JHARGRAM RAJ COLLEGE

JHARGRAM – 721 507

DEPARTMENT OF MATHEMATICS

INTERNAL EXAMINATION – 2021- 2022

SEM: III SUBJECT: MATHEMATICS PAPER: CC6T

Full Marks: 10

Answer any five questions: **$(5 \times 2 = 10)$**

1. Let X be a non empty set and P(X) be the power set of X. Examine if P(X) is a group under the composition $*$ defined by $A * B = A\Delta B = (A - B) \cup (B - A), A, B \in P(X)$.
2. If each element in a group be its own inverse then prove that the group is abelian.
3. Find all elements of order 5 in the group $(Z_{20}, +)$.
4. Prove that centralizer of an element in a group G is a subgroup of G.
5. In a group G, a is the only element of order n, for some $n \in N$. Prove that $a \in Z(G)$.
6. Find the order of $(1\ 2\ 3)o(5\ 4)$ in S_5.
7. Let S $=\{1, x, x^2, \ldots\ldots, x^5\}$ where $x = cos\frac{\pi}{3} + isin\frac{\pi}{3}$. Prove that S is a cyclic group under multiplication.
8. Prove that in a cyclic group of even order, there is exactly one element of order 2.