MA 1033	Advanced Mathematics for Biomedical Engineering	L	T	P	C
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	Total contact hours = 60 hours				
	(Common to BME)				

Purpose:
To impart analytical ability in solving mathematical problems as applied to Biomedical Engineering.

Instructional objectives:	
1	To know to formulate and solve partial differential equations.
2	To have thorough knowledge in Fourier series.
3	To be familiar with applications of partial differential equations.
4	To gain good knowledge in the application of Fourier transform.
5	To gain good knowledge in graph theory concepts.

UNIT I PARTIAL DIFFERENTIAL EQUATIONS

Formation – Solution of standard types of first order equations – Lagrange's equation – Linear homogeneous partial differential equations of second and higher order with constant coefficients - Classification of second order linear partial differential equations including the reduction to the above types. **(12 Hours)**

UNIT II FOURIER SERIES

Dirichlet's conditions – General Fourier series – Half range Sine and Cosine series – Parseval's identity – Harmonic Analysis. **(12 Hours)**

UNIT III ONE DIMENSIONAL WAVE & HEAT EQUATION

Boundary and initial value problems - Transverse vibrations of elastic string with fixed ends – Fourier series solutions – One dimensional heat equation - Steady and transient states – problems – Excluding thermally insulated ends. **(12 Hours)**

UNIT IV FOURIER TRANSFORMS

Statement of Fourier integral theorem(proof omitted) – Fourier transform pairs – Fourier Sine and Cosine transforms – Properties – Transforms of simple functions – Convolution theorem – Parseval's identity – Integral equations. **(12 Hours)**

UNIT V GRAPH THEORY

Graphs; Isomorphism-Walk; Path; Circuit; Shortest Path: Dijkstra's Algorithm; Tree; Properties of Tree; Binary Tree; Matrix Representation of Graphs (Adjacency and Incidence Matrices);

(12 Hours)

TEXT BOOK:

Kreyszig.E, Advanced Engineering Mathematics,10th edition, John Wiley & Sons, Singapore, 2012.

REFERENCES:

1. Grewal B.S, Higher Engg Maths, Khanna Publications, 42nd Edition,2012..
2. Miller I.R. and Freund J.E., Probability and Statistics for Engineers, Prentice Hall, 5th edition,1995
3. Kandasamy P etal. Engineering Mathematics, Vol. II & Vol. III (4th revised edition), S.Chand & Co., New Delhi, 2000
4. Narayanan S., Manicavachagom Pillay T.K., Ramanaiah G., Advanced Mathematics for Engineering students, Volume II & III (2nd edition), S.Viswanathan Printers and Publishers, 1992
5. Venkataraman M.K., Engineering Mathematics - Vol.III - A & B (13th edition), National Publishing Co., Chennai, 1998
6. Veerajan T., Discrete Mathematics with Graph Theory and Combinatorics", 10th edition,Tata McGraw Hill Companies,2010.

MA 1033 – Advanced Mathematics for Biomedical Engineering												
Course designed by		Department of Mathematics										
1	Student Outcome	a	b	c	d	e	f	g	h	i	j	k
		X				X						
2	Mapping of instructional objectives with student outcome	1-5				1-5						
3	Category	General (G)		Basic Sciences (B)		Engineering Sciences and Technical Arts (E)		Professional Subjects (P)				
				X								
4	Broad Area	Structural Engineering		Geotechnical Engineering		Water Resources Engineering		Geomatics Engineering				
5	Approval	23rd meeting of academic council, May 2013										

Note:

1. **Instructional objectives (IO) shall be to the point and numbered; not more than five IOs shall be listed and they shall be mapped with the student outcomes.**

2. **For reference, the list of student outcomes are given below. For each course appropriate outcomes shall be chosen**

(a) an ability to apply knowledge of mathematics, science, and engineering
(b) an ability to design and conduct experiments, as well as to analyze and interpret data

(c) an ability to design a system, component, or process to meet desired needs within realistic constraints such as economic, environmental, social, political, ethical, health and safety, manufacturability, and sustainability
(d) an ability to function on multidisciplinary teams
(e) an ability to identify, formulate, and solve engineering problems
(f) an understanding of professional and ethical responsibility
(g) an ability to communicate effectively
(h) the broad education necessary to understand the impact of engineering solutions in global, economic, environmental, and societal context
(i) a recognition of the need for, and an ability to engage in life-long learning
(j) a knowledge of contemporary issues
(k) an ability to use the techniques, skills, and modern engineering tools necessary for engineering practice.