Academic Course Description

BHARATH University
Faculty of Science and Humanities
Department of Electrical and Electronics Engineering
BMA201 ENGINEERING MATHEMATICS - II
Second Semester(Even Semester)

Course (catalog) description

In this course, in the first Chapter we introduce the concepts Higher order linear differential equations with constant coefficients , Method of variation of parameters , Cauchy's and Legendre's linear equations and simultaneous first order linear equations with constant coefficients.

In the second chapter we introduces to the concepts and definitions of Gradient, divergence and curl ,Directional derivatives – Irrational and Solenoidal vector fields, vector integration, Green's theorem in a plane , Gauss divergence theorem and Stoke's theorem (without proofs) and simple applications involving cubes and rectangular parallelepipeds

In The third Chapter we introduce the concepts Functions of a complex variable ,Analytic functions , Necessary conditions, Cauchy-Riemann equation and sufficient conditions (without proofs) ,Harmonic and orthogonal properties of analytic functions – Harmonic conjugate – construction of analytic functions and conformal mapping : W= Z+C,CZ , 1/Z and bilinear transformation.

In the fourth Chapter we introduce the concept Complex integration – Statement and application of Cauchy's integral theorem and Cauchy's integral formula – Taylor and Laurent expansions – Singular points – Residues – Residue theorem –Application of Residue theorem to evaluate real integrals – Unit circle and semi-circular contour (excluding ploes on boundaries).

In the fifth Chapter we introduce the concepts of Mean , Median ,Mode – Moments – Skewness and Kurtosis – correlation – Rank Correlation – Regression –Chi square test – 2 x 2, m x n .

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Compulsory/Elective course : Compulsory for all branch students
Credit & Contact hours : 3 and 60 hours
Course Coordinator : Mr.P.Bhathmanaban, Asst. Professor
Instructors : Mr.P.Bhathmanaban

Name of the instructor	Class handling	Office location	Office phone	Email (domain:@ bharathuniv.ac.in	Consultation
Mr.P.Bhathmanaban	All first Year Students	FIRST YEAR MAIN BULIDING	**04422290125**	**bhathrns@gmail.com**	9.00-9.50 AM

Relationship to other courses:

Pre –requisites **:** Mathematics – I

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, Ordinary differentiation, series concepts .

Syllabus Content

UNIT I ORDINARY DIFFERENTIAL EQUATION 12

Higher order linear differential equations with constant coefficients - Method of variation of parameters – Cauchy's and Legendre's linear equations - simultaneous first order linear equations with constant coefficients.

UNIT II VECTOR CALCULUS 12

Gradient, divergence and curl –Directional derivatives –Irrotational and solenoidal vector fields – vector integration– Green's theorem in a plane , Gauss divergence theorem and Stoke's theorem (without proofs) – simple applications involving cubes and rectangular parallelepipeds.

UNIT III ANALYTIC FUNCTIONS 12

Functions of a complex variable – Analytic functions – Necessary conditions, Cauchy-Riemann equation and sufficient conditions (without proofs) – Harmonic and orthogonal properties of analytic functions – Harmonic conjugate – construction of analytic functions – conformal mapping: W= Z+C, CZ, 1/Z and bilinear transformation.

UNIT IV COMPLEX INTEGRATION 12

Complex integration – Statement and application of Cauchy's integral theorem and Cauchy's integral formula –Taylor and Laurent expansions – Singular points – Residues – Residue theorem –Application of Residue theorem to evaluate real integrals – Unit circle and semi-circular contour (excluding poles on boundaries).

UNIT V STATISTICS 12

Mean, Median, Mode – Moments –Skewness and Kurtosis – Correlation – Rank Correlation – Regression –Chi square test for contingency tables.

Computer usage: Nil

Professional component

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

Broad area : Complex Analysis, Vector Calculus, Statistics, Differential Equations.

Test Schedule

S. No.	Test	Tentative Date	Portions	Duration
1	Cycle Test-1	February 1st week	Session 1 to 24	2 Periods
2	Cycle Test-2	March 1st week	Session 25 to 48	2 Periods
3	Model Test	April 2nd week	Session 1 to 60	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 ODE	b,c,d,j	a,f,k	e,g
2. To develop the ability to solve problems in Vector Calculus	b,c,f	a,d,g,h	j
3. To understand the concepts of Analytic Functions	a,d,e	b,g	j,k
4. To develop students problem solving techniques in Complex Integration	a,d,e	b,g,h,k	f,j
5. to learn basic concepts of **S**tatistics	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 ORDINARY DIFFERENTIAL EQUATIONS		
1.	Higher order linear differential equations with constant coefficients	Yes	[T1]
2.	Types to find Complementary Function	Yes	
3.	Types to find particular Integral	Yes	
4.	Method of variation of parameters	Yes	
5.	Cauchy's Linear equation	Yes	
6.	Problems on Cauchy's Linear equation	Yes	
7.	Test	Yes	
8.	Test	Yes	
9.	Legendre's linear equations	Yes	
10.	Problems on Legendre's linear equations	Yes	
11.	Simultaneous first order linear equations with constant coefficients.	Yes	
12.	Test	Yes	
	UNIT II VECTOR CALCULUS		
13.	Gradient, divergence and curl	Yes	[T2]
14.	Directional derivatives	Yes	
15.	Irrotational and Solenoidal vector fields	Yes	
16.	vector integration	Yes	
17.	Green's theorem in a plane	Yes	
18.	Problems on Green's theorem in a plane	Yes	
19.	Test	Yes	
20.	Gauss divergence theorem	Yes	
21.	Problems on Gauss divergence theorem	Yes	
22.	Stoke's theorem	Yes	
23.	Problems on Stoke's theorem	Yes	
24.	simple applications involving cubes and rectangular parallelepipeds	Yes	
	UNIT III ANALYTIC FUNCTIONS		
25.	Functions of a complex variable	Yes	
26.	Analytic functions	Yes	
27.	Necessary conditions, Cauchy-	Yes	

	Riemann equation and sufficient conditions		[T3]
28.	Harmonic and orthogonal properties of analytic functions	Yes	
29.	Harmonic and orthogonal properties of analytic functions	Yes	
30.	Harmonic conjugate.	Yes	
31.	Harmonic conjugate.	Yes	
32.	construction of analytic functions	Yes	
33.	construction of analytic functions	Yes	
34.	Conformal mapping: W= Z+C,CZ , 1/Z and bilinear transformation.	Yes	
35.	Conformal mapping: W= Z+C,CZ , 1/Z and bilinear transformation.	Yes	
36.	Test	Yes	
	UNIT IV COMPLEX INTEGRATION		
37.	Complex integration	Yes	[T4]
38.	Statement and application of Cauchy's integral theorem and Cauchy's integral formula	Yes	
39.	Taylor and Laurent expansions	Yes	
40.	Singular points	Yes	
41.	Residues	Yes	
42.	Problems on Residues	Yes	
43.	Residue theorem	Yes	
44.	Problems on Residue theorem	Yes	
45.	Application of Residue theorem to evaluate real integrals	Yes	
46.	Application of Residue theorem to evaluate real integrals	Yes	
47.	Unit circle and semi-circular contour (excluding ploes on boundaries).	Yes	
48.	Test	Yes	
	UNIT V STATISTICS		
49.	Mean	Yes	[T5]
50.	Median	Yes	
51.	Mode	Yes	
52.	Moments	Yes	
53.	Skewness and Kurtosis	Yes	
54.	correlation	Yes	
55.	Rank Correlation	Yes	
56.	Regression	Yes	
57.	Chi square test – 2 x 2, m x n .	Yes	
58.	Test	Yes	
59.	Test	Yes	
60.	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	-	5%
Cycle Test – II	-	5%
Model Test	-	10%
Assignment	-	5%
Attendance	-	5%
Final exam	-	70%

Prepared by: **Dated:**
P.Bhathmanaban, Assistant professor**,** Department of Mathematics

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 fundamentals.
b) An ability to identify, formulate, and solve engineering problems.
c) An 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) An ability to design and conduct experiments, as well as to analyze and interpret data.
e) An ability to use the techniques, skills, and modern engineering tools necessary for engineering practice.
f) An ability to apply reasoning informed by the knowledge of contemporary issues.
g) An ability to broaden the education necessary to understand the impact of engineering solutions in a global, economic, environmental, and societal context.
h) An ability to understand professional and ethical responsibility and apply them in engineering practices.
i) An ability to function on multidisciplinary teams.
j) An ability to communicate effectively with the engineering community and with society at large.
k) An 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) An ability to recognize the need for,and an ability to engage in life-long learning.

Program Educational Objectives

PEO1: PREPARATION
Electrical Engineering Graduates are in position with the knowledge of Basic Sciences in general and Electrical Engineering in particular so as to impart the necessary skill to analyze and synthesize electrical circuits, algorithms and complex apparatus.

PEO2: CORE COMPETENCE
Electrical Engineering Graduates have competence to provide technical knowledge, skill and also to identify, comprehend and solve problems in industry, research and academics related to power, information and electronics hardware.

PEO3: PROFESSIONALISM
Electrical Engineering Graduates are successfully work in various Industrial and Government organizations, both at the National and International level, with professional competence and ethical administrative acumen so as to be able to handle critical situations and meet deadlines.

PEO4: SKILL
Electrical Engineering Graduates have better opportunity to become a future researchers/ scientists with good communication skills so that they may be both good team-members and leaders with innovative ideas for a sustainable development.

PEO5: ETHICS
Electrical Engineering Graduates are framed to improve their technical and intellectual capabilities through life-long learning process with ethical feeling so as to become good teachers, either in a class or to juniors in industry.

Course Teacher	Signature
Mr.P.Bhathmanaban	

Course Coordinator **HOD/EEE**
(Mr.P.Bhathmanaban) ( )