

BA224 – MATHEMATICS 4

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

This course gives a comprehensive study on the 2D and 3D vectors : algebra, differential and integral calculus , and the physical interpretation of the integral theorems. The course also gives a study on the complex functions, its differentiation and integration, the residue theorems and its application to real integrals.

PREREQUISITE:

BA 223

RELATION OF COURSE TO PROGRAM

Required

COURSE INSTRUCTION OUTCOMES

The student will be able to:

- Know vector Differential Calculus
- Know vector integral calculus
- Know complex Analytic Functions and Complex Integration.

TOPICS COVERED

- Vector Algebra / Dot and cross product and Applications.
- Partial Differentiation / and Derivatives of vector functions.
- Gradient / Divergence/ curl/ Laplacian.
- Line Integrals / line Integrals Independent of the path / Exactness.
- Conservative vector fields.
- Double Integrals in Cartesian and polar coordinates / Green's Theorem,
- Surface Integrals / Stokes' Theorem /7th week Exam.
- Triple Integrals / Divergence (Gauss' Theorem).
- Review on Integrals Theorems.
- Complex numbers and functions / forms of representation.
- Analytic functions/ Harmonic functions.
- Line complex integrals / Cauchy's Integrals Theorem /12th week Exam.
- Zeros and poles of Analytic functions/ Residues and their evaluation.

- Residue Theorem / Application to Real Integral.
- Introduction to Fourier Integrals and Transforms.

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.	