

**P.V.P SIDDHARTHA INSTITUTE OF TECHNOLOGY**  
(Autonomous)  
**NUMERICAL METHODS AND TRANSFORM TECHNIQUES**

Course Code	23BS1303	Year	II	Semester	I
Course Category	Basic Science	Branch	<b>Mechanical</b>	Course Type	Theory
Credits	3	L-T-P	3-0-0	Pre-requisites	<b>Differentiation and Integration</b>
Continuous Internal Evaluation:	30	Semester End Evaluation:	70	Total Marks:	100

Course Outcomes	
Upon successful completion of the course, the student will be able to	
CO1	<b>Understand</b> the basic concepts of Numerical Methods and Transforms. <b>(L2)</b>
CO2	<b>Apply</b> different Numerical methods to solve the problems of numerical differentiation, integration, ordinary differential equations. <b>(L3)</b>
CO3	<b>Apply</b> the Laplace transforms and its properties to evaluate the integrals. <b>(L3)</b>
CO4	<b>Estimate</b> the interpolated values, approximate roots and derivatives. <b>(L4)</b>
CO5	<b>Compute</b> Fourier series and Fourier transforms of a Periodic signals . <b>(L4)</b>

Contribution of Course Outcomes towards achievement of Program Outcomes & Strength of correlations (3:High,2:Medium,1:Low)														
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PS01	PS02
CO1	2												1	
CO2	3												1	
CO3	3												1	
CO4		3											1	
CO5		3											1	

## SYLLABUS

Unit No.	contents	MappedCO
I	<b>Solution of Algebraic &amp; Transcendental Equations, Interpolation:</b> Introduction-Bisection method- RegulaFalsi method - Newton Raphson method,. Finite differences -Newton's forward and backward interpolation formulae – Lagrange's formulae.	CO1,CO2, CO4
II	<b>Numerical Differentiation and Numerical integration :</b> Numerical differentiation using Newton's forward & backward difference formulae. Numerical Integration by trapezoidal rule, Simpson's 1/3 <sup>rd</sup> and 3/8 <sup>th</sup> rules, Boole's Rule, Weddle's Rule.	CO1,CO2, CO4
III	<b>Numerical Solution of Ordinary Differential Equations of first order:</b> Solution by Taylor's series ,Picard's Method of successive Approximations-Euler's Method and -Runge-Kutta method of fourth order-Milne,s Predictor and Corrector Method.	CO1,CO2, CO4
IV	<b>Laplace Transforms:</b> Definition and Laplace transforms of some Standard functions- Shifting theorems; Laplace transforms of derivatives and integrals-unit step function-Dirac's delta function.Inverse Laplace transforms: Inverse Laplace transforms – Method of partial fraction Inverse Laplace Transform of Derivatives, Integrals, $sF(s)$ , and $\frac{F(s)}{s}$	CO1,CO3,
V	<b>Fourier series and Fourier Transforms:</b> <b>Fourier series:</b> Introduction, Periodic functions, Fourier series of Periodic functions, Dirichlet's conditions, Even and Odd Functions, Change of interval, Half range Fourier sine and cosine series. <b>Fourier Transforms:</b> Fourier integral theorem (without proof) -Fourier sine and cosine integrals- sine and cosine transformsand Inverse Transform.	CO1,CO5

**TextBooks:**

1. **B. S. Grewal**, Higher Engineering Mathematics,44/e, Khanna Publishers, 2017
2. **S.S.Sastry**, Introductory Methods of Numerical Analysis, 5/e, PHI publication, 2012.

**ReferenceBooks:**

1. **Erwin Kreyszig**, Advanced Engineering Mathematics, 10/e, Wiley publications, 2011.
2. **M.K.Jain, S.R.K.Iyengar and R.K.Jain**, Numerical Methods for scientific and Engineering computation,NewAge.International Publications.
3. **B.V.Ramana**,Higher Engineering Mathematics,2007 Edition,TataMc.Graw Hill Education.

**Online Learning Resources:**

<https://archive.nptel.ac.in/courses/111/107/111107105/>

- <https://nptel.ac.in/courses/122106033>
- <http://digimat.in/nptel/courses/video/111106111/L01.html>