P.R. GOVERNMENT COLLEGE (AUTONOMOUS), KAKINADA
SEM END EXAMINATIONS NOV -2024
II BSC CHEMISTRY/STATISTICS MINOR : GROUP THEORY

TIME: 2 HRS

DATE& SESSION	25.11.24 & AN	REG NO									MAX MARKS	50

Answer any three questions. Selecting at least one question from each part

Part – I

3 X 10 = 30

1. Show that the set Q_+ of all positive rational numbers forms an abelian group under the compositiondefined by 'o' such that $a\, ob = (ab)/3 \ for\ a, b \in Q_+$.
2. State and prove Lagrange's Theorem. Prove that the converse of Lagrange's theorem is not true.
3. Prove that H is a normal sub-group of G if and only if product of two right right (left) cosets of H in G is again a right (left) coset of H on G

Part – II

4. . State and prove fundamental theorem of homomorphism of groups.
5. State and prove Cayley's theorem
6. .Prove that every subgroup of a cyclic group is cyclic.

SECTION-B

Answer any four questions **4 X 5 M = 20 M**

7. If G is a group,fo r $a, b \in G$ prove that $(ab)^{-1} = b^{-1}a^{-1}$
8. Prove that the group (G, •) is abelian iff $(ab)^2 = a^2 b^2$
9. If H and K are two subgroups of a group G then show that $H \cap K$ is also a subgroup of G.
10. If H is a subgroup of a group G then show that HH = H.
11. Prove that every subgroup of an abelian group is normal.
12. Prove that the homomorphic image of an abelian group is abelian.
13. Verify whether the permutation $\begin{pmatrix} 1 & 2 & 3 & 4 & 5 & 6 & 7 & 8 & 9 \\ 2 & 5 & 4 & 3 & 6 & 1 & 7 & 9 & 8 \end{pmatrix}$ is even or odd.