Abstract of Thesis

“A Study of properties of solutions of Differential Equations”

A differential equation is an equation in mathematics it is unknown for one as well as various variables are related to the values of function & itself as well as its derivatives of various order. Differential equations originated in Newton’s effort to explain the motion of particles and mainly used to describe the change of quantities or behavior of certain systems in applications, such as those governed by Newtonian laws or many other things. The theory of differential equations, the methods used in their solutions and their wise applications have all advanced to the extent that aspects in each of these areas have demanded individual attention.

Theory of models given for dynamical system that can be stated space models as well as customary to suppose any external input or output. As well as this is an very well develop theory for passing through an one type of model to another type of model. Therefore in this theory more efficient algorithm for passes from an convolution to function transfer as well as to an state model & back. Also here we having stochastic as well as non-linear system, here availability of so many methods for helping representation of first order state to higher order model.

Therefore much understands the interaction from to system variable which is needed in various applications as well as further understanding of behavior of functions given from those variables. Obviously in many conditions such type of functions are crucial in dissipative system theory also in optimal control which is in Lyapunov theory. Such contexts we note that observation of theory gives for dynamics which is nearly invariably concentrate on representation states as well as first order models. Therefore in
the study of system stability by the use of Lyapunov method, we suppose that representation of states as well as problems in optimal control invariably consider that the value gives in integral of function of input as well as states. Here a question arises; can this be successful for developing an external theory; e.g. Lyapunov theory, which is functional as well as systems for the passivity & stability analysis, instance, can it proceed by basis of first principle models instead first which is giving for finding representation states. In given research work we assume that models which are not present in state form but also some proofs are used to represent states. When our models are not fully general first principle models then these are specified externally; in that case we focus on models which are in Kernel.

Purpose of our research work is that to developing such theory. But here we doesn’t set our goals too high as well as started with an much better understanding of class of system also functional, linear time-invariant diff. systems as well as quadratic function in system variable also in its derivatives. In our research work there are two polynomials which are appropriate tool for parameterize the model as well as the functionals; thus here we represent that interested interacting within one & two variables polynomial matrices. For the analysis of quadratic functional for linear systems for turns out two variable polynomials it is a much better and effective tool.

This research work concludes that sequence of general concept as well as questions are mixed with some specific results given by Lyapunov stability also by dissipativity which is the positivity of QDF’s. As well as the goal of this work to point out the interference in evolution of the more useful as well as subtle notions of dissipative as well as conservative systems.
Such type of techniques are applies to H∞ & LQ problems. The final achievement of this research work is that the interaction between one or two variable polynomial matrices for properties in higher order as well as functional analysis in appearance of new Lyapunov functions.

In the Chapter 1st studied review of study on quadratic equations and its theory with examples.

In the Chapter 2nd The study of Banach algebras entails combining the use of algebraic and analytical (or topological) methods. It is common to find that, algebraic conditions imply topological ones. Banach spaces also exhibit some of this behavior; for example, the open mapping theorem gives topological conditions (continuity of an inverse) out of purely algebraic hypotheses (the existence of a linear inverse). It should not surprise us that if we look at Banach algebras which are closely related to Banach spaces (for example, the Banach algebra of all operators on a Banach space) then we find that geometrical properties of the Banach spaces have close links to algebraic properties of the Banach algebras. This thesis will explore some questions in this direction. This first chapter sketches the background material that we shall need from the theory of Banach spaces and Banach algebras. Proofs and references are omitted except for the more unusual results, or when a proof will shed light on later work. Also review the points Banach Algebra, Its Applications, Preliminaries, Main Results and Some Consequences with its examples.

Chapter 3rd depends on the best way to introduce the concept of a functional differential equation is through the use of an example. With the concept of quadratic function, its theory, Existence and Uniqueness dependence, stability theory, Delay

Next chapter 4th is studied with The goal of this thesis is to expose the reader to modern computational tools for solving differential equation models that arise in chemical engineering, e.g. diffusion-reaction, mass-heat transfer and fluid flow. The emphasis is placed on the understanding and proper use of software packages. In each chapter we outline numerical techniques that either illustrate a computational property of interest or are the underlying methods of a computer package. At the close of each chapter a survey of computer packages in accompanied by examples of their use. Also points are reviewed with theory, extrapolagy, stability, implicit method, extrapolation, multistep methods, systems of differential equations and existence and uniqueness theorems, etc. with examples.

The last chapter of thesis is mainly deal with boundary value problems involving second order differential operators. The main tool for solvability analysis of such problems in the concept of Green’s function. This transforms the differential equation in to integral equation, which, at time, is more informative. Hence there is a detailed discussion involving the definition of Green’s function through Dirac-delta function, its properties and construction. Numerous examples are given for illustration.

Towards the end, we give Eigen function expansion technique for computing the solution of boundary value problems. Nonlinear boundary value problem is also the topic of our investigation. We use both fixed point theory and monotone operators for this analysis.