DEPARTMENT OF MATHEMATICS

MA1033 – ADVANCED MATHEMATICS FOR BIOMEDICAL ENGINEERING

SEMESTER: III **ACADEMIC YEAR: 2014-2015**

LECTURE SCHEME / PLAN

The objective is to equip the students of Engineering and Technology, the knowledge of Mathematics and its applications so as to enable them to apply them for solving real world problems.

The list of instructions (provided below) may be followed by a faculty relating to his/her own schedule includes warm-up period, controlled/free practice, and the respective feedback of the classes handled. The lesson plan has been formulated based on high quality learning outcomes and the expected outcomes are as follows

Each subject must have a minimum of 56 hours, which in turn, 45 hours for lecture and rest of the hours for tutorials. The faculty has to pay more attention in insisting the students to have : 95 % class attendance.

UNIT I: PARTIAL DIFFERENTIAL EQUATIONS			
Lect. No.	**Lesson schedule**	**Learning outcomes**	**Cumulative hours**
L.1.1	Introduction to Partial Differential Equations, Formation of PDE by elimination of arbitrary constants –problems	The students will be able to use partial differential equations in the study of fluid mechanics, heat transfer, electromagnetic theory and quantum mechanics. They will be able to simulate mathematical models using partial differential equations	1
L.1.2	Formation of PDE by elimination of arbitrary functions- problems		2
L.1.3	Methods to solve the first order partial differential equations–Type-1, Type-2		3
L.1.4	Tutorial		4
L.1.5	Methods to solve the first order partial differential equations – Type-3, Type-4		5
L.1.6	Reduction to standard types		6
L.1.7	Lagrange's Linear Equations- Method of Grouping		7
L.1.8	Lagrange's Linear Equations- Method of Multipliers		8
L.1.9	Tutorial		9
L.1.10	Linear Homogeneous Partial Differential Equations of second and Higher order with constant co efficient Type-1, Type-2		10

L.1.11	Linear Homogeneous Partial Differential Equations of second and Higher order with constant co efficient Type -3		11
L.1.12	Linear Homogeneous Partial Differential Equations of second and Higher order with constant co efficient-Type4		12
L.1.13	Classification of second order linear PDE-variable separable method		13
CYCLE TEST – I :			**DATE: 30.07.2014**
UNIT II: FOURIER SERIES			
L 2.1	Introduction - Fourier series, Dirichlet's conditions	Students will be able to have good knowledge in Fourier series.	14
L.2.2	General Fourier series		15
L.2.3	Fourier series of odd and Even functions in $(-\pi, \pi)$		16
L.2.4	Fourier series of odd and Even functions in $(-l, l)$		17
L.2.5	Tutorial		18
L.2.6	Half Range sine and cosine series in $(0, \pi)$		19
L.2.7	Half Range sine and Cosine series in $(0, l)$		20
L.2.8	RMS value - Parseval's Theorem / Identity		21
L.2.9	Harmonic Analysis – Full range problems		22
L.2.10	Harmonic Analysis – Half range problems		23
L.2.11	Tutorial		24
UNIT III: ONE DIMENSIONAL WAVE AND HEAT EQUATION			
L.3.1	Introduction to one dimensional Wave Equation	Students will be able to be familiar with one dimensional wave equation	25
L.3.2	One dimensional Wave Equation – Boundary and initial value Problems with zero velocity		26
L.3.3	Boundary and initial value Problems with zero velocity - problems		27
L.3.4	Tutorial		28
L.3.5	Boundary and initial value Problems with Nonzero velocity	Students will be able to be familiar with one dimensional heat equation	29
L.3.6	Boundary and initial value Problems with Nonzero velocity problems		30
L.3.7	One dimensional heat equation – problems with zero boundary values		31
L.3.8	Steady state conditions and zero boundary conditions		32
L.3.9	Steady state conditions and Non-zero boundary conditions		33
L.3.10	More problems in Steady state with Non zero Boundary conditions		34
L.3.11	Steady and transient states - problems		35

L.3.12	Tutorial		36
CYCLE TEST – II :			**DATE: 25.08.2014**
UNIT IV: FOURIER TRANSFORMS			
L.4.1	Introduction to Fourier transforms- statement of Fourier integral theorem	Students will be able to gain good knowledge in the application of Fourier transforms	37
L.4.2	Complex Fourier transforms pair - problems		38
L.4.3	Fourier sine transforms pair - problems		39
L.4.4	Fourier cosine transforms - problems		40
L.4.5	Tutorial		41
L.4.6	Properties of Complex Fourier transforms		42
L.4.7	Properties of Fourier sine & cosine Transforms		43
L.4.8	Transforms of simple functions - problems		44
L.4.9	Tutorial		45
L.4.10	Convolution Theorem and its applications		46
L.4.11	Problems based on Parseval's identity		47
L.4.12	Solution of Integral equations using FT		48
SURPRISE TEST			
UNIT V: GRAPH THEORY			
L.5.1	Basic definitions	Students will be able to solve using graph theory techniques in real-world problems like shortest path and matrix representation of graphs.	49
L.5.2	Some special simple graphs: Complete, Regular, Bipartite, Sub and Isomorphic Graphs		50
L.5.3	Matrix representation of graphs		51
L.5.4	Tutorial		52
L.5.5	Isomorphism and Adjacency matrices - examples		53,54
L.5.6	Paths, Cycles and connectivity		55
L.5.7	Shortest Path Algorithms: Dijkstsra's Algorithm		56, 57
L.5.8	Trees – Properties of Trees		58
L.5.9	Binary Trees and their properties		59
L.5.10	Tutorial		60
MODEL EXAM	**20.10.2014**		**(Duration: 3 Hours)**
LAST WORKING DAY : 07.11.2014			

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. Veerarajan T., Discrete Mathematics with Graph Theory and Combinatorics", 10th edition, Tata McGraw Hill Companies,2010.

WEB BASED RESOURCES

http://www.the-science-lab.com/Math/
http://botw.org/top/Science/Math/
http://dir.yahoo.com/Science/Mathematics/
http://www.cms.caltech.edu/
http://www.en.wikipedia.org

http://engg-maths.com/home

Internal marks Total: 50

Internal marks split up:	Cycle Test 1: 10 Marks	Model Exam: 20 Marks
	Cycle Test 2: 10 Marks	Surprise Test: 5 marks
	Attendance: 5 marks	

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