SKILL BASED SUBJECT-IV -MATHEMATICAL MODELLING WITH SPREADSHEET

Semester	Subject Code	Category	Lecture		Theory		Practical	Credits
VI	21SMA6A	Skill Based Subject – IV	Hrs/week	Hrs/Sem	Hrs/week	Hrs/Sem	-	2
			2	30	2	30		

COURSE OBJECTIVES:

The students will be able to

- Develop deep understanding of the mathematical modelling through differential equations, systems of ordinary differential equations and difference equations.
- Analyze the long-term behaviour of discrete and continuous dynamical systems numerically and graphically using Spreadsheet.

COURSE OUTCOMES:

On the successful completion of the course, the students will be able to

CO Number	CO Statement	Knowledge Level (K1-K4)
CO1	Develop the knowledge about Mathematical Modelling	K2
CO2	Understand and apply the concepts of Mathematical Modelling through ordinary differential equations	K3
CO3	Apply the methods of Mathematical Modelling through systems of ordinary differential equations	K3
CO4	Evaluate the problems on Difference equation	K3
CO5	Acquire the knowledge on applications of Partial Differential Equation	K3

Knowledge Level: K1 – Remember; K2 – Understand; K3 – Apply; K4 – Analyze.

MAPPING WITH PROGRAMME OUTCOMES:

C	PO1	PO2	PO3	PO4	PO5	PO6
CO1	S	M	M	S	M	M
CO2	S	M	S	S	S	S
CO3	S	M	S	S	S	M
CO4	S	M	S	S	S	S
CO5	S	M	S	S	S	S

S- Strong: M- Medium: L- Low

UNIT - I: MATHEMATICAL MODELLING: NEED, TECHNIQUES, CLASSIFICATIONS AND SIMPLE ILLUSTRATIONS   6 Hours

Simple Techniques requiring Mathematical Modelling – The Technique of Mathematical Modelling – Classification of Mathematical Models – Some Characteristics of Mathematical Models.

(Chapter 1- Sections 1.1-1.4)

UNIT - II: MATHEMATICAL MODELLING THROUGH ORDINARY DIFFERENTIAL EQUATIONS OF FIRST ORDER   6 Hours

Mathematical Modelling through Differential Equations – Linear Growth and Decay Models – Non-Linear Growth and Decay Models.

(Chapter 2- Sections 2.1-2.3)

UNIT - III: MATHEMATICAL MODELLING THROUGH SYSTEMS OF ORDINARY DIFFERENTIAL EQUATIONS OF FIRST ORDER   6 Hours

Mathematical Modelling in Population Dynamics – Mathematical Modelling of Epidemics through Systems of Ordinary Differential Equations of First Order.

(Chapter 3- Sections 3.1-3.2)

UNIT - IV: MATHEMATICAL MODELLING THROUGH DIFFERENCE EQUATIONS   6 Hours

The Need for Mathematical Modelling through Difference equations; some simple models-Basic Theory of linear difference equation with constant coefficients-Mathematical Modelling through Difference equation in finance.

(Chapter 5- Sections 5.1-5.3)

UNIT - V: MATHEMATICAL MODELLING THROUGH PARTIAL DIFFERENTIAL EQUATIONS   6 Hours

Situations giving rise to partial Differential equations Models-Mass Balance Equations: First Method of getting PDE models-Momentum-Balance equations.

(Chapter 6- Sections 6.1-6.3)

TEXT BOOK

S.NO	AUTHORS	TITLE	PUBLISHERS	YEAR OF PUBLICATION
1.	J.N. Kapur	Mathematical Modelling	New Age International (P) Ltd., Publishers,	2000

REFERENCE BOOKS

S.NO	AUTHORS	TITLE	PUBLISHERS	YEAR OF PUBLICATION
1.	Brian Albright	Mathematical Modelling with Excel	Jones & Bartlett, Student Edition,	2012
2.	Belinda Barnes, Glenn Robert Fulford	Glenn Robert Fulford, Mathematical Modelling with case studies	Chapman & Hall/CRC	2009
3.	Dilwyn Edwards, Mike Hamson	Guide Mathematical Modelling	Palgrave, St.Martin's Press, LLC	2007
4.	Glenn Fulford , Peter Forrester , Arthur Jones	Modelling with Differential and Difference Equations	Cambridge University Press	1997
5.	R.RobertHuckfeldt , C.W.kohfeld, Thomas W.Likens	Dynamic modelling An Introduction	SAGE Publications	1982
6.	Allman, E.S, and J.A.RhodesJ.A.Rhodes	Mathematical models in Biology	Cambridge University Press	2004
7.	M.M.Meerschaert	Mathematical Modeling, 2nd edition	San Diego, CA Academic press	1999

WEB RESOURCE

https://people.maths.bris.ac.uk/~madjl/course_text.pdf

TEACHING METHODOLOGY

1. Class room Teaching

2. Assignments

3. Seminars

4. Discussions

5. PPT Presentations

6. Computer programming

SYLLABUS DESIGNER

Dr. N. Nithyapriya, Assistant Professor of Mathematics.