

FMT-06

MSc (SECOND SEMESTER) EXAMINATION, 2021

MATHEMATICS

PAPER: VI

ADVANCED ABSTRACT ALGEBRA-II

MAX MARKS: 35

Note: Attempt all the questions.

Q 1. Let  $F$  be an  $R$ -homomorphism of an  $M$ -module an  $R$ -module  $N$ . Then prove that

$$M/\text{Ker}F \simeq I_m F$$

Hence in particular, if  $F$  is  $M$  onto  $N$ , then prove that

$$M/\text{Ker}F \simeq N$$

Q 2. Let  $M$  be a (finitely generated unital) free module with a basis  $\{e_1, e_2, \dots, e_n\}$  then prove that  $M \simeq R^n$

Q 3. State and prove Hilbert Basis Theorem.

Q 4. State and prove the Noether – Laskar Theorem.