

Roll No.

Total No. of Pages : 02

Total No. of Questions : 07

M.Sc.(Mathematics) (2019 Batch) (Sem.-2)

ALGEBRA-I

Subject Code : MSM-101-18

M.Code : 75129

Time : 3 Hrs.

Max. Marks : 70

INSTRUCTIONS TO CANDIDATES :

1. SECTION-A is COMPULSORY consisting of FIVE questions carrying TWO marks each.
2. SECTION - B & C. have THREE questions each.
3. Attempt any FOUR questions from SECTION B & C carrying FIFTEEN marks each.
4. Select atleast TWO questions from SECTION - B & C each.

SECTION-A

1. Write short answers :

- a) Define Homomorphism map in groups and define kernel of homomorphism.
- b) Prove that the center $Z(G)$ of a group G is normal subgroup.
- c) Write down a composition series for the Klein 4-group.
- d) Show that a group of order 1986 is not simple.
- e) Find the ideals of the ring $\mathbb{Z}/(n)$.

SECTION-B

2. a) State and prove Cayley theorem.
b) State and prove First isomorphism theorem.

3. a) Prove that **any two** composition series of a finite group are equivalent.
- b) Prove that Set of all permutation in S_n is a group.
4. Prove that alternation group A_n is simple if $n > 4$.

SECTION-C

5. State and prove Fundamental theorem on Finitely generated Abelian groups.
6. State and prove second and third Sylow theorems.
7. Let R and S be rings, and Let A and B be ideals in R and S, respectively. Show that

$$\frac{R \otimes S}{A \otimes B} = \frac{R}{A} \otimes \frac{S}{B}$$

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