M.A Semester –II

Assignment

Subject- Mathematics

Course –Theory of Rings and Modules

Subject Course No.-DEMATH2ELEC4

Total Marks-25

Group-A

Answer any one of the following questions (15 marks)

1. State and prove five lemma in Module theory.
2. Let E, E' be modules and assume that E' is free. Let $f: E \to E'$ be a surjective homomorphism. Then show that there exists a free submodule F of E such that the restriction of f to F induces an isomorphism of F to E' and also $E = F \oplus ker\ f$.

Group-B

Answer any one of the following questions (10marks)

1. Prove that a commutative ring R with 1 is Noetherian if and only if every prime ideal is finitely generated.
2. Let M be a finitely generated free module over R, a PID and let $X = \{e_1, e_2, \ldots, e_n\}$ be a basis of M. Show that if N a submodule of M then N is also free and has rank at most n elements.