

GANPAT UNIVERSITY										
FACULTY OF ENGINEERING & TECHNOLOGY										
Programme		Bachelor of Technology				Branch/Spec.		Biomedical Engineering		
Semester		III				Version		2.0.0.0		
Effective from Academic Year			2023-2024			Effective for the batch Admitted in			July 2022	
Subject code		2BS3104		Subject Name		Mathematics for Biomedical Engineering				
Teaching scheme						Examination scheme (Marks)				
(Per week)	Lecture(DT)		Practical(Lab.)		Total		CE	SEE	Total	
	L	TU	P	TW						
Credit	3	1	0	0	4	Theory	40	60	100	
Hours	3	1	0	0	4	Practical	0	0	0	
Pre-requisites:										
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Course Outcome:										
On successful completion of the subject, students should be able to										
CO1	Express physical phenomenon in Fourier Series & Laplace Transforms.									
CO2	Solve Different Numerical techniques.									
CO3	Use basic knowledge of Complex variables and their applications in Biomedical engineering to cater various problems.									
Theory syllabus										
Unit	Content								Hrs	
1	<b>Laplace Transforms:</b> Definition, Laplace transform of elementary functions. Formulas of Laplace transform, Inverse Laplace transforms. Laplace transform of derivatives, Laplace transform of integration. Multiplication by $t^n$ , Division by $t$ , Convolution theorem. Unit step and Heaviside's unit function, Dirac-delta function. Periodic functions Solution of ordinary linear differential equations, simultaneous equation with constant co-efficient applied to electrical circuits								10	
2	<b>Fourier Series:</b> Definition of periodic function, Euler's formula, Functions having points of discontinuity, Change of intervals, Odd and Even functions, Expansion of odd or even periodic functions, Half range sine and cosine series, Elements of harmonic analysis.								08	
3	<b>Fourier Transforms:</b> Definition, Fourier integral, Fourier sine and cosine integration, complex form of Fourier integral, Fourier sine transform, Fourier cosine transform, Inverse Fourier transforms.								05	
4	<b>Theory Of Complex Variables</b> Analytic functions, Cauchy-Riemann Equations, Necessary and Sufficient condition for analyticity, Properties of Analytic Functions, Laplace Equation, Harmonic Functions, Finding Harmonic Conjugate functions Exponential, Trigonometric, Hyperbolic functions and its properties, Line integral, Cauchy's theorem and Cauchy's integral formula, Application of the solution of two-dimensional problems for Simple form of conformal transformation.								10	
5	<b>Numerical Methods:</b> Roots of algebraic equations, Solution of linear simultaneous equations, Numerical differentiation and Numerical integration, Numerical methods to solve first order & first degree ordinary differential equations.								08	
6	<b>Finite Differences And Difference Equations</b> Finite differences interpolation, Newton's and LaGrange's formula, Difference equation with constants co-efficient, Solution of ordinary and partial differential equations with boundary conditions by finite difference method.								04	

Assignments and tutorials are based on the above syllabus.	
Text Books	
1.	Higher engineering mathematics. By B.S.Grewal.
2.	Introductory Methods of Numerical Analysis 4
3.	Theory of functions of complex variables. By: Shanti Narayan.
Reference Books	
1.	Dr. K. R. Kachot, “Higher Engineering Mathematics”, Vol.2, Mahajan Publication.
2.	Textbook of engineering mathematics By A.B.Mathur and V.P.Jaggi.
3.	Engineering mathematics. By Srivastava.
ICT/MOOCs	
1.	<a href="https://nptel.ac.in/courses/111105035/27">https://nptel.ac.in/courses/111105035/27</a>
2.	<a href="https://nptel.ac.in/courses/111105035/22">https://nptel.ac.in/courses/111105035/22</a>
3.	<a href="https://nptel.ac.in/courses/111105035/30">https://nptel.ac.in/courses/111105035/30</a>
4.	<a href="https://nptel.ac.in/courses/111105035/11">https://nptel.ac.in/courses/111105035/11</a>
5.	<a href="https://nptel.ac.in/courses/111105035/14">https://nptel.ac.in/courses/111105035/14</a>
6.	<a href="https://nptel.ac.in/courses/122102009/2">https://nptel.ac.in/courses/122102009/2</a>
7.	<a href="https://nptel.ac.in/courses/111107062/">https://nptel.ac.in/courses/111107062/</a>

Mapping of CO with PO and PSO:															
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
<b>CO1</b>	3	2	0	0	0	2	0	1	0	2	1	3	2	1	1
<b>CO2</b>	3	2	1	2	2	1	3	0	2	1	2	1	2	2	1
<b>CO3</b>	2	1	0	1	2	3	2	2	1	1	1	2	2	1	1