Subject : Mathematics

Teacher name: Archana Semester 2nd

Name of the Paper : Paper 5

Class: MSc (Mathematics)

April 2021

|  |
| --- |
| Linear second order equations: Preliminaries, self adjoint equation of second order, Basic facts, superposition principle, Riccati’s equation, Prüffer transformation, zero of a solution, Oscillatory and non-oscillatory equations. Abel’s formula. Common zeros of solutions and their linear dependence  |

May 2021

|  |
| --- |
| Sturm theory: Sturm separation theorem, Sturm fundamental comparison theorem and its corollaries. Elementary linear oscillations. Autonomous systems: the phase plane, paths and critical points, Types of critical points; Node, Center, Saddle point, Spiral point. Stability of critical points. Critical points and paths of linear systems: basic theorems and their applications  |

June 2021

|  |
| --- |
| Critical points and paths of non-linear systems: basic theorems and their applications. Liapunov function. Liapunov’s direct method for stability of critical points of non-linear systems. Limit cycles and periodic solutions: Limit cycle, existence and non-existence of limit cycles, Benedixson’s non-existence criterion. Half-path or Semiorbit, Limit set, PoincareBenedixson theorem. Index of a critical point.  |

July 2021

|  |
| --- |
| Second order boundary value problems(BVP): Linear problems; periodic boundary conditions, regular linear BVP, singular linear BVP; non-linear BVP. Sturm-Liouville BVP: definitions, eigen value and eigen function. Orthogonality of functions, orthogonality of eigen functions corresponding to distinct eigen values. Green’s function. Applications of boundary value problems. Use of Implicit function theorem and Fixed point theorems for periodic solutions of linear and non-linear equations |