MAHARISHI MARKANDESHWAR (Deemed to be University)
Mullana- Ambala, 133207
(Established under Section 3 of the UGC Act. 1956)
(NAAC Accredited Grade 'A' University)
Department of Mathematics & Humanities

B. Tech. (Common for all Branches except Biotech)
MATHEMATICS II (BMAT-002)

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Theory	: 60 marks
Sessional	: 40 marks
Total	: 100 marks
Credit	: 4.0
Duration of Exam	: 3 Hrs.

OBJECTIVES:

The objective of this course is to familiarize the prospective engineers with techniques in multivariate integration, ordinary and partial differential equations and complex variables. It aims to equip the students to deal with advanced level of mathematics and applications that would be essential for their disciplines. More precisely, the objectives are:

- To acquaint the student with mathematical tools needed in evaluating multiple integrals and their usage.
- To introduce effective mathematical tools for the solutions of differential equations that model physical processes.
- To introduce the tools of differentiation of functions of complex variable that is used in various techniques dealing engineering problems.

UNIT I

Multivariable Calculus (Integration) (10 hours)

Multiple Integration: Double integrals, change of order of integration in double integrals, Change of variables (Cartesian to polar), Applications: areas and volumes, Triple integrals.

Scalar line integrals, vector line integrals, scalar surface integrals, vector surface Integrals, Volume integral, Application of Green, Gauss and Stokes Theorem (without proof).

UNIT II

First order ordinary differential equations (10 hours)

Formation of ordinary differential equation, Exact differential equation, reducible to exact differential equation, linear and Bernoulli's equations, Application of linear differential equation to electric circuit . Orthogonal trajectories Equations not of first degree: equations solvable for p, y, x and Clairaut's type.

UNIT III

Ordinary differential equations of higher orders (10 hours)

Linear differential equations of second and higher order. Complete solutions, Complementary function and particular integral, method of variation of parameters and method of undetermined coefficients, Cauchy's and Legendre's linear equations, simultaneous linear equations with constant coefficients. Applications of linear differential equations to electric circuits.

UNIT IV

Complex Variable (10 hours)

Functions of complex variables, Exponential function, Trigonometric, Hyperbolic and Logarithmic functions, Differentiability and analyticity. Cauchy-Riemann equations, Necessary and sufficient conditions for a function to be analytic, polar form of the Cauchy-Riemann equations, Harmonic functions, finding Harmonic conjugate, Applications to flow problems.