Roll No. | | | | | | | | | | | | | **Total No. of Pages : 02**

Total No. of Questions : 08

M.Sc. (Mathematics) (2020 Batch) (Sem.–1)

ALGEBRA-I

Subject Code : MSM-101-18

M.Code : 75129

Time : 2 Hrs. **Max. Marks : 35**

INSTRUCTIONS TO CANDIDATES :

1. **Attempt any FIVE question(s), each question carries 7 marks.**

1. a) Let G be a Group such that $(ab)^2 = a^2b^2$ for all $a, b \in G$ show that G is abelian.

   b) If a,b are any two elements in group G, Show that **ab** and **ba** have the same order.

2. a) Define normal series of group G.

   b) State all Sylow theorems.

3. a) State and prove third isomorphism theorem.

   b) Prove that set **Aut(G)** of all automorphisms of a Group G is a group under composition of mapping and **In(G)** < **Aut(G)**.

4. Prove that alternating group A_n is simple for **n>4**.

5. a) State and prove Jordan – holder's theorem.

   b) Prove that every permutation can be expressed as a product of transpositions.

6. a) In a non zero commutative ring with unity. Prove that ideal M is maximal if and only if R/M is a field.

   b) If R is a Ring with unity. Show that each maximal ideal is prime. But the converse in general, is not true.

7. State and prove fundamental theorem of homomorphism.

8. State and prove fundamental theorem on finitely generated abelian groups.

Note: Any student found attempting answer sheet from any other person(s), using incriminating material or involved in any wrong activity reported by evaluator shall be treated under UMC provisions.

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Any student found making any change/addition/modification in contents of scanned copy of answer sheet and original answer sheet, shall be covered under UMC provisions.