
(a) $a - b \in H$ (b) $a + b \in H$ **(c)** $ab^{-1} \in H$ (d) $a - b \in G$
(20) A nonempty subset H of finite group G is a subgroup of G iff ....
(a) $a - b \in H$ (b) $a + b \in H$ (c) $(ab)^{-1} \in H$ **(d)** $ab \in G$
(21) Total .... binary operations can be defined on a set with two elements .
(a) 16 (b) 4 (c) 2 (d) 6
(22) Let G be a group ,an element $a \in G$ is called idempotent if $a^2 =$ ....
(a) 0 **(b)** a (c) e (d) 1

(23) In group $(Q - \{1\}\ ,*)$, $*$ is defined by $a * b = a + b - ab$, $\forall a, b \in G$, identity element $e =$ ....
(a) 2 (b) a **(c)** 0 (d) 1

(24) In group $(Q - \{-1\}\ ,*)$, $*$ is defined by $a * b = a + b + ab$, $\forall a, b \in G$, $a^{-1} =$ ....
(a) $a/a-1$ (b) $-a/a-1$ (c) $a/a+1$ **(d)** $-a/a+1$

(25) In group $(Q - \{1\}\ ,*)$, $*$ is defined by $a * b = a + b - ab$, $\forall a, b \in G$, $a^{-1} =$ ....
(a) $a/a-1$ (b) $a/1-a$ (c) $a/a+1$ (d) $-a/a+1$

(26) Let R^* be the set of all nonzero real numbers and operation $*$ is defined as $a * b = \frac{1}{2}ab$ .In group $(R^*, *)$ identity element e = ...
(a) 0 **(b)** 2 (c) 1 (d) -1

(27) Let R^* be the set of all nonzero real numbers and operation $*$ is defined as $a * b = \frac{1}{2}ab$ .In group $(R^*, *)$ $a^{-1} =$ ....
(a) $a/4$ (b) $2/a$ **(c)** $4/a$ (d) a

(28) If X is non empty subset and G is set of all subset of X then identity element of group $(G, \cup)$ is E = ...
(a) I (b) 0 (c) X **(d)** $\emptyset$

(29) If X is non empty subset and G is set of all subset of X then identity element of group $(G, \cap)$ is E = ...
(a) I (b) 0 **(c)** X (d) $\emptyset$

(30) If X is non empty subset and G is set of all subset of X then identity element of group $(G, \triangle)$ is E = ...
(a) I (b) 0 (c) X **(d)** $\emptyset$

(31) If X is non empty subset and G is set of all subset of X then in group $(G, \triangle)$, $A^{-1} =$ ....
(a) A (b) I (c) X (d) $\emptyset$

(32) If operation $*$ is defined as $a * b = max\{a, b\}$ then identity element of $(N, *)$ is e = ...
(a) 0 **(b)** 1 (c) 0 (d) 1

(33) In group $({Z_7}^*, \cdot)$, $\bar{2}^{-1} =$ ....
(a) $\bar{1}$ (b) $\bar{5}$ **(c)** $\bar{4}$ (d) $\bar{2}$

(34) In group $({Z_7}^*, \cdot)$, $\bar{3}^{-1} =$ ....
(a) $\bar{1}$ (b) $\bar{3}$ (c) $\bar{4}$ **(d)** $\bar{5}$

(35) In group $({Z_7}^*, \cdot)$, $\bar{6}^{-1} =$ ....
(a) $\bar{6}$ (b) $\bar{3}$ (c) $\bar{4}$ (d) $\bar{2}$

(36) If G is commutative group then $(ab)^n =$ ....$\forall n \in Z$.
(a) ab (b) ba **(c)** $a^n b^n$ (d) $a^n b^m$

(37) Cyclic group of order 5 has only .... generator .
(a) 6 **(b)** 4 (c) 5 (d) 1

(38) Cyclic group of order 6 has only .... generator .
(a) 6 (b) 5 **(c)** 2 (d) 1

(39) .... is generator of group $\mathbb{Z}$.
(a) -2 (b) 3 **(c)** -1 (d) 2

(40) .... is generator of group $\{\pm 1\ ,\ \pm i\}$.
(a) 2 (b) -1 (c) 1 **(d)** -i

(41) .... is generator of group $\left\{ ...\frac{1}{8}, \frac{1}{4}, \frac{1}{2}, 1, 2, 4, 8, ... \right\}$.
(a) $\frac{1}{2}$ (b) 1 (c) -2 (d) $\frac{1}{4}$

(42) .... is generator of group $\left\{ ...\frac{1}{8}, \frac{1}{4}, \frac{1}{2}, 1, 2, 4, 8, ... \right\}$.
(a) $\frac{1}{6}$ (b) $-\frac{1}{2}$ **(c)** 2 (d) $\frac{1}{4}$

(43) .... is generator of group Z_n .
(a) $\bar{0}$ (b) $\bar{3}$ **(c)** $\bar{1}$ (d) $\bar{2}$

(44) .... is generator of group ${Z_5}^*$.
(a) $\bar{3}$ (b) $\bar{1}$ (c) $\bar{4}$ (d) $\bar{5}$

(45) .... is generator of group ${Z_5}^*$.
(a) $\bar{0}$ (b) $\bar{1}$ (c) $\bar{4}$ **(d)** $\bar{2}$

(46) O(i) in C^* is ....
(a) 1 **(b)** 2 (c) 3 (d) 4

(47) O(2) in Z is ....
(a) 0 (b) 3 **(c)** infinite (d) 2

(48) $O(\bar{3})$ in Z_6 is ....
(a) 1 (b) 3 (c) 4 **(d)** 2

(49) $O(\bar{5})$ in Z_6 is ....
(a) 6 (b) 3 (c) 4 (d) 2

(50) O(i) in $\{\pm 1, \pm i\}$ is ....
(a) 4 (b)v 1 (c) i (d) 3

(51) O(-i) in $\{\pm 1, \pm i\}$ is ....
(a) 3 **(b)** 4 (c) 1 (d) 2

(52) Every infinity cyclic group has exactly .... generators .
(a) 3 (b) 1 **(c)** 2 (d) 4

(53) Group ${Z_5}^*$ has .... generators .
(a) 3 **(b)** 2 (c) 4 (d) 1

(54) Cyclic group of order 13 has only .... generator .
(a) 13 (b) 11 **(c)** 12 (d) 2

(55) Cyclic group with one generator has at most .... elements.
(a) 0 (b) 3 (c) 1 **(d)** 2

(56) For any $a, b \in G$, $O(ab) =$ ....
(a) $O(ba)$ (b) $O(a) + O(b)$ (c) $O(a) - O(b)$ (d) 1

(57) If binary operation on the set of all non-negative integers is defined by $m * n = m^2 + n^2$. Then unit element of set is ....
(a) 0 (b) 1 (c) 2 **(d)** does not exist

(58) If binary operation on the set of all non-negative integers is defined by $m * n = m^2 + n^2$. Then inverse element m of set is ....
(a) $1/m$ (b) $-m$ (c) 0 **(d)** does not exist

(59) Unit element of $\mathbb{R} \times \mathbb{R}$ is .... under the binary operation
$(a, b) * (c, d) = (ac - bd \ , \ ad + bc)$ defined in the set .
(a) $(0,0)$ (b) $(0,1)$ **(c)** $(1,0)$ (d) $(1,1)$

(60) The only idempotent element of group is the ....
(a) $(0,0)$ (b) $(0,1)$ **(c)** unit element (d) $(1,1)$

(61) If $a \in G$ then ....
(a) $Z(G) \supset N(a)$ **(b)** $Z(G) \subset N(a)$ (c) $Z(G) = N(a)$ (d) $Z(G) \subset N(A)$

(62) If H is subgroup of G then ....
(a) $H \subset N(H)$ (b) $Z(G) \supset N(H)$ (c) $H \supset N(H)$ (d) $Z(G) \subset N(H)$

(63) If G has no nontrivial subgroups then G is a group of .... order .
(a) 1 (b) composite (c) infinite **(d)** prime

(64) .... is not cyclic group but every proper subgroup of it is cyclic .
(a) S_4 (b) S_2 **(c)** S_3 (d) A_3

(65) Cyclic group with just one generator has .... element.
(a) at least two **(b)** at most two (b) only two (d) 3

(66) Let $a, b \in G$ such that $b = xax^{-1}$, for some $x \in G$ then ....
(a) $O(a) \neq O(b)$ **(b)** $O(a) = O(b)$ (c) $O(a) < O(b)$ (d) $O(a) > O(b)$

(67) Let $a \in G$ such that $O(ab) = mn$, $b = a^m$ then $O(b) =$ ....
(a) $m + n$ (b) mn **(c)** n (d) m

UNIT-2

(1) Let $G = Z$, $H = mZ$ then $(G : H) =$ ....
(a) Z **(b)** m (c) 1 (d) infinite

(2) If H and K are finite subgroup of group G such that $(O(G), O(H)) = 1$ then $H \cap K =$ ....
(a) $\{0\}$ (b) 1 **(c)** $\{e\}$ (d) e

(3) .... is cyclic subgroup of Z_{12} .
(a) $\langle \bar{2} \rangle$ (b) $\langle \bar{8} \rangle$ (c) $\langle \bar{10} \rangle$ (d) $\langle \bar{9} \rangle$

(4) .... is cyclic subgroup of Z_{12} .
(a) $\langle \bar{3} \rangle$ (b) $\langle \bar{5} \rangle$ (c) $\langle \bar{7} \rangle$ (d) $\langle \bar{9} \rangle$

(5) .... is cyclic subgroup of Z_{12} .
(a) $\langle \bar{4} \rangle$ (b) $\langle \bar{10} \rangle$ (c) $\langle \bar{7} \rangle$ (d) $\langle \bar{8} \rangle$

(6) .... is cyclic subgroup of Z_{12} .
(a) $\langle \bar{6} \rangle$ (b) $\langle \bar{8} \rangle$ (c) $\langle \bar{7} \rangle$ (d) $\langle \bar{9} \rangle$

(7) .... is not cyclic subgroup of Z_{12} .
(a) $\langle \bar{2} \rangle$ **(b)** $\langle \bar{9} \rangle$ (c) $\langle \bar{3} \rangle$ (d) $\langle \bar{6} \rangle$

(8) .... is not cyclic subgroup of Z_{12} .
(a) $\langle \bar{4} \rangle$ **(b)** $\langle \bar{10} \rangle$ (c) $\langle \bar{12} \rangle$ (d) $\langle \bar{6} \rangle$

(9) $\phi(10) =$ ....
(a) 9 (b) 2 **(c)** 4 (d) 10

(10) $\phi(12) =$ ....
(a) 3 (b) 11 (c) 12 **(d)** 4

(11) $\phi(11) =$ ....
(a) 10 (b) 11 (c) 1 (d) 0

(12) If G is cyclic group of order n and $a^m = e$, for some $m \in Z$ then ....
(a) m/n **(b)** n/m (c) $m = n$ (d) $m = 0$

(13) $o(e) =$ ....
(a) e (b) 0 **(c)** 1 (d) not possible

(14) If G is infinite cyclic group , $a \in G$, $a \neq e$ then $O(a)$ is ....
(a) 2 (b) finite (c) 1 **(d)** infinite

(15) If G is commutative group ,$(O(a), O(b)) = 1$ then $o(ab) =$ ....
(a) $O(a)O(b)$ (b) 1 (c) $O(a) + O(b)$ (d) 0

(16) Let $H = 4Z$ $G = Z$ then $H - 1 =$ ....
(a) $H + 1$ **(b)** $H + 3$ (c) $H - 3$ (d) $H + 4$

(17) Let $H = 4Z$ $G = Z$ then $H - 3 =$ ....
(a) $H - 3$ (b) $H - 1$ **(c)** $H + 1$ (d) $H + 4$

(18) $a^{O(G)} =$ ....
(a) n (b) 0 (c) 1 **(d)** e

(19) If $O(G) = n$, $a \in G$ then ....
(a) a/n **(b)** $O(a)/n$ (c) $n/O(a)$ (d) $O(a) = n$

(20) If $G = \{\bar{m} \in Z_n \ / \ (m, n) = 1\}$ then $O(G) =$ ....
(a) $\phi(n-1)$ (b) $O(n)$ **(c)** $\phi(n)$ (d) 1

(21) Every group of order .... is cyclic.
(a) 4 (b) 6 (c) 12 **(d)** 7

(22) If $(a, n) = 1$ then $a^{\phi(n)} \equiv$ ....$(mod\ n)$.
(a) 0 (b) n **(c)** 1 (d) $\phi(n)$

(23) Every group of order ....is abelian group .
(a) 2 (b) 5 **(c)** 4 (d) 6

(24) Every noncyclic group of order 4 is isomorphic to ....
(a) Klein 4-group (b) Z (c) N (d) Z_4

(25) Every cyclic group of order 4 is isomorphic to ....
(a) Klein 4-group (b) Z (c) N **(d)** Z_4

(26) Every infinite cyclic group has exactly .... nontrivial automorphism.
(a) 2 (b) 3 (c) 4 **(d)** 1

(27) $(Z : mZ) =$ ....
(a) $m-1$ (b) $m+1$ (c) 1 **(d)** m
(28) $(Z : 3Z) =$ ....
(a) 4 (b) 2 (c) 1 **(d)** 3
(29) If G is a non-trivial group which has no proper subgroups then G is a cyclic group of .... order .
(a) n (b) infinite **(c)** prime (d) composite
(30) If H and K are subgroups of finite order G and $K \subset H$ then $(G : K) =$ ....
(a) $(G : H)$ **(b)** $(G : H)(H : K)$ (c) $(G : H)(K : H)$ (d) $(H : G)(H : K)$
(31) If H and K are finite subgroup of group G such that $((o(H))\ ,\ O(K)) = 1$,then $H \cap K =$ ....
(a) $\{e\}$ (b) e (c) ϕ (d) 1

UNIT-3

(1) Homomorphic image of abelian group is ....
(a) simple (b) cyclic **(c)** abelian (d) 2
(2) Every group has atleast .... normal subgroups.
(a) 3 **(b)** 2 (c) 4 (d) 1
(3) If H is any normal subgroup of G then ....
(a) Hx=Hy **(b)** Hx = xH (c) Hx = H (d) xH = yH
(4) A homomorphism f is .... iff $Ker f = \{e\}$.
(a) one-one (b) onto (c) isomorphism (d) automorphism
(5) Every subgroup of .... group is normal subgroup .
(a) cyclic (b) non abelian **(c)** abelian (d) noncyclic
(6) Every cyclic group of .... order is simple group .
(a) 4 **(b)** prime (c) 6 (d) 1
(7) Every cyclic group of .... order is simple group .
(a) 4 **(b)** 7 (c) 6 (d) 1
(8) Define $f : R^* \to R^*$ by $f(x) = x^2$ then Ker $f =$ ....
(a) 0 (b) ± 1 (c) 1 **(d)** $\{\pm 1\}$
(9) Define $f : R^* \to R^*$ by $f(x) = |x|$ then Ker $f =$ ....
(a) 0 (b) ± 1 (c) 1 **(d)** $\{\pm 1\}$
(10) Define $f : R^* \to R^*$ by $f(x) = 1/x$ then Ker $f =$ ....
(a) 1 (b) ± 1 **(c)** $\{1\}$ (d) $\{\pm 1\}$
(11) Let $G = \{z \in C/|z| = 1\}$, $m \in N$. A mapping $f : G \to G$ is defined by $f(z) = z^m$ then Ker $f =$....................
(a) 1 (b) ± 1 (c) $1^{1/m}$ **(d)** $\{z \in C/z = 1^{1/m}\}$
(12) Let $I(G)$ be Inner automorphism of group G , then $I(G) \simeq$ ....
(a) G (b) G/Z (c) $Z(G)/G$ **(d)** $G/Z(G)$
(13) .... is quotient group of Z_{12} .
(a) Z_2 (b) Z_8 (c) Z_{10} (d) Z_9
(14) .... is quotient group of Z_{12} .
(a) Z_3 (b) Z_5 (c) Z_7 (d) Z_9
(15) .... is quotient group of Z_{12} .
(a) Z_4 (b) Z_{10} (c) Z_7 (d) Z_8
(16) .... is quotient group of Z_{12} .
(a) Z_6 (b) Z_8 (c) Z_7 (d) Z_9
(17) .... is quotient group of Z_{12} .
(a) Z_{12} (b) Z_5 (c) Z_7 (d) Z_8
(18) .... is not quotient group of Z_{12} .
(a) Z_2 **(b)** Z_9 (c) Z_3 (d) Z_6
(19) .... is not quotient group of Z_{12} .
(a) Z_4 **(b)** Z_{10} (c) Z_{12} (d) Z_6
(20) If $G = R$, $G' = \{z \in C/|z| = 1\}$ then $G' \simeq$ ....
(a) Z (b) Z/G **(c)** G/Z (d) G

(21) If $G = R$, $G' = \{z \in C/|z| = 1\}$ .Define $f : G \to G'$ by $f(a) = e^{2\pi ai}$ then $f(a+b)=$ ....

(a) $f(a)+f(b)$ (b) $f(a)-f(b)$ (c) $f(ab)$ **(d)** $f(a)f(b)$

(22) If $G = R$, $G' = \{z \in C/|z| = 1\}$ .Define $f : G \to G'$ by $f(a) = e^{2\pi ai}$ then $Kerf=$ ....

(a) Klein 4-group **(b)** Z (c) N (d) C

(23) If $e^{z_1} = e^{z_2}$, where z_1 , $z_2 \in C$ then ....

(a) $z_1 = z_2$ **(b)** $z_1 - z_2 = 2k\pi i$ (c) $z_1 = z_2 + k\pi i$ (d) $z_1 - z_2 = 2\pi$

(24) If $G = \{........, 1/8, 1/4, 1/2, 1, 2, 4, 8, ...\}$ then $G \simeq$ ....

(a) Klein 4-group (b) C (c) N **(d)** Z

(25) If $G = \{\pm 1, \pm i\}$, then $G \simeq$ ....

(a) Klein 4-group (b) C **(c)** Z_4 (d) Z

(26) $Z_4 \simeq$..........................

(a) Z_5^* (b) Z (c) C (d) Z_5

(27) If $f : R \to R^+$ defined by $f(x) = 2^x$ then f is ....

(a) not one-one (b) not onto **(c)** onto (d) not homomorphism

(28) If $f : Z \to Z_n$ defined by $f(x) = \bar{x}$ then f is ....

(a) not one-one (b) not onto (c) one-one (d) not homomorphism

(29) If $f : Z \to Z_n$ defined by $f(x) = \bar{x}$ then f is ....

(a) one-one (b) not onto **(c)** on to (d) homomorphism

(30) External direct sum of Z_2 is ....

(a) Klein 4- group (b) Q (c) Z (d) Z_2

(31) External direct sum of .... is a Klein's 4- group .

(a) Z_3 **(b)** Z_2 (c) Z (d) Z_4

(32) If $f : A \to B$ is one-one homomorphism but not onto then $A \simeq$ ....

(a) $f(AB)$ (b) $f(B)$ **(c)** $f(A)$ (d) B

(33) $H_{ab} =$ ....

(a) H_{ba} (b) H_b (c) H_bH_a **(d)** H_aH_b

(34) A simple abelian group is cyclic group of ....order

(a) 4 (b) 6 (c) infinite **(d)** prime

(35) Inner automorphism of G is normal subgroup of ....

(a) G (b) $N(G)$ (c) $Z(G)$ **(d)** $Aut(G)$

(36) If H is any normal subgroup of G of order 2 then ....

(a) $H = Z(G)$ (b) $Z(G) \subset H$ **(c)** $H \subset Z(G)$ (d) $H \subset Aut(G)$

(37) Let $\theta : G \to G'$ be homomorphism ,G is simple group then θ is either trivial or .... mapping .

(a) not one-one **(b)** one - one (c) onto (d) one - one and onto

(38) A homomorphism of Z_5 onto Z_4 is .... exist .

(a) always (c) may be **(c)** does not (d) uniquely

(39) If K is normal subgroup of G and $a \in G$ then ....

(a) $o(K)/o(a)$ (b) $o(a)/o(aK)$ **(c)** $o(aK)/o(a)$ (d) $o(aK) = o(a)$

(40) If $\sigma \in S_3$, $\sigma = \begin{pmatrix} 1 & 2 & 3 \\ 2 & 3 & 1 \end{pmatrix}$ then $o(\sigma) =$ ....

(a) 6 (b) 4 (c) 2 **(d)** 3

(41) If $\sigma \in S_3$, $\sigma = \begin{pmatrix} 1 & 2 & 3 \\ 2 & 3 & 1 \end{pmatrix}$, $K = A_3$ then ....

(a) $\sigma K > K$ (b) $\sigma K < K$ (c) $\sigma K \neq K$ **(d)** $\sigma K = K$

(42) If $\sigma \in S_3$, $\sigma = \begin{pmatrix} 1 & 2 & 3 \\ 2 & 3 & 1 \end{pmatrix}$, $K = A_3$ then$O(\sigma K) =$ ....

(a) 1 (b) K (c) 3 (d) 6

(43) If $G/Z(G)$ is cyclic then G is ....

(a) non abelian **(b)** abelian (c) onto (d) one - one

(44) $Z_2 \times Z_2$ is .... group .

(a) cyclic **(b)** not cyclic (c) not commutative (d) one - one

(45) $Z_2 \times Z_3$ is .... group .

(a) cyclic (b) not cyclic (c) not commutative (d) one - one

(46) $O((\bar{1}\ ,\ \bar{1}))$ in $Z_2 \times Z_3$ is ....
(a) 4 (b) 3 (c) 2 **(d)** 6
(47) $Z_{60} =$ ....
(a) $(\bar{6}) \times (\bar{10})$ (b) $(\bar{2}) \times (\bar{30})$ **(c)** $(\bar{5}) \times (\bar{12})$ (d) $(\bar{10}) \times (\bar{6})$
(48) Largest order of a cyclic group contained in $Z_6 \times Z_8$ is ....
(a) 48 **(b)** 24 (c) 12 (d) 16
(49) $(Z_4, +)$ is isomorphic to ....
(a) $(Z_5^*\ ,\cdot)$ (b) $(Z_5\ ,\cdot)$ (c) $(Z_4\ ,\cdot)$ (d) $(Z_5^*\ ,+)$
(50) Automorphism of Klein 4 - group is isomorphic to ....
(a) S_4 (b) $Z_2 \times Z_2$ **(c)** S_3 (d) Z_4

UNIT-4

(1) S_n is .... group.
(a) Klein 4- group (b) cyclic (c) commutative **(d)** non commutative
(2) Order of S_4 is ....
(a) 3 (b) 12 **(c)** 24 (d) 4
(3) Order of S_5 is ....
(a) 4 (b) 5 (c) 24 **(d)** 120
(4) Signature of every transposition is ....
(a) 1 **(b)** -1 (c) 2 (d) -2
(5) Order of A_n is ....
(a) n (b) 1 (c) $n!$ **(d)** $n!/2$
(6) Order of S_n/A_n is ....
(a) n **(b)** 2 (c) $n!$ (d) 0
(7) S_n/A_n is ....group.
(a) simple (b) non commutative (c) noncyclic **(d)** cyclic
(8) A permutation σ is said to be even permutation if signature of σ is ....
(a) 2 (b) -1 **(c)** 1 (d) -2
(9) A permutation σ is said to be odd permutation if signature of σ is ....
(a) 2 **(b)** -1 (c) 1 (d) -2
(10) If $\sigma = (1\ 3\ 2)$ in S_4 then $\varepsilon\sigma =$ ....
(a) 1 (b) -1 (c) 0 (d) 2
(11) If $\sigma = (1\ \ 4)$ in S_5 then $\varepsilon\sigma =$ ....
(a) 1 **(b)** -1 (c) 0 (d) 2
(12) $\sigma = \begin{pmatrix} 1 & 2 & 3 & 4 & 5 & 6 \\ 3 & 2 & 5 & 4 & 6 & 1 \end{pmatrix}$ can be written as $\sigma =$ ....
(a) $(1\ \ 6)(1\ \ 5)(1\ \ 3)$ (b) $(1\ \ 3)(1\ \ 5)(1\ \ 6)$ (c) $(1\ \ 3)(3\ \ 5)(5\ \ 6)$ (d) $(2\ \ 2)(4\ \ 4)$
(13) If $\sigma = \begin{pmatrix} 1 & 2 & 3 & 4 & 5 & 6 \\ 3 & 2 & 5 & 4 & 6 & 1 \end{pmatrix}$ then $\varepsilon\sigma =$ ....
(a) 1 **(b)** -1 (c) 0 (d) 2
(14) Ker $\varepsilon =$ ....
(a) A_n (b) e (c) ± 1 (d) S_n
(15) $(1\ \ 2\ \ 3)(4\ \ 6\ \ 5)$ is .... permutation .
(a) even (b) odd (c) even and odd (d) commutative
(16) $(1\ \ 2\ \ 4\ \ 5\ \ 3)^{-1}$ ....
(a) (3 1)(3 2)(3 4)(3 5) (b) (3 5)(3 4)(3 2)(3 1) (c) (1 3)(1 5)(1 4)(1 2) (d) none
(17) Every $\sigma \in A_n$ can be expressed as a product of .... cycles .
(a) 2 **(b)** 3 (c) 4 (d) n
(18) S_n $(n \geq 3)$ has .... centre .
(a) non-trivial (b) n **(c)** trivial (d) proper
(19) $r-$ cycle is an element of order .... in S_n .
(a) 2 (b) $n-r$ (c) n **(d)** r
(20) If G is non abelian group of order p^3 then $Z(G)$ is cyclic group of order ....
(a) 3 (b) p^3 (c) p^2 **(d)** p
(21) Number of elements in conjugate class of $\sigma = (1\ \ 2\ \ 3\ .....\ \ n) \in S_n$ is ....
(a) $(n-1)!$ (b) $n!$ (c) $(n+1)!$ (d) n

(22) Number of conjugate classes of S_3 is ....
(a) 3 (b) 3! (c) 2 (d) 1

(23) Conjugate classes of S_3 containing .... elements .
(a) 2 or 3 **(b)** 1 or 2 or 3 (c) 1 or 3 (d) 3

(24) G has a unique Sylow p - subgroup P iff P is .... in G .
(a) simple (b) cyclic **(c)** normal (d) quotient

(25) A group of order .... can not be simple .
(a) 60 **(b)** 42 (c) 360 (d) $A_7/2$

(26) A group of order .... can not be simple .
(a) 60 (b) 360 **(c)** 56 (d) $A_7/2$

(27) A group of order .... can not be simple .
(a) 60 (b) 360 **(c)** 108 (d) $A_7/2$

(28) A group of order .... can not be simple .
(a) 148 (b) 60 (c) 360 (d) $A_7/2$

(29) A group of order .... can be simple .
(a) 148 **(b)** 60 (c) 42 (d) 56

(30) The group A_n is simple for ....
(a) $n \geq 4$ (b) $n \geq 3$ **(c)** $n \geq 5$ (d) $n \geq 1$

(31) A_4 has no subgroup of order ....
(a) 1 (b) 4 (c) 3 **(d)** 6

(32) Under the action of G on G by conjugation , $stab(a) =$ ....
(a) G (b) G - orbit **(c)** $N(a)$ (d) $Z(G)$