

DEPT. OF MATHEMATICS
JHARGRAM RAJ COLLEGE
B.Sc(H) Sem – III , INTERNAL ASSESSMENT-1st , 2019-20
Sub: MATHEMATICS, Course – C12

Full Marks: 10

Time: 30 m.

Answer any five questions:

(2 × 5 = 10)

1. Prove that the mapping $f: U(16) \rightarrow U(16)$ defined by $f(x) = x^3$ is an Automorphism.
2. Prove that a group G is Abelian iff $G' = \{e_G\}$.
3. Prove that $Z(G)$ is a characteristic subgroup of G .
4. Find the order of $\text{Inn}(G)$ where $G = S_3$.
5. In $\mathbb{Z}_{30} \times \mathbb{Z}_{60}$ find two subgroups of order 12.
6. Find the number of non-isomorphic Abelian group of order 360.
7. Find the order of $(10,15,24)$ in $\mathbb{Z}_{12} \times \mathbb{Z}_{30} \times \mathbb{Z}_{40}$.
8. Find all Abelian groups of order p^3q^2 , where p, q are distinct primes.

DEPT. OF MATHEMATICS
JHARGRAM RAJ COLLEGE
B.Sc(H) Sem – V , INTERNAL ASSESSMENT-2nd , 2019-20
Sub: MATHEMATICS, Course – C12

Full Marks: 10

Time: 30 m.

Answer any five questions:

(2 × 5 = 10)

1. Let H be a subgroup of order 11 and index 4 of a group G . Show that H is a normal subgroup of G .
2. Find the class equation for S_3 .
3. Let G be a finite group that has only two conjugate classes. Show that $|G|=2$.
4. Show that A_4 has no subgroup of order 4.
5. Let G be a noncommutative group of order p^3 , p a prime. Prove that $|Z(G)| = p$.
6. How many elements of order 7 are there in a group of order 28?
7. Show that every commutative group of order 36 contains an element of order 6.
8. Prove Cayley's theorem by using extended Cayley's theorem.