

Academic Course Description

BHARATH University
 Faculty of Science and Humanities
 Department of Mathematics

BMA301 ENGINEERING MATHEMATICS - III
Third Semester, 2015-16 (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 discontinuous 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 & contact hours : 4 & 75
 Course Coordinator : Ms.J.Arthy

Instructors :

Name of the instructor	Class handling	Office location	Office phone	Email (domain:@bharathuniv.ac.in)	Consultation
Mr. T.Pari	II Year Mech	JR BLOCK		Pari1959@gmail.com	12.30 to 1 pm
Ms.J.Arthy	II Year Mech	JR BLOCK		arthyj@gmail.com	12.30 to 1 pm

Relationship to other courses:

Pre –requisites : BPH101 Engineering Physics –I, BPH201 Engineering Physics –II, BMA 101 Engineering Mathematics – I, BMA 201 Engineering Mathematics - 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	-	0%
Basic Sciences	-	0%
Engineering sciences & Technical arts	-	00%
Professional subject	-	100%

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

Test Schedule

S. No.	Test	Tentative Date	Portions	Duration
1	Cycle Test-1	August 1 st week	Session 1 to 14	2 Periods
2	Cycle Test-2	September 2 nd week	Session 15 to 28	2 Periods
3	Model Test	October 2 nd week	Session 1 to 45	3 Hrs
5	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

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	
UNIT II FOURIER SERIES			
6.	Dirichlet's conditions	Yes	[T2]
7.	General Fourier series	Yes	
8.	Half-range Sine and Cosine series	Yes	
9.	Parseval's identity	Yes	
10.	Harmonic Analysis.	Yes	
UNIT III BOUNDARY VALUE PROBLEMS			
11.	Classification of second order linear partial differential equations	Yes	[T3]
12.	Solutions of one - dimensional wave equation	Yes	
13.	one-dimensional heat equation		
14.	Steady state solution of two-dimensional heat equation	Yes	
15.	Fourier series solutions in Cartesian coordinates.	Yes	
UNIT IV LAPLACE TRANSFORM			
16.	Transforms of simple functions	Yes	[T4]
17.	Basic operational properties	Yes	
18.	Transforms of derivatives and integrals	Yes	
19.	Initial and final value theorems	Yes	
20.	Inverse transforms	Yes	

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Lecture
Schedule

21.	Convolution theorem	Yes	
22.	Periodic functions	Yes	
23.	Applications of Laplace transforms for solving linear ordinary differential equations upto second order with constant coefficients simultaneous equations of first order with constant coefficients	Yes	
UNIT V FOURIER TRANSFORMS			
24.	Statement of Fourier integral theorem	Yes	[T5]
25.	Fourier transform pairs	Yes	
26.	Fourier Sine and Cosine transforms	Yes	
27.	Properties	Yes	
28.	Transforms of simple functions	Yes	
29.	Convolution theorem	Yes	
30.	Parseval's identity	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	-	5%
Cycle Test – II	-	5%
Model Test	-	10%
Assignment / Seminar / Online		
Test / Quiz	-	5%
Attendance	-	5%
Final exam	-	70%

Prepared by: Mr.T.Pari, Assistant professor , Department of Mathematics

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Addendum

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

- a) The ability to apply knowledge of mathematics, science, and engineering fundamentals.
- b) The ability to identify, formulate and solve engineering problems.
- c) The ability to design a system, component, or process to meet the desired needs within realistic constraints such as economic, environmental, social, political, ethical, health and safety, manufacturability, and sustainability.

- d) The ability to design and conduct experiments, as well as to analyze and interpret data
- e) The ability to use the techniques, skills, and modern engineering tools necessary for engineering practice.
- f) The ability to apply reasoning informed by the knowledge of contemporary issues.
- g) The ability to broaden the education necessary to understand the impact of engineering solutions in a global, economic, environmental, and societal context.
- h) The ability to understand professional and ethical responsibility and apply them in engineering practices.
- i) The ability to function on multidisciplinary teams.
- j) The ability to communicate effectively with the engineering community and with society at large.
- k) The ability in understanding of the engineering and management principles and apply them in project and finance management as a leader and a member in a team.
- l) The ability to recognize the need for, and an ability to engage in life-long learning.

Program Educational Objectives

PEO1: PREPARATION:

Mechanical Engineering graduates are enthusiastic to provide strong foundation in mathematical, scientific and engineering fundamentals necessary to analyze, formulate and solve engineering problems in the field of Mechanical Engineering.

PEO2: CORE COMPETENCE:

Mechanical Engineering graduates have competence to enhance the skills and experience in defining problems in the field of Mechanical Engineering and Technology design and implement, analyzing the experimental evaluations, and finally making appropriate decisions.

PEO3: PROFESSIONALISM:

Mechanical Engineering graduates made competence to enhance their skills and embrace new thrust areas through self-directed professional development and post-graduate training or education.

PEO4: PROFICIENCY:

Mechanical Engineering graduates became skilled to afford training for developing soft skills such as proficiency in many languages, technical communication, verbal, logical, analytical, comprehension, team building, inter personal relationship, group discussion and leadership skill to become a better professional.

PEO5: ETHICS:

Mechanical Engineering graduates are morally merged to apply the ethical and social aspects of modern Engineering and Technology innovations to the design, development, and usage of new products, machines, gadgets, devices, etc.

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Course Teacher	Signature
Mr. T. Pari MS.J.Arthy	

Course Coordinator
MS.J.Arthy

HOD/Mech