Academic Course Description

BHARATH UNIVERSITY

Faculty of Science and Humanities

Department of Mathematics

BMA301 ENGINEERING MATHEMATICS - III

Third Semester (Odd Semester)

Course (catalog) description

In this course, in the first Chapter we introduce the concepts Partial Differential Equations, Formation of PDE, Solution of PDE in ordinary cases, Different solutions of PDE, Types of Solution, Types of first order non linear PDE(Type I to VI), Lagranges linear equations, method of grouping, method of multipliers, Homogeneous linear PDE.

In the second chapter we introduces to the concepts and definitions of periodic functions, limit of a function, continuous and dis -continuous functions, fourier series, Dirichlet condition, even and odd functions, change of interval, half – range expansion, complex form of Fourier series, Parsevals identity, RMS value, Harmonic analysis.

In The third Chapter we introduce the concepts method of separation of variables, the vibrating string, solution of wave equation, solution of vibrating string with non zero initial velocity, one dimensional heat flow, steady state condition and zero boundary condition, two dimensional heat flow equation, solution of two dimensional heat flow equation.

In the fourth Chapter we introduce the concept transform of simple functions, basic operational properties, transforms of derivatives and integrals, initial and final value theorems, inverse transforms, convolution theorem, periodic functions, applications of laplace transforms for solving linear ODE upto second order with constant coefficients and simultaneous equations of first order with constant coefficients.

In the fifth Chapter we introduce the concepts of integral transform, Fourier integral theorem, Fourier sine and cosine integral, complex form of Fourier integral, Complex Fourier transform and its inversion formula, properties of fourier transform, Fourier sine and cosine transform and its properties, convolution of two functions, Parsevals identity.

Compulsory/Elective course: Compulsory for all branch students

Credit hours & contact hours : 4 & 75 hours

Course Coordinator : Ms.Subhashini

Instructors **:** Ms.Subhashini

Name of the instructor	Class handling	Office location	Office phone	Email (domain:@ bharathuniv.ac.in	Consultation
Ms.Subhashini	Second year EEE	KS 101	04422290125	hod.maths@ bharathuniv.ac.in	12.30-1.30 PM

Relationship to other courses:

Pre –requisites **:** BMA101 Maths-I & BMA201 Maths-II

Assumed knowledge : The students will have a physics and mathematics background obtained at a high school (or Equivalent) level. In particular, working knowledge of basic mathematics including integration , differential equations, Partial differentiation, series concepts .

Following courses : BMA401 Numerical Methods

Computer usage: Nil

Professional component

General	-	100%
Basic Sciences	-	0%
Engineering sciences & Technical arts	-	0%
Professional subject	-	0%

Broad area : Fourier Series, Fourier Transforms, Laplace Transforms.

Test Schedule

S. No.	Test	Tentative Date	Portions	Duration
1	Cycle Test-1	August 1st week	Session 1 to 30	2 Periods
2	Cycle Test-2	September 2nd week	Session 31 to 54	2 Periods
3	Model Test	October 2nd week	Session 1 to 75	3 Hrs
4	University Examination	TBA	All sessions / Units	3 Hrs.

Mapping of Instructional Objectives with Program Outcome

To develop problem solving skills and understanding of Mathematics. This course emphasizes:	Correlates to program outcome		
	H	M	L
1. To develop an understanding of the fundamental s in PDE	b,c,d,j	a,f,k	e,g
2. To develop the ability to solve problems in Fourier series	b,c,f	a,d,g,h	j
3. To understand the concepts of Boundary Value Problems.	a,d,e	b,g	j,k
4. To develop students problem solving techniques in Laplace Transforms	a,d,e	b,g,h,k	f,j
5. To learn the Fourier transform	a	a,b,c,d,g	j,k

H: high correlation, M: medium correlation, L: low correlation

Draft Lecture Schedule

Session	Topics	Problem solving (Yes/No)	Text / Chapter
UNIT I	**PARTIAL DIFFERENTIAL EQUATIONS**		
1.	Formation	Yes	[T1]
2.	Solutions of standard types of first order equations	Yes	
3.	Lagrange's Linear equation	Yes	
4.	Linear partial differential equations of second with constant Coefficients	Yes	
5.	Linear partial differential equations of higher order with constant Coefficients	Yes	
6.	Lagrange's Linear equation	Yes	
7.	Solutions of standard types of first order equations	Yes	
8.	Problems based on Solutions of standard types of first order equations	Yes	
9.	Problems based on Lagrange's Linear equation	Yes	
10.	Problems based on Solutions of standard types of first order equations	Yes	
11.	Revision of Solutions of standard types of first order equations	Yes	
12.	Revision on Lagrange's Linear equation	Yes	
13.	Revision on partial differential	Yes	
14.	Total revision	Yes	
15.	Test	Yes	
UNIT II	**FOURIER SERIES**		
16.	Dirichlet's conditions	Yes	[T2]
17.	General Fourier series	Yes	
18.	Half-range Sine and Cosine series	Yes	
19.	Parseval's identity	Yes	
20.	Harmonic Analysis.	Yes	
21.	Problems based on Harmonic Analysis.	Yes	
22.	Problems based on Parseval's identity	Yes	
23.	Problems based on Half-range Sine and Cosine series	Yes	
24.	Revision on Harmonic Analysis.	Yes	
25.	Revision on Parseval's identity	Yes	
26.	Revision on Half-range Sine and Cosine series	Yes	

27.	Revision on General Fourier series	Yes	
28.	Test	Yes	
29.	Test	Yes	
30.	Test	Yes	
UNIT III	**BOUNDARY VALUE PROBLEMS**		
31.	Classification of second order linear partial differential equations	Yes	
32.	Solutions of one - dimensional wave equation	Yes	
33.	one-dimensional heat equation	Yes	[T3]
34.	Problems on one-dimensional heat equation	Yes	
35.	Problems on Solutions of one - dimensional wave equation	Yes	
36.	Problems on Classification of second order linear partial differential equations	Yes	
37.	Steady state solution of two-dimensional heat equation	Yes	
38.	Problems based on Steady state solution of two-dimensional heat equation	Yes	
39.	Fourier series solutions in Cartesian coordinates.	Yes	
40.	Problems based on Fourier series solutions in Cartesian coordinates.	Yes	
41.	Revision on Fourier series solutions in Cartesian coordinates.	Yes	
42.	Test		
43.	Test		
UNIT IV	**LAPLACE TRANSFORM**		
44.	Transforms of simple functions	Yes	
45.	Basic operational properties	Yes	
46.	Transforms of derivatives and integrals	Yes	[T4]
47.	Initial and final value theorems	Yes	
48.	Inverse transforms	Yes	
49.	Convolution theorem	Yes	
50.	Periodic functions	Yes	
51.	Applications ofLaplace transforms for solving linear ordinary differential equations upto second order with constant coefficients simultaneous equations of first order with constant coefficients	Yes	
52.	Problems on convolution theorm	Yes	
53.	test	Yes	
54.	test	Yes	

UNIT V	FOURIER TRANSFORMS		
55.	**S**tatement of Fourier integral theorem	Yes	
56.	Fourier transform pairs	Yes	
57.	Fourier Sine and Cosine transforms	Yes	
58.	Properties	Yes	[T5]
59.	Transforms of simple functions	Yes	
60.	Convolution theorem	Yes	
61.	Parseval's identity	Yes	
62.	Problems on Fourier transform	Yes	
63.	Problems on Fourier transform	Yes	
64.	Problems on Fourier sine transform	Yes	
65.	Problems on Fourier sine transform	Yes	
66.	Problems on Fourier cosine transform	Yes	
67.	Problems on Fourier cosine transform	Yes	
68.	Problems on Transforms of simple functions	Yes	
69.	Problems on Transforms of simple functions	Yes	
70.	Problems on Convolution theorem	Yes	
71.	Problems on Convolution theorem	Yes	
72.	Test	Yes	
73.	Test	Yes	
74.	Test	Yes	
75.	Test	Yes	

Teaching Strategies

The teaching in this course aims at establishing a good fundamental understanding of the areas covered using:

Formal face-to-face lectures

Tutorials, which allow for exercises in problem solving and allow time for students to resolve problems in understanding of lecture material.

Laboratory sessions, which support the formal lecture material and also provide the student with practical construction, measurement and debugging skills.

Small periodic quizzes, to enable you to assess your understanding of the concepts.

Evaluation Strategies

Cycle Test – I	-	05%
Cycle Test – II	-	05%
Model Test	-	10%
Attendance	-	05%
SEMINAR&ASSIGNMENT		05%
Final exam	-	70%

Prepared by: Ms. Subhashini, Assistant professor , Department of Mathematics Date:

Addendum

ABET Outcomes expected of graduates of B.Tech / EEE / program by the time that they graduate:

(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 a 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.

(l) The ability to recognize the need for, and an ability to engage in life-long learning.

Course Teacher	Signature
Ms. Subhashini	

Course Coordinator **HOD/EEE**

(Ms. Subhashini)