

BLOW UP SYLLABUS

Transform Calculus, Fourier Series and Numerical Techniques(18MAT31)

(Common to all Programmes)
(Effective from the academic year 2019-20)

Topics	Topics To be Covered	Hours
MODULE - I		
LAPLACE TRANSFORMS		
1. Laplace Transform: Definition and Laplace transforms of elementary functions (statements only). Laplace transforms of Periodic functions (statement only) and unit-step function – problems	Discussion restricted to the problems as suggested in Article No.21.1 to 21.5, 21.7,21.9, 21.10 & 21.17 of Text Book 2.	3L
2. Inverse Laplace Transform: Definition & problems, Convolution theorem to find the inverse Laplace Transforms(without Proof) and Problems	Discussion restricted to problems as suggested in Article No.21.12 & 21.14 of Text Book 2.	3L
3. Solution of linear differential equations using Laplace Transforms.	Application of Laplace transforms to solve ODE's restricted to Article No. 21.15 of Text Book 2.	1L
Tutorials	Involvement of faculty and students in identifying the solutions to the problems; PPT presentations of Engg. Applications by the faculty, about the module.	2T
(RBT Levels: L1 & L2)		Total 09
MODULE - II		
FOURIER SERIES		
1.Fourier Series: Periodic functions, Dirichlet's condition. Fourier series of periodic functions period 2π and arbitrary period.	Discussion and coverage of contents as suggested in Article No. 10.1 to 10.6 of Text book 2.	3L
2. Half range Fourier series.	Discussion and coverage of contents as suggested in article No. 10.7 of Text Book 2.	2L
3. Practical harmonic analysis.	Discussion and problems restricted to the full range Fourier series, in article No.10.11 of Text Book 2.	2L
Tutorials	Involvement of faculty and students in identifying the solutions to the problems; PPT presentations of Engg. Applications by the faculty, about the module.	2T
(RBT Levels: L1 & L2)		Total 09
MODULE - III		
FOURIER TRANSFORMS & Z-TRANSFORMS		
1. Fourier Transforms: Infinite Fourier transforms, Fourier sine and cosine transforms. Inverse Fourier transforms. Problems.	Discussion and Problems as suggested in Article No.22.1,22.2, 22.4 and, 22.5 (statements only) of Text Book 2.	3L

2. Difference equations and Z-transforms: Difference equations, basic definition, z-transform-definition, standard z-transforms, damping and shifting rules, initial value and final value theorems (without proof) and problems.	Discussion and problems as suggested in Article No.23.1 to 23.6 & 23.9 of Text Book 2	2L
3. Inverse z-transform-problems and applications to solve difference equations. (RBT Levels: L1 & L2)	Discussion and problems restricted to Article No.23.15(II) & 23.16 of Text Book 2.	2L
Tutorials	Involvement of faculty and students in identifying the solutions to the problems; PPT presentations of Engg. Applications by the faculty, about the module.	2T
(RBT Levels: L1 & L2)	Total	09

MODULE - IV

NUMERICAL SOLUTIONS OF ORDINARY DIFFERENTIAL EQUATIONS

1. Numerical Solutions of Ordinary Differential Equations (ODE's): Numerical solution of ODE's of first order and first degree- Taylor's series method.	Discussion and problems restricted to Article No.32.1 & 32.3 of Text Book 2.	2L
2. Modified Euler's method & Runge - Kutta method of fourth order.	Discussion and problems restricted to Article No.32.5 & 32.7 of Text Book 2. (For R-K method, the ' h ' shall be of single step)	3L
3. Milne's and Adam-Basforth predictor and corrector method (No derivations of formulae)-Problems	Discussion and problems restricted to Article No.32.8 to 32.10 of Text Book 2.(For both the methods, usage of corrector formula shall be only once)	2L
Tutorials	Involvement of faculty and students in identifying the solutions to the problems; PPT presentations of Engg. Applications by the faculty, about the module.	2T
(RBT Levels: L1 & L2)	Total	09

MODULE - V

NUMERICAL SOLUTIONS OF SECOND ORDER ODE'S & CALCULUS OF VARIATIONS

1. Numerical Solution of second order ODE's:- Runge-Kutta method of order IV and Milne's predictor and corrector method.(No derivations of formulae).	Discussion and problems as suggested in Article No.32.12 of Text Book 2.	3L
2. Calculus of Variations: Variation of function and functional, variational problems, Euler's equation.	Discussion and problems as suggested in Article No.35.1 to 35.4(excluding minimal surface of revolution and Brachistochrone problems) of Text Book 2.	2L
3. Geodesics, hanging chain, problems	Discussion and problems as suggested in Article No. 35.5 and problem No. 10 (page 1118) of Text Book 2.	2L
Tutorials	Involvement of faculty and students in identifying the solutions to the problems; PPT presentations of Engg. Applications by the faculty, about the module.	2T
(RBT Levels: L1 & L2)	Total	09

Text books:

1. **E. Kreyszig**: Advanced Engineering Mathematics, John Wiley & Sons, 10th Ed.(Reprint), 2017.
2. **B.S. Grewal**: Higher Engineering Mathematics, Khanna Publishers, 44th Ed., 2017.
3. **Srimanta Pal & Subobh C Bhunia**: "Engineering Mathematics", Oxford University Press, 3rd Reprint, 2016.

Reference Books:

1. **C.Ray Wylie, Louis C.Barrett** : "Advanced Engineering Mathematics", 6th Edition, 2. McGraw-Hill Book Co., New York, 1995.
2. **S.S.Sastry**: "Introductory Methods of Numerical Analysis", 11th Edition, Tata McGraw-Hill, 2010
3. **B.V.Ramana**: "Higher Engineering Mathematics" 11th Edition, Tata McGraw-Hill, 2010.
4. **N.P.Bali and Manish Goyal**, "A Text Book of Engineering Mathematics", Laxmi Publications. Latest edition, 2014.
5. **Chandrika Prasad and Reena Garg** "Advanced Engineering Mathematics", Latest edition, Khanna Publishing, 2018.