Roll No…………………….. **Total No. of Printed Pages: [01]**
Total No. of Questions: [09]

B.Sc. (Hons.) Mathematics (Sem : 2nd)
ALGEBRA-II
Subject Code: BMAT1205
Paper ID: [18131207]

Time: 03 Hours **Maximum Marks: 60**

Instruction for candidates:

1. Section A is compulsory. It consists of 10 parts of two marks each.
2. Section B consist of 5 questions of 5 marks each. The student has to attempt any 4 questions out of it.
3. Section C consist of 3 questions of 10 marks each. The student has to attempt any 2 questions.

Section - A **(2 marks each)**

Q1. Attempt the followings:
a. Define Group?
b. Define the Normal group?
c. State Cauchy's inequality?
d. Define ring?
e. Define Field?
f. Define integral domain?
g. Define permutation of group.
h. Define inner product space?
i. State Cayley theorem.
j. State Sylow's theorem.

Section - B **(5 marks each)**

Q2. State and prove Lagrange's theorem.
Q3. State and prove Fermat's theorem.
Q4. Let R be a commutative ring with unity. Let $f(x),\ g(x)$ be two non-zero polynomial in $R[x]$, the polynomial ring. Prove that $deg(f(x)+\ g(x))\leq max(f(x),\ g(x), f(x)+\ g(x))\neq 0$. Give an example when equality holds.
Q5. Express the permutation:

1	2	3	4	5	6	7	8
3	4	5	2	1	8	6	7

As a product of disjoint cycles. Express it as product of transposition also.

Q6. Let R be a commutative ring with unity. Prove that a maximal ideal of R is always a prime ideal.

Section-C **(10 marks each)**

Q7. Discuss Gram-Schmidt process for three dimension.
Q8. Prove that sub-ring of integral domain is an integral domain.
Q9. State and prove Sylow's theorem.