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Total No. of Pages : 02

Total No. of Questions : 07

M.Sc. Mathematics (2017 Batch) (Sem.-2)

ALGEBRA-II

Subject Code : MSM-201

Paper ID : [75008]

Time : 3 Hrs.

Max. Marks : 80

INSTRUCTIONS TO CANDIDATES :

1. **SECTION-A** is **COMPULSORY** consisting of **EIGHT** questions carrying **TWO** marks each.
2. **SECTION - B & C.** have **THREE** questions in each section carrying **SIXTEEN** marks each.
3. **Select atleast TWO questions from SECTION - B & C EACH.**

SECTION-A

Q1. Answer briefly :

- a) Define UFD.
- b) Prove that every field is principal ideal domain.
- c) Use Eisenstein's criterion to prove that the following polynomials are irreducible over \mathbb{Q} .
 - i) x^2+1
 - ii) x^2-3x+4
- d) State Gauss lemma.
- e) Show that no finite field is algebraically closed.
- f) State Fundamental theorem of Algebra.
- g) Discuss PID.
- h) Find splitting fields of the polynomial x^4+x^2+1 .

SECTION-B

- Q2. Prove that Every Euclidean Domain is P.I.D.
- Q3. State and prove Eisenstein's Criterion.
- Q4. Prove that any finite extension of a finite field is a Galois extension.

SECTION-C

- Q5. State and prove fundamental theorem of Galois Theory.
- Q6. Prove that every finite separable extension is a simple extension.
- Q7. Prove that a field is finite if and only if its multiplicative group is cyclic.