Subject : Mathematics

Teacher name : Archana Semester 1st

Name of the Paper : Paper 5

Class: MSc (Mathematics)

January2021

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| Preliminaries: Initial value problem and equivalent integral equation, ε-approximate solution, equicontinuous set of functions. Basic theorems: Ascoli- Arzela theorem, Cauchy –Peano existence theorem and its corollary. Lipschitz condition. Differential inequalities and uniqueness, Gronwall’s inequality. Successive approximations. Picard-Lindelöf theorem. Continuation of solution, Maximal interval of existence, Extension theorem. Kneser’s theorem (statement only) |

February 2021

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| Linear differential systems: Definitions and notations. Linear homogeneous systems; Fundamental matrix, Adjoint systems, reduction to smaller homogeneous systems. Nonhomogeneous linear systems; variation of constants. Linear systems with constant coefficients. Linear systems with periodic coefficients; Floquet theory. |

March 2021

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| Higher order equations: Linear differential equation (LDE) of order n; Linear combinations, Linear dependence and linear independence of solutions. Wronskian theory: Definition, necessary and sufficient condition for linear dependence and linear independence of solutions of homogeneous LDE. Abel’s Identity, Fundamental set, More Wronskian theory. Reduction of order. Non-homogeneous LDE. Variation of parameters. Adjoint equations, Lagrange’s Identity, Green’s formula. Linear equation of order n with constant coefficientsSystem of differential equations, the n-th order equation. Dependence of solutions on initial conditions and parameters: Preliminaries, continuity and differentiability. Maximal and Minimal solutions. Differential inequalities. A theorem of Wintner. Uniqueness theorems: Kamke’s theorem, Nagumo’s theorem and Osgood theorem |