

COURSE MODULES OF THE SUBJECT TAUGHT FOR THE SESSION SEP-JAN 2027

Course Syllabi with CO's

Faculty Name :			Academic Year: 2026-2027 (ODD SEMESTER)				
Department: Mathematics							
Course Code	Course Title	Core/ Elective	Prerequisite	Contact Hours			Total Hrs/ Sessions
				L	T	P	
1BMATEC301	Transform Techniques and Optimization Theory	Core	Differentiation, Integration, Partial Fraction, Differential Equation	4	2	-	-
Objectives	- Learn to use the Fourier series to represent periodical physical phenomena in engineering analysis. - To enable the students to study Fourier Transforms and concepts of infinite Fourier Sine and Cosine transforms and to learn the method of solving difference equations by the z-transform method. - Analyze and solve linear programming models of real-life situations and learn about the applications to transportation and assignment problems.						
Topics Covered as per Syllabus							
Module-1: Fourier series Periodic functions, Euler's Formula, Conditions for Fourier expansion (Dirichlet's condition), Fourier series of functions- having points of discontinuity, with period 2π , with change of interval, (arbitrary period) and Even and odd functions. Half range Fourier series. Practical harmonic analysis.							
Module-2: Fourier transforms Fourier Transforms: Infinite Fourier transform, Infinite Fourier sine and cosine transforms, Properties-Linear property, Change of scale, shifting property, Modulation theorem. Inverse transforms, Convolution theorem and its significance, Fourier transform of derivatives and integrals, Solution of PDE's using Fourier transforms. Discrete Fourier transform (DFT), Inverse DFT, Fast Fourier transform (FFT).							
Module-3: Discrete Transforms - Z transforms Z-transform of Standard functions, Linearity property, Damping rule, Shifting property, Initial and final value theorems (statement only), Inverse Z-transform- Power series method, Partial fraction method, inverse integral method. Convolution theorem, Application of Z-transforms to solve difference equations.							
Module-4: Linear programming problems Introduction to optimization techniques, nature and characteristics of operation research; Introduction to Linear programming, graphical solution, solution by simplex and Big M method.							



ATME

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Module-5: Transportation problems

Formulation of transportation problem, Initial Basic feasible solution by North-West Corner method, Least cost method, Vogel's approximation method. Optimal solutions Problems.

Formulation of assignment problems, Hungarian method-Problems

Title of the Book Name of the Author/s Name of the Publisher Edition and Year

Textbooks

1. B.S. Grewal, Higher Engineering Mathematics, 45th Edition, Khanna Publishers.
2. Hamdy A. Taha, Operations Research: An Introduction, Pearson Education.
3. H.K. Dass and Er. Rajnish Verma, Higher Engineering Mathematics, S. Chand Publications.

List of Reference Books

1. Ruel V. Churchill and James Ward Brown, Fourier Series and Boundary Value Problems, McGraw-Hill Education.
2. Erwin Kreyszig, Advanced Engineering Mathematics, 10th Edition, Wiley India.
3. Schaum's Outline of Fourier Analysis and Applications, McGraw-Hill.
4. Murray R. Spiegel, John Schiller and R. Alu Srinivasan, Schaum's Outline of Probability and Statistics, McGraw-Hill.
5. S. D. Sharma, Operations Research, Kedar Nath Ram Nath Publications.

List of URLs, Text Books, Notes, Multimedia Content, etc

- NPTEL Courses on Engineering Mathematics
- MIT OpenCourseWare Mathematics
- SWAYAM Online Courses

Course Outcomes

On completion of this course, students are able to:

- CO1:** Develop Fourier series representations of periodic functions and perform harmonic analysis for functions with different periodicities, discontinuities, and symmetry properties.
- CO2:** Apply Fourier transforms, including sine, cosine, discrete Fourier transforms (DFT), and Fast Fourier Transforms (FFT), to analyze signals and solve engineering problems involving differential equations.
- CO3:** Utilize Z-transforms, their properties, inverse transforms, and convolution techniques to analyze discrete-time systems and solve difference equations.
- CO4:** Formulate and solve Linear Programming Problems using graphical, simplex and Big-M methods to obtain optimal solutions in engineering and management applications.
- CO5:** Determine the extremals of functionals using calculus of variations and solve problems arising in dynamics of rigid bodies and vibrational analysis.

Internal Assessment Marks: 50 (A minimum of two Internal Assessment Tests(IA) shall be conducted, carrying a total of 25 marks. In addition, Continuous Comprehensive Assessment (CCA) shall be conducted for a total of 25 marks.).



The Correlation of Course Outcomes (CO's) and Program Outcomes (PO's)

Subject Code:	1BMATEC301	TITLE: Transform Techniques and Optimization Theory						Faculty Name:			
List of Course Outcomes	Program Outcomes										
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11
CO-1	3	2	-	-	2	-	-	3	-	-	2
CO-2	3	2	-	-	2	-	-	3	-	-	2
CO-3	3	2	-	-	2	-	-	3	-	-	2
CO-4	2	3	-	-	-	-	-	-	-	-	2
CO-5	2	2	-	-	-	-	-	-	-	-	2

Note: 3 = Strong Contribution 2 = Average Contribution 1 = Weak Contribution