A. BRITTO MANOJ
Ref. No: 27394/Ph.D.K3/Mathematics/Part Time/January 2018/Date 10.01.2018

Ph.D. Mathematics Course Work Syllabi – Paper - I

Subject code	Title of the paper	Credits
18PHDMA1	MATHEMATICAL MODELING	4

Unit – 1

Discrete - Time Models: Motivation- An example of bacterial reproduction – Solution and equilibrium of a discrete model – cobwebbing – general theory and analytical methods-optimization of discrete models. **Continuous – Time Models:**Motivation and derivation of continuous models – Differential equation models – separation of variables – linear equations – optimization of continuous models.

Unit – 2

Deterministic States: Motivation- Dimensional Analysis and Similarity- Buckingham's theorem-Dimensional Analysis and Similarity- Applications of Low-Complexity- Vehicular Stopping Distance- Kepler's Third Law- Stoke's Law- Application of Medium-Complexity: Time Measurement- The Pendulum Period- Dimensional Analysis- Comparison with Other Results- Applications of High-Complexity: Lift- The Problem- The Range of Parameter Variations- The Lift Coefficient Calculation.

Unit – 3

Deterministic Changes: Motivation- Linear Changes- Linear First-Order Difference Equations- Interest- Loan Repayments- Linear Changes with Delays- Linear Second-Order Difference Equations- Solution Features- National Income- Red Blood Cell Production-Nonlinear Changes- Analysis Concepts- The Discrete Logistic Equation: Analysis and Solutions-Difference and Differential Equations- Difference and Differential Equations- First and Second-Order Difference and Differential Equations.

Unit – 4

Deterministic Evolution: Motivation- Heat and Mass Transfer Balance- Heat and Mass Transfer Models- First-Order Linear Differential Equations- Time of Death- Contamination of Lakes- Newton's Laws of Motion: Oscillations- Newton's Laws of Motion- Second-Order Linear Differential Equations- The Damped Harmonic Oscillator- Population Ecology: Growth and Self-Limitation- Growth and Self-Limitation- Population Density Function Models-Application to World Population Modeling- Population Ecology: Oscillations and Collapse-Basic Population Dynamics Scenarios- The World3 Model1- A Delay Logistic Model.

Unit – 5

Deterministic Multivariate Evolution: Motivation- Systems of First-Order Differential Equations- Linear Systems of First-Order Differential Equations- Features of Solutions of Linear First-Order Systems- Analysis of Nonlinear Equation Systems- Population Ecology: Species Interactions- Multivariate Population Dynamics Equations- Competition for Food- Predator-Prey Interaction- Mechanical Motions: The pendulum- Pendulum Equations- Linear Stability Analysis- Nonlinear Stability Analysis Pendulum Motions- Fluid Dynamics: Loren's Weather-The Lorenz Equations- Linear Stability Analysis- Deterministic Chaos.

Text Books:

1. Mathematical Modeling I – Preliminary: Hao Wang.
2. Mathematical Modeling : Stefan Heinz

References:

1. B. R. Bhat, "Stochastic Models", New Age International (P) Limited, New Delhi.
2. Richerd Haberman, "Mathematical Models", SIAM, Philadelphia, 1998.

A. BRITTO MANOJ
Ref. No: 27394/Ph.D.K3/Mathematics/Part Time/January 2018/Date 10.01.2018

Ph.D. Mathematics Course Work Syllabi – Paper - II

Subject code	Title of the paper	Credits
18PHDMA2	MATHEMATICAL MODELING IN BIOLOGY	4

Unit – 1

Dynamic Modeling with Difference Equations: The Malthusian Model – Nonlinear Models – Analyzing Nonlinear Models – Variations on the Logistic Model – Comments on Discrete and Continuous Models.

Unit – 2

Discrete Population Models for a Single Species: Simple Models – Cob webbing: A Graphical Procedure of Solution – Discrete Logistic- Type Model: Chaos – Stability, Periodic Solutions and Bifurcations – Discrete Delay Models – Fishery Management Model – Ecological Implications and Caveats – Tumour Cell Growth.

Unit – 3

.**Modeling Molecular Evolution**: Background on DNA – An Introduction to Probability – Conditional Probabilities – Matrix Models of Base Substitution – Phylogenetic Distances.

Unit – 4

Infectious Disease Modeling: Elementary Epidemic Models – Threshold Values and Critical Parameters – Variations on a Theme – Multiple Populations and Differentiated Infectivity.

Unit – 5

Curve Fitting and Biological Modeling: Fitting Curves to Data – The Method of Least Squares – Polynomial Curve Fitting – Basic Analysis of Numerical Data – The Meaning of a Measurement – Understanding Variable Data – Histograms and Distributions – Mean, Median, and Mode – The Spread of Data – Populations and Samples.

Text Books:

1. Mathematical Models in Biology An Introduction: Elizabeth S. Allman and John A. Rhodes.
2. Mathematical Biology: I. An Introduction, Third Edition, J.D.Murray.

References:

1. B. R. Bhat, " Stochastic Models", New Age International (P) Limited, NewDelhi.
2. Richerd Haberman, "Mathematical Models", SIAM, Philadelphia, 1998.
   Peter Congdon "Applied Bayesian Modeling " John Wiley sons

Mr. P. MANIKANDAN, M.Sc., M. Phil.
Ref. No: 23470/Ph. D.–K3 /Mathematics/Part Time/January 2018/Date: 10.01.2018

Ph.D. Mathematics Course Work Syllabi – Paper - I

Subject code	Title of the paper	Credits
18PHDMA1	MATHEMATICAL MODELING	4

Unit I Modeling process, proportionality, and Geometric Similarity and model fitting
Introduction-mathematical models –Examples :vehicular distance –modeling using proportionality – examples: kepler's third law-Modeling using Geometric Similarity –Examples : Raindrops from a motionless cloud –modeling a bass fishing derby- Automobile Gasoline Mileage – Body Weight and Height strength and agility-Model Fitting : fitting Models to Data Graphically – Analytic Methods of Model Fitting – least Square criterion.

Unit II Experimental Modeling
Introduction – Harvesting in the Chesapeake Bay and Other one –Term Models –Harvesting Bluefish – Harvesting Blue Craps – high Order Polynomial Models : Elapsed Time of Tape Recorder – Smoothing Low – order Polynomial Models : Elapsed Time of Tape Recorder Revisited – Elapsed Time of Tape Recorder Revisited Again – Vehicular Stopping Distance-Growth Of Yeast Culture – Cubic Spline Models – Examples : Vehicular Stopping Distance Revisited.

Unit III Discrete Optimization Modeling
An Overview Of Discrete Optimization Modeling –Example : Determining a Production Schedule –Space Shuttle Cargo – Approximation by a Piecewise Linear Function –Linear Programming I: Geometric Solutions –Example : The Carpenter's Problem – A Data- Fittng Problem – Linear Programming II : Algebraic Solutions –Example – Solving the Carpenters Problem Algebraically – Linear Programming III :The Simplex Method –Examples: The Carpenter's problem Revisited – Using the Tableau Format – Linear Programming IV : Sensitivity Analysis – Numerical Search Methods – Using the Dichotomous Search Method – Using the Golden Section Search Method – Model Fitting Criterion Revisited .

Unit IV Modeling With a Differential Equation
Introduction – Population Growth - Prescribing Drug Dosage – Breaking Distance Revisited – Graphical Solutions Of Autonomous Differential Equtions –Examples :Drawing a Phase Line and Sketching Solution Curves – Cooling Soup – Logistic Growth Revisited – Numerical Approximation Methods – Examples : using Euler's Method – A Savings Certificate Revisited.

Unit V Empirical Modeling with Data Fitting
Linear least Squares- The Mammalian Heart Revisited – General Formulation-Exponential Fits-Fitting Data With Polynomials – Interpolation Versus Least Squares-Splines - Linear Splines – Cubic splines – Data Fitting and the Uniform Approximation-Error Model Selection.

Text Books:

1. Frank R. Glordano, William P.Fox, Steven B. Horton "A First Course in Mathematical Modeling" Fifth Edition,
2. Gerhard Dangelmayr and Michael Kirby "Mathematical Modeling A Comprehensive Introduction" Prentice Hall Upper Saddle River ,New Jersey .

References:

1. B. R. Bhat, " Stochastic Models", New Age International (P) Limited, NewDelhi.
2. Richerd Haberman, "Mathematical Models", SIAM, Philadelphia, 1998.

Mr. P. MANIKANDAN, M.Sc., M. Phil.
Ref. No: 23470/Ph. D.–K3 /Mathematics/Part Time/January 2018/Date: 10.01.2018

Ph.D Mathematics Course Work Syllabi– Paper-2

Subject code	Title of the paper	Credits
18PHDMA2	MATHEMATICAL MODELING IN BIOLOGY	4

Unit I Continuous Population Models for Single Species

Continuous Growth Models- Insect Outbreak Model : Spruce Budworm –Delay Models – Linear Analysis of Delay Population Models : Periodic Solutions – Delay Models in Physiology : Periodic Dynamic Diseases – Harvesting a Single Natural Population – Population Model With Age Distribution .

Unit II Modeling the Dynamics of Martial Interaction: Divorce Prediction and Marriage Repair

Psychological background and Data : Gottman and Levenson Methodology – Marital Typology and Modeling Motivation – Modeling Strategy and the model Equations – Steady States and Stability – Practical Results from the model – Benefits ,Implications and Marriage Repair Scenariors.

Unit III Dynamics of Infectious Diseases

Historical Aside on Epidemics – Simple Epidemic Models and Practical Applications – Modeling Veneral Diseases – Multi Group Model for Gonorrhes and its Control – AIDS : Modeling the Transmission Dynamics of the Human Immunodeficiency Virus –Delay Model for Hiv Infection With Drug Therapy – Modeling the Population Dynamics of Acquired Immunity to Parasite Infection – Age Dependent Epidemic Model – Simple Drug Use Epidemic Model and Threshold Analysis – Bovine Tuberculosis Infection in Badgers and Cattle.

Unit IV Temperature – Dependent Sex Determination (TSD)

Biological Introduction and Historical Asides on the Crocodilia – Nesting Assumptions and Simple Population Model – Age Structured population model for Crrocodilia – Density Dependent Age Structured Model Equations – Stability of the female population in wet Marsh Region I – Sex Ratio and Survivorship – Temperature – Dependent Sex Determination Versus Genetic Sex Determination – Related Aspects on Sex Determination.

Unit V Biological Waves: Single –Species Models

Background and the Travelling Waveform – Fisher – Kolmogoroff Equation and Propagating Wave Solutions – Asymptotic Solution and Stability of Wave front Solutions of the Fisher – Kolmogoroff Equation – Density – Dependent Diffusion – Reaction Diffusion Models and Some Exact Solutions – Waves in Models with Multi –steady State Kinetics – Calcium Waves on Amphibian Eggs : Activation Waves on Medaka Eggs – Invasion Wave speeds With Dispersive Variability – Species Invasion and Rangs Expansion.

Text Books:

1. J.D.Murray “Mathematical Biology : I An Introduction” Third Edition Springer,2001
2. J.D.Murray “Mathematical Biology –II :Spatial Models and Biomedical Applications“ Third edition Springer - Newyork

References:

1. Elizabeth S.Allman ,John A.Rhodes “Mathematical Models in Biology an Introduction” Cambridge University Press.2004
2. Peter Congdon “Applied Bayesian Modeling “John Wiley sons.

R. CHINNAVEDI
Ref. No. 07391 /Ph. D.–K3 / Mathematics /Full Time/April 2016 / Date: 30 /03 /2016 .

Ph.D. Mathematics Course Work Syllabi – Paper – I

Subject code	Title of the paper	Credits
16PHDMA1	**Graph Theory With Applications**	4

Unit – I Graphs and Sub Graphs

Graphs and Simple Graphs - Graph Isomorphism-The Incidence and Adjacency Matrices- Sub Graphs- Vertex Degree-Paths and Connection- Cycles- The Shortest Path Problem- Sperner's Lemma.

Unit – II Trees

Trees- Cut Edges and Bonds – Cut Vertices- Cayley's Formula-The Connector Problem.

Unit – III Connectivity

Connectivity- Blocks- Construction of Reliable Communication Networks.

Unit – IV Euler Tours and Hamilton Cycles

Euler Tours- Hamilton Cycles- The Chinese Postman Problem- The Travelling Salesman Problem.

Unit – V Matchings

Matchings- Matchings and Coverings in Bipartite Graphs- Perfect Matchings- The Personnel Assignment Problem- The Optimal Assignment Problem.

Text Book:

[1]. J.A.Bondy and U.S.R.Murty, "Graph Theory With Applications", The Macmillan press Ltd.,New York,1976, Unit (I –V)

References:

[1]. R.Balakrishnan and K.Renganathan"A Textbook of graph theory",springer verlag,Newyork,2000.

[2]. F.Harary,Graph Theory,Addison Wesley,Reading Mass,(1969).

R. CHINNAVEDI
Ref. No. 07391 /Ph. D.–K3 / Mathematics /Full Time/April 2016 / Date: 30 /03 /2016

Ph.D. Mathematics Course Work Syllabi– Paper-2

Subject code	Title of the paper	Credits
16PHDMA2	**Decomposition of graphs**	4

Unit – I Decomposition of Complete multigraps into stars and cycles

Introduction-preliminaries-introductory results-Decomposition of λK_n when $n \geq 4k$ or $n \geq 2k$ and λ even.

References

[1] . "Fairouz Beggas, Mohammed Hadded, Hamamacne Kheddouch" "Decompositions of a complete multigraph into Stars and cycles" Discuss.mathe (2015) PP.(629-639).

Unit – II Decomposition of product graphs into paths and cycles of length four

Introduction – Base constructions-(4;p,q)-decomposition of $K_m \times K_n$ -(4;p,q)-decomposition of $K_m \otimes K_n$ -(4;p,q)-decomposition of $K_m \square K_n$.

References

[1] . S. Jeevadoss and A.Muthusamy" Decomposition of product graphs into paths and cycles of length four",Graphs and combinatorics,(2015),(DOI 10.1007/s00373-015-1564-z) .

Unit – III On the decompositions of complete graphs into cycles and stars on the same number of Edges

Introduction-preliminaries-Decompositions

References

[1] . Atif A . Abueida and Chester Lian "On the decompositions of complete graphs into cycles and stars on the same number of Edges" Discuss.mathe (2014) PP.(113-125).

Unit – IV Decomposition of complete bipartite multigraph into cycles and stars

Introduction – preliminaries- S_K-decomposition of $\lambda K_{m,n}$ - C_K-decomposition of $\lambda K_{m,n}$ - (S_K, C_K)-decomposition of $\lambda K_{m,n}$.

References

[1] . Hung-Chih Lee "Decomposition of complete bipartite multigraph into cycles and stars" Discrete mathematics 338 (2015) PP. (1362-1369)

Unit – V Decomposition of complete graphs into cycles and stars

Introduction-Necessary conditions for decomposing K_n into cycles and stars-sufficient conditions for decomposing K_n into C_K's and S_K's-decomposition of K_n into C_4's and S_4's .

References

[1] . Tay-Woei Shyu "Decomposition of complete graphs into cycles and stars" Graphs and combinatorics 29,(2013).PP. (301-313).

COURSE WORK SYLLABUS – PAPER II

Decision Making Techniques for using FUZZY TOPSIS Method in Agriculture Sector - 19PHDMA2

Unit-1

Agriculture and land suitability-Need for land suitability Analysis-crop- Land suitability and precision farming-crop-land suitability and sustainable Agriculture-Land suitability Analysis-Current suitability-potential suitability-Need for multi_criteria Decision Making-Fuzziness in Land suitability Decision Role of GIS and Remote Sensing-Relating information from different source- GIS uncertainties.

Unit-2

Data representation-Data capture-Spatial analysis with geographical system (GIS)-Slope and aspect- Data analysis-Multi_criteria decision analysis- Data output and cartography-GIS data mining- implications of GIS in society-GIS in education.

Unit-3

Land suitability analysis and land use planning-multi-criteria decision making-fuzzy decision making

Unit-4

Methodology-framework for decision making spatial-criteria Decision making-Framework of land suitability decision making –Hierachical organisation of the criteria-multi_criteria Evaluation.

Uinit-5

TOPSIS(Technique for Order Preference by similarity to Ideal Solution)-TOPSIS in the context of Land suitability analysis for Agricultural Crops -Fuzzy TOPSIS approach in Land Suitability Analysis- Implementation the Fuzzy TOPSIS in the context of Land suitability Analysis-Fuzzy TOPSIS- Sensitivity analysis-Conclusions.

REFERENCES:

[1] Addeo,G.G.guastadisegni and M.Pisante(2001). Land and water quality for sustainable and precision farming.I World Congress on Conservation Agriculture. Madrid.

[2] Bellman,R.E. and L.A.Zadeh(1970). "Decision-making in a Fuzzy Environment." Management Sciences 17(4): B141-B164.

[3] Buckley, J.J.(1985)."Fuzzy Hierachical Analysis." Fuzzy Sets and Systems : 233-247.

[4] Chen, S.J. and C.L. Hwang (1992). Fuzzy Multi Attribute Decision Making: Methods and Applications. Springer.

[5] Saaty,T.L.(1977). " A Scaling Method for Priorities in Hierarchical Structure." Journal of Mathematical Psychology 15.3.

[6] Saaty , T.L. (1980). The Analytic Hierachy Process. New York, McGraw-Hill International.

13/3/20

Dr.G.MARIMUTHU,
Associate Professor & Research Advisor,
Department of Mathematics,
A.V.V.M Sri Pushpam College (Autonomous),
Poondi, Thanjavur - 613503.

Dr.G.Ramesh M.Sc.,M.Phil.,Ph.D.,MSET.,MBA.,
Associate Professor of Mathematics
Government Arts College (Autonomous)
Kumbakonam-612002

Dr.A.VENKATESH
Assistant Professor
A.V.V.M. Sri Pushpam College
Poondi-613503

SYLLABUS [Paper - I]

NAME: C. Sankari **CLASS: Ph.D-Mathematics**

Ref.No.27271/Ph.D.K3/Mathematics/Full Time/January 2018/Date:17-01-2018.

Subject Code	Title of the paper	Credits
18PHDMA1	Linear Algebra	4

UNIT - I: Linear Equations

Fields - System of Linear Equations - Matrices and Elementary Row Operations - Row-Reduced Echelon Matrices - Matrix Multiplication - Invertible Matrices.

UNIT - II: Vector Spaces

Vector Spaces - Subspaces - Bases and Dimension - Coordinates - Summary of Row-Equivalence - Computations Concerning Subspaces.

UNIT - III: Linear Tranformations

Linear Transformations - The Algebra of Linear Transformations - Isomorphism - Representation of Linear Tranformations by Matrices - Linear Functionals - The Double Dual - The Transpose of a Linear Transformation.

UNIT - IV: Linear Polynomials

Algebras - The Algebra of Polynomials - Lagrange Interpolation - Polynomial Ideals - The Prime Factorization of a Polynomial.

UNIT - V: Determinants

Commutative Rings - Determinant Functions - Permutations and the Uniqueness of Determinants - Additional Properties of Determinants - Modules - Multilinear Functions - The Grassman Ring.

Text Book:

[1]. Kenneth Hoffman and Ray Kunze, "Linear Algebra", Prentice-Hall., Englewood Cliffs, New Jersy.

References:

[1]. Seymour Lipschutz and Marc Lipson, "Linear Algebra", The Schaum's Outline Series,(3rd Edition).

SYLLABUS [Paper - II]

NAME: C. Sankari **CLASS: Ph.D-Mathematics**

Ref.No.27271/Ph.D.K3/Mathematics/Full Time/January 2018/Date:17-01-2018.

Subject Code	Title of the paper	Credits
18PHDMA2	Matrices Over Commutative Rings	4

UNIT - I:

Modules Over Commutative Ring - Matrices with Entries from a Commutative Rings - The Ideals in $M_{n\times n}(R)$.

UNIT - II:

The Rank of a Matrix - Linear Equations - Minimal Primes and the Radical of an Ideal.

UNIT - III:

The Cayley-Hamilton Theorem - Resultants - Zero Divisors in $M_{n\times n}(R)$.

UNIT - IV:

Finitely Generated Modules and Local Rings - Primary Decompositions in Noetherian Rings - Tensor Products.

UNIT - V:

Fitting Ideals - Principal Ideal Rings - The Smith Normal Form of a Matrix - The Frobenius Normal Form of a Matrix.

Text Book:

[1]. William.C.Brown, Matrices Over Commutative rings, Monographs and Text Books in Pure and Applied Mathematics, vol-169.

References:

[1]. I.N. Herstein, Topics In Algebra, Second Edition., Wiley India Edition.

K.ARTHI

Ref. No. 16908 /Ph. D.–K3 / Mathematics /Full Time/October 2017 / Date: 09 /10 /2017

Ph.D. Mathematics Course Work Syllabi – Paper - II

Subject code	Title of the paper	Credits
17PHDMA2	**Graph Theory With Applications**	4

Unit – I :Graphs and Sub Graphs

Graphs and Simple Graphs - Graph Isomorphism-The Incidence and Adjacency Matrices- Sub Graphs- Vertex Degree-Paths and Connection- Cycles- The Shortest Path Problem- Sperner's Lemma.

Unit – II :Trees

Trees- Cut Edges and Bonds – Cut Vertices- Cayley's Formula-The Connector Problem. Connectivity:Connectivity- Blocks- Construction of Reliable Communication Networks.

Unit – III:Euler Tours and Hamilton Cycles

Euler Tours- Hamilton Cycles- The Chinese Postman Problem- The Travelling Salesman Problem.

Unit – IV : Matchings

Matchings- Matchings and Coverings in Bipartite Graphs- Perfect Matchings- The Personnel Assignment Problem- The Optimal Assignment Problem.

Unit – V:Edge Colourings

Edge Chromatic Number- Vizing's Theorem- Timetabling problem.

Text Book:

[1]. J.A.Bondy and U.S.R.Murty, "Graph Theory With Applications", The Macmillan press Ltd.,New York,1976, Chapters (I –VI)

References:

[1]. R.Balakrishnan and K.Renganathan"A Textbook of graph theory",springer verlag,Newyork,2000.
[2].F.Harary,Graph Theory,Addison Wesley,Reading Mass,(1969).

K.ARTHI

Ref. No. 16908 /Ph. D.–K3 / Mathematics /Full Time/October 2017 / Date: 09 /10 /2017

Ph.D. Mathematics Course Work Syllabi – Paper - I

Subject code	Title of the paper	Credits
17PHDMA1	**Research Methodology**	4

Unit I:The Basics

What is LATEX? - Simple typesetting – Fonts – Type size. The Document: Document class – Page style – Page numbering – Formattinglengths – Parts of a document – Dividing the document – What next?

Unit II: Bibliography

Introduction – natbib. Bibliographic Databases: The BIBTEX program – BIBTEX style files – Creating a bibliographic database. Table of contents, Index and Glossary: Table of contents – Index – Glossary .

Unit III: Displayed Text

Borrowed words – Poetry in typesetting – Making lists – When order matters – Descriptions and definitions.Rows and Columns **:** Keeping tabs – Tables .

Unit IV:Typesetting Mathematics

The basics – Custom commands – More on mathematics – Mathematics miscellany - New operators – The many faces ofmathematics – And that is not all! – Symbols. Typesetting Theorems **:** Theorems in LATEX – Designer theorems—The amsthm package – Housekeeping. Several Kinds of Boxes :LR boxes – Paragraph boxes- Paragraph boxes with specific height – Nested boxes – Rule boxes.

Unit V: Floats

The figure environment – The table environment . Cross References in LATEX :Why cross references? – Let LATEX do it – Pointing to a page—the package varioref – Pointing outside—the package xr – Lost the keys? Use lablst. tex . Footnotes, Marginpars, and Endnotes :Footnotes – Marginal notes – Endnotes .

Text Book:

[1]. “LATEX Tutorials”, (EDITOR: E. Krishnan), Indian TEX UsersGroupTrivandrum, India2003 September. .http://www.tug.org.in/tutorials.html

Reference Book:

[1]. Donald E. Knuth, The texbook, Addison-Wesley Professional, 1984.

[2]. Alexander Borbon A., Walter Mora F.,"LATEX 2014", Revista digital Matemática Educación e Internet ,2014.

K.ARTHI

Ref. No. 16908 /Ph. D.–K3 / Mathematics /Full Time/October 2017 / Date: 09 /10 /2017

Ph.D. Mathematics Course Work Syllabi – Paper - III

Subject code	Title of the paper	Credits
17PHDMA3	**Spectra Of Graphs: Theory And Application**	4

Unit – I:Introduction to the graph spectra

Definition of the spectrum- Some more graph theoretic notions and conventions- Some Theorems from matrix theory and their application to the spectrum of a graph.

Unit – II:Basic Properties of the Spectrum of a Graph

The adjacency matrix and the (ordinary) spectrum of a graph- A general method for defining different kinds of graph spectra- Some remarks concerning current spectra- The coefficient of $P_G(\lambda)$- The coefficient of $C_G(\lambda)$- The coefficient of $Q_G(\lambda)$- A formula connecting the cyclic structure and the tree structure of a regular or semiregular multigraph- On the number of walks.

Unit – III:Operations on Graphs and the resulting spectra

The polynomial of a graph- The spectrum of the complement, direct sum, and complete product of graphs- Reduction procedures for calculating the characteristic polynomial- Line graphs and total graphs- NEPS and Boolean functions- The determination of characteristic polynomial and spectra of graphs of some particular types.

Unit – IV:Relations Between Spectral and Structural Properties of Graphs

Digraphs- Graphs- Regular graphs- Some remarks on strongly regular graphs- Eigenvectors.

Unit – V:Characterization of Graphs by Means of Spectra

Some families of non-isomorphic cospectral graphs- The characterization of a graph by its spectrum- The characterization and other spectral properties of line graphs- Metrically regular graphs- The (-1,1,0)-adjacency matrix and seidel switching.

Text Book:

[1]. Dragos M. Cvetkovic, Michael Doob, Horst sachs,"Spectra of Graphs: Theory and Application", Academic press, New york,1979, Chapters (0 –III and VI).

References:

[1]. Dulmage. A.L., (with N.S.Mendelsohn), Graphs and matrices. In: Graph Theory and Theoretical physics(ed. F. Harary), Academic press,London-New York 1967,pp. 167-227.

[2]. Marcus.M., (with H.Minc), A Survey of Matrix Theory and Matix Inequalities. Allyn and Bacon., Boston 1964.

Ph.D., Scholar Name: B.Swaminathan

Ref.No.23936/Ph.D-k3/Mathematics/Part-Time/January 2017

SUBJECT CODE	TITTLE OF THE PAPER	NO.OF.CREDITS
17PHDMAO1	MATHEMATICAL MODELING	4

UNIT I:Modeling methodology- introduction -definitions and terminology -methodology and modeling flow chart-the methodology in practice summary.

UNIT II:Modeling skills-Introduction -listing factors-making assumptions-types of behavior-translating into mathematics-choosing mathematical functions-relative sizes of terms- units-dimensions-dimensions analysis summary.

UNIT III:Using difference equations-introduction-first-order linear difference equations- tending to a limit-more then one variable-matrix models-non –linear models and chaos-using spreadsheets.

UNIT IV:Using differential equations-introduction- first order-one variable-second order-one variable and two variable (uncoupled)-simultaneous coupled differential equations summary.

UNIT V:Using random numbers-introduction- modeling random variables -generating random variables-simulations-using simulation models-packages and simulation language-Using data collection - empirical models- estimating parameters- errors and accuracy- testing models.

TAXT BOOk

Dilwyn Edwardsand Milke Hamson.,"Guide to mathematical modeling",Replika Press Ltd.- 2007

24/12/17

G.KOMAHAN, M.Tech.,Ph.D.,
Asso. Prof. of Maths,
A.V.V.M. Sri Pushpam College
Poondi - 613 503.

24.3.17

Dr.S.Chandrasekaran
Associate Professor and Head
PG & Research Department of Mathematics
Research Advisor(9606/Maths/R.A/9.5.12/Bharathidasan)

Dr. A. VENKATESH, M.Sc.,M.Phil.,PGDCA.,Ph.D.,
Assistant Professor of Mathematics,
A.V.V.M. Sri Pushpam College (Autonomous)
Poondi-613 503, Thanjavur Dt.

Ph.D., CANDIDATE:B. SWAMINATHAN.

Ref.No.23936/Ph.D-k3/Mathematics/Part-Time/January 2017

SUBJECT CODE	TITLE OF THE PAPER	NO. OF CREDITS
14PHDMA02	MATHEMATICAL MODELING IN DIABETES	4

Uint:1 Blood Glucose Level: Preliminaries-insulin-glucagon-adrenaline-thyroxin-glucocorticodes-growth hormone-blood Plasma-Boodle Cell production-erythrocytes-leukocytes-control of lymphocyte differentiation-clotting.

UINT:2 MATHEMATICAL MODELS: Ordinary differential equation models-models in the form of delay differential equation-models in the form of Integra_-differential equations- models in the form of partial differential equations.

UNIT:3 MODELING DIABETES : Modeling diabetes-glucose tolerance test-diabetes in NOD Mice-T cell immune Response-Autoimmunity for type-1 diabetes in NOD Mice-Model reduction-Equilibrium and linear analysis-Full model simulation

UINT: 4 DIABETES APPROACH AND METHODOLOGY: Type-1 Diabetes-The Effects of Diabetes-Short-term complication of type-1 diabetes-glucose monitoring in diabetes-insulin-therapy-mathematical type-1 models-Choice of mathematical model-The used mathematical model-modifications for a second real time model and insulin infusion-model equations –Blood glucose regulation

UNIT:5 MATHEMATICAL MODEL FOR TESTING OF DIABETES :Back ground of the problem –Review of Related literature-statement of the problem-Objective of the study –Research method-Definition of terms-systems of differential equations-phase planes-Stability and Equilibrium solutions of linear systems-verification of the model

TEXT BOOK: Mathematical modeling on diabetes mellitus-Godwin Christopher Ezike Mbab

GENERAL REFERENC: Mathematical model for detecting diabetes in the blood – Boniface Otieno kwach.

24/3/17

Dr.G.KOMAHAN, M.Tech.,Ph.D.,
Asso. Prof. of Maths,
A.V.V.M. Sri Pushpam College
Poondi - 613 503.

24.3.17

Dr.S.Chandrasekaran
Associate Professor and Head
PG & Research Department of Mathematics
Research Advisor(9606/Maths/R.A/9.5.12/Bharathidasan)
Khadir Mohideen College,Adirampattinam-614 701

Dr. A. VENKATESH, M.Sc.,M.Phil.,PGDCA.,Ph.D.,
Assistant Professor of Mathematics,
A.V.V.M. Sri Pushpam College (Autonomous)
Poondi-613 503, Thanjavur Dt.

16870/Ph.D/Maths/P.T/Oct 2017/Date 23.11.2017

Paper Code	Title of the Paper	Cridit Point
17PHDMA1	MATHEMATICAL MODELLING	4

Unit-I Drug Design

Mathematical Modeling in Drug Action-Application of Polynomial and Composite to Optimize the Design and Development of Controlled Release Oral Drug Delivery System-Mathematical Modeling and Animal Experimentation-Theoretical Modeling of Activity and Pharmacokinetics of Binzofurans.

Unit –II Biological Systems

On Selective Harvesting of an Inshore Fishery: A Bioeconomic Model-Stenosis-Effect on Blood Flow Rate in Blocked Arteries-Mathematical Models for Secondary Infection of Soil-Borne Pathogens-Mucus transport in the Airways due to Coughing : Effect of Series Fluid-A Model for Mucus Transport in Larger Airways to Mild Forced Expiration.

Unit –III Applied Analysis

Modelling studies and Adsorption of Chromium on an Alumina Column-An Analysis of FM/FM/I Fuzzy Priority Queue with two Different service Rates-Non-Existence of Bianchi Type String Cosmological Models in Bimetric Theory-Analysis of Health Hazards Faced by Rag Pickers of Chennai city using Fuzzy Relational Maps.

Unit-IV Applied Fuzzy Analysis

Study of Problems Faced by School Dropouts using Applied Fuzzy analysis-Two Dimensional Fir Fiter with Flat Amplitude or Group Delay Constraints-Analytical study of Mathematical Models for Software Reusability Metrics for the software Development Environment.

Unit-V Decision Making

A study of A Class of Differential Equations-Existence of Solutions to Nonlocal History-Valued Retarded Differential Equations-Fuzzy Decision Making in Health Care-Performance Assessment of some Hospitals in India Through Dea techniques

Tex Book:

Bimal K.Mishra and Dipak Satpathi – Mathematical Modeling (Application, Issues and Analysis),Ane Books Pvt. Ltd.(2009)

2/1/18
Dr.G.KOMAHAN
Co-ordinator,
Department of Mathematics.
M. Sri Pushpam College (Autonomous)
POONDI - 613 503, THANJAVUR - Dt

2/1/18
Dr.N.RAJESH, M.Sc., M.Phil., Ph.D.,
Assistant Professor of Mathematics
Rajah Serfoji Govt.Arts College (Autonomous)
THANJAVUR - 613 005.

2/1/18
Assistant Professor of Mathematics
Rajah Serfoji Govt. College,
THANJAVUR-613 005

16870/Ph.D/Maths/P.T/Oct 2017/Date 23.11.2017

Paper Code	Title of the Paper	Cridit Point
17PHDMA2	Differential Equations and Their Applications	4

Chapter-1 **First-order differential equations**

Introduction-First-order linear differential equations-Separable equations- Population models-The spread of technological innovations- An atomic waste disposal problem-The dynamics of tumor growth, mixing problems, and orthogonal trajectories- Exact equations, and why we cannot solve very manydifferential equations- The existence-uniqueness theorem; Picard iteration- Finding roots of equations by iteration- Newton's method-Difference equations, and how to compute the interest-due on your student loans- Numerical approximations; Euler's method- Error analysis for Euler's method- The three term Taylor series method- An improved Euler method- The Runge-Kutta method.

Chapter 2 Second-order linear differential equations

Algebraic properties of solutions- Linear equations with constant coefficients- Complex roots- Equal roots; reduction of order- The nonhomogeneous equation-The method of variation of parameters- The method of judicious guessing-Mechanical vibrations-The Tacoma Bridge disaster- Electrical networks-A model for the detection of diabetes-Series solutions-Singular points; Euler equations-Regular singular points; the method of Frobenius-Equal roots, and roots differing by an integer-The method of Laplace transforms- Some useful properties of Laplace transforms-Differential equations with discontinuous right-hand sides-The Dirac delta function-The convolution integral-The method of elimination for systems-Higher-order equations

Chapter 3 Systems of differential equations

Algebraic properties of solutions of linear systems-Vector spaces-Dimension of a vector space-Applications of linear algebra to differential equations-The theory of determinants-Solutions of simultaneous linear equations-Linear transformations-The eigenvalue-eigenvector method of finding solutions- Complex roots- Equal roots-Fundamental matrix solutions;-The nonhomogeneous equation; variation of parameters- Solving systems by Laplace transforms

Chapter 4 Qualitative theory of differential equations

Introduction -Stability of linear systems-Contents- Stability of equilibrium solutions-The phase-plane-Mathematical theories of war-L. F. Richardson's theory of conflict Lanchester's combat models and the battle of Iwo Jima- Qualitative properties of orbits- Phase portraits of linear systems- Long time behavior of solutions; the Poincare-Bendixson Theorem-Introduction to bifurcation theory-Predator-prey problems; or why the percentage of sharks caught in the Mediterranean-Sea rose dramatically during World War I- The principle of competitive exclusion in population biology- The Threshold Theorem of epidemiology- A model for the spread of gonorrhea

Chapter 5 Separation of variables and Fourier series

Two point boundary-value problems-Introduction to partial differential equations.The heat equation; separation of variables- Fourier series- Even and odd functions- Return to the heat equation- The wave equation- Laplace's equation.

Text Book:M. Braun-DifferentialEquations and TheirApplications-Springer-Verlag New York Heidelberg - Berlin

21/11/18

Co-ordinator, Dr.G.KOMAHAN.

Department of Mathematics,
A.V.V.M. Sri Pushpam College (Autonomous)
POONDI - 613 503, THANJAVUR - Dt

21/11/18

Dr.N.RAJESH, M.Sc., M.Phil., Ph.D.,
Assistant Professor of Mathematics
Serfoji Govt Arts College (Autonomous)
THANJAVUR - 613 005.

21/11/18