Subject : Mathematics

Teacher name: Nitika Semester 2nd

Name of the Paper : Paper 1

Class: MSc(Mathematics)

April 2021

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| Commutators and higher commutators. Commutators identities. Commutator subgroups. Derived group. Three subgroups Lemma of P.Hall. Central series of a group G. Nilpotent groups. Centre of a nilpotent group. Subgroups and factor subgroups of nilpotent groups. Finite nilpotent groups. Upper and lower central series of a group G and their properties. Subgroups of finitely generated nilpotent groups. Sylow-subgroups of nilpotent groups. |

May 2021

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| Similar linear transformations. Invariant subspaces of vector spaces. Reduction of a linear transformation to triangular form. Nilpotent transformations. Index of nilpotency of a nilpotent transformation. Cyclic subspace with respect to a nilpotent transformation. Uniqueness of the invariants of a nilpotent transformation. Primary decomposition theorem. Jordan blocks and Jordan canonical forms. Cyclic module relative to a linear transformation. Companion matrix of a polynomial f(x). Rational Canonicals form of a linear transformation and its elementary divisior. Uniqueness of the elementary divisior. |

June 2021

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| Modules, submodules and quotient modules. Module generated by a non-empty subset of an R-module. Finitely generated modules and cyclic modules. Idempotents. Homomorphism of R-modules. Fundamental theorem of homomorphism of R-modules. Direct sum of modules. Endomorphism rings EndZ(M) and EndR(M) of a left R-module M. Simple modules and completely reducible modules (semi-simple modules). Finitely generated free modules. Rank of a finitely generated free module. Submodules of free modules of finite rank over a PID. |

July 2021

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| Endomorphism ring of a finite direct sum of modules. Finitely generated modules. Ascending and descending chains of sub modules of an R-module. Ascending and Descending change conditions (A.C.C. and D.C.C.). Noetherian modules and Noetherian rings. Finitely co-generated modules. Artinian modules and Artinian rings. Nil and nilpotent ideals. Hilbert Basis Theorem. Structure theorem of finite Boolean rings. Wedeerburn-Artin theorem and its consequences |