

BA223 – MATHEMATICS 3

CREDIT HOURS

3 Hours

CONTACT HOURS (Hours/week)

Lecture: 2; Tutorial: 2

TEXT BOOK

Erwin Kreyszig, Advanced Engineering Mathematics , John Wiley, 9th edition , 2006 .

COURSE DESCRIPTION

Solving first order differential equations: Separable of variables, Homogeneous equation, Exact equation, Linear equation and Bernoulli's equation. Solving second order homogeneous and non-homogeneous differential equations with constant and variable coefficients. Undetermined coefficients and variation of parameters methods. Laplace transformations, basic properties, first shifting theorem, unit step function, second shifting theorem, transform of derivatives and integrals, and inverse Laplace transforms. Solving differential equations by using Laplace transform. Fourier series: Fourier series for even, odd, and harmonic functions.

PREREQUISITE:

BA 124

RELATION OF COURSE TO PROGRAM

Required

COURSE INSTRUCTION OUTCOMES

The student will be able to:

Study differential equations, Laplace transform and Fourier analysis, that is of fundamental importance in modern engineering and science.

TOPICS COVERED

- Solving first order differential equations: Separable of variables and Homogeneous equation.
- Solving first order differential equations: Exact and Linear equations.
- Solving first order differential equations: Bernoulli's equation and revision on first order differential equations.
- Solving second order homogeneous differential equations with constant coefficients. Method of undetermined coefficients.
- Solving second order non-homogeneous differential equations with constant coefficients. Method of variation of parameters.
- Continue method of variation of parameters. Solving second order differential equations with variable coefficients (Euler's equation).
- Laplace transform: Basic definition, First shifting theorem.
- Laplace transform: Transform differentiation and integration.

- Unit step function, second shifting theorem, and convolution theorem.
- Inverse Laplace transforms.
- Solving differential equations by using Laplace transform.
- Fourier series: Fourier series for functions of period $2P$.
- Fourier series for even and odd functions.
- Fourier series for harmonic functions.

CONTRIBUTION OF COURSE TO MEET THE REQUIREMENTS OF CRITERION 5:

Professional component Content			
Math and Basic Sciences	Engineering Topics	General Education	Other
✓			

RELATIONSHIP OF COURSE TO STUDENT OUTCOMES:

Student Outcomes		Course aspects
A	An ability to apply knowledge of mathematics, science, and engineering	a ₁ a ₂
B	An ability to design and conduct experiments, analyze and interpret data.	
C	An ability to design a system, component, or process to meet desired needs within realistic constraints such as economics, environmental, social, political, ethical, health, and safety, manufacturability, and sustainability	
D	An ability to function on multi-disciplinary teams.	
E	An ability to identify, formulate, and solve engineering problems	e ₁ e ₂ e ₃
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 social content	
I	A recognition of the need for, and an ability to engage in life-long learning.	
J	A knowledge of contemporary issues within and outside the electrical engineering profession.	
K	An ability to use the techniques, skills, and modern engineering tools necessary for electrical engineering practice.	