KU3DSCMAT211
DIFFERENTIAL EQUATIONS, LAPLACE TRANSFORMS, LINEAR PROGRAMMING AND NUMERICAL METHODS

Semester	Course Type	Course Level	Course Code	Credits	Total Hours
III	DSC	200-299	KU3DSCMAT211	4	60

Learning Approach (Hours/ Week)			Marks Distribution			Duration of ESE (Hours)
Lecture	Practical/ Internship	Tutorial	CE	ESE	Total	
4		1	30	70	100	2

Course Description

This course introduces computer application students to fundamental mathematical topics differential equation, Laplace transforms, linear programming, and numerical methods.

Course Prerequisite

Derivatives, integrals.

Course Outcomes

CO No.	Expected Outcome	Learning Domains
1	Understand Methods of solving Differential Equations: Separable ODEs, Exact ODEs, Integrating Factors, Linear ODEs.	Understand
2	Understand Laplace Transform, Linearity, first shifting theorem, Transforms of Derivatives and transform of integrals.	Apply
3	Understand the definition of Linear Programming Problems (LPP), differentiate between canonical and standard forms, and apply graphical and simplex methods for solution.	Understand
4	Apply numerical methods for solving algebraic and transcendental equations, including bisection, false position, Newton-Raphson, and numerical integration techniques like the trapezoidal and Simpson's 1/3 rule.	Apply

Mapping of Course Outcomes to PSOs

	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5	PSO 6	PSO 7
CO 1	✓	✓	✓	✓			
CO 2		✓	✓		✓		
CO 4		✓	✓			✓	
CO 5	✓		✓	✓			

COURSE CONTENTS

Contents for Classroom Transaction

MODULE	UNIT	DESCRIPTION	HOURS
I		**First Order Ordinary Differential Equations**	
	1	Basic Concepts. Modeling	13
	2	Separable ODEs	
	3	Exact ODEs. Integrating Factors	
	4	Linear ODEs.	
II		**Laplace transforms**	14
	1	Laplace Transform, Linearity, First Shifting Theorem (s-Shifting)	
	2	Transforms of Derivatives, transform of integrals, ODEs	
III		**Linear Programming**	14
	1	Introduction	
	2	Requirements of linear programming problem	
	3	Areas of application of linear programming	
	4	Graphical method of solution	
	5	Canonical and standard form of linear programming problem	
	6	The simplex method (Technique and algorithm)	
IV		**Numerical Methods**	14
	1	**Solution of algebraic and transcendental equations**	
		a) Introduction	
		b) Bisection Method	
		c) Newton Raphson method	
	2	**Numerical integration**	
		a) Trapezoidal rule	
		b) Simpsons 1/3 rule	
V		**Teacher Specific Module**	**5**
		Directions	
		Formulation of linear programming problems (Module III, Section 2.6.1, 2.6.2, 2.6.3, 2.6.4)	
		Application of the some renowned Numerical Methods. (Module IV)	
		Differential equations, solution of ODEs	

Essential Readings

1. Advanced Engineering Mathematics (10th edition), E. Kreyszig, Wiley, 2015
2. Operations Research (Revised Edition) Er. Prem Kumar Gupta and Dr. D.S. Hira
3. Introductory Methods of Numerical Analysis (5th edition), S.S. Sastry PHI Learning

Reference Distribution

Module	Unit	Reference No.	Page Nos.	Remarks
I	1	1	1.1	More on Modeling excluded
	2	1	1.3	Modeling excluded
	3	1	1.4	Theorems and proof excluded
	4	1	1.5	Population Dynamics excluded
II	1	1	6.1	Existence and Uniqueness of Laplace Transforms excluded
	2	1	6.2	Differential Equations, Initial Value Problems excluded
III	1	2	2.1	
	2	2	2.2	
	3	2	2.5	
	4	2	2.9	Examples2.9-8,2.9-10,2.9-11 are excluded
	5	2	2.12	
	6	2	2.16	Algorithm excluded in the end semester examination
IV	1	3	2.1, 2.2, 2.5	
	2	3	6.4.1, 6.4.2	

Suggested Readings

1. Operations Research (18th thoroughly revised edition), Kantiswaroop, P.K. Gupta and Manmohan, Sultan Chand & Sons.
2. Numerical Analysis (3rd Edition), Timothy Sauer, Pearson

Assessment Rubrics

Evaluation Type		Marks
End Semester Evaluation		**70**
Continuous Evaluation		**30**
a)	Test Paper *	12
b)	Assignment	12
c)	Seminar, Viva-Voce	6
Total		**100**

* A student has to appear for at least two written tests. Average mark of best two tests is to be considered for internal mark.

** **Use of Scientific Calculators below 100 functions (that is, upto *fx 99*) shall be permitted.**