Roll No.

Total No. of Pages: 02

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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:

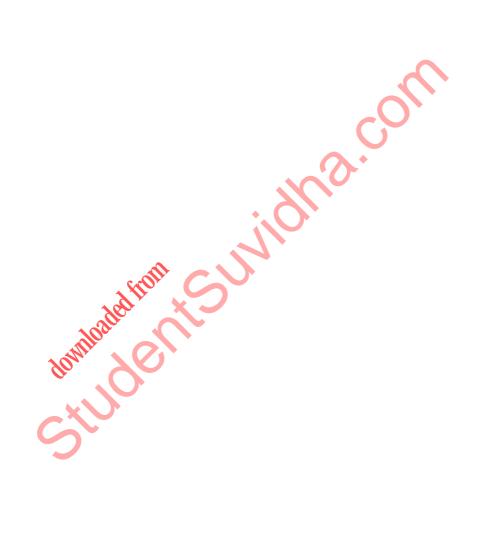
- 1. Attempt any FIVE question(s), each question carries 7 marks.
- 1. a) Let G be a Group such that $(ab)^2 = a^2b^2$ for all $a, b \mathcal{D}G$ show that G is abelian.
 - b) If a,b are any two elements in group G, Show that **ab** and **ba** have the same order.
- 2. a) Define normal series of group 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 ln(G) < Aut(G).
- 4. Prove that alternating group A_n is simple for n>4.
- 5. a) State and prive 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.

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