

**Maulana Abul Kalam Azad University of Technology, West Bengal**  
*(Formerly West Bengal University of Technology)*  
**1<sup>st</sup> Year Curriculum Structure for B.Tech courses in Engineering & Technology**  
(Applicable from the academic session 2018-2019)

<b>Course Code :</b> BS-M202	<b>Category :</b> Basic Science Course
<b>Course Title :</b> Mathematics – II B	<b>Semester :</b> Second (All stream except CSE & IT)
<b>L-T-P : 3-1-0</b>	<b>Credit: 4</b>
<b>Pre-Requisites:</b> High School Mathematics and BS-M102	

<b>Module No.</b>	<b>Description of Topic</b>	<b>Lectures Hours</b>
1	<p><b><i>Multivariate Calculus (Integration):</i></b></p> <p>Multiple Integration: Double integrals (Cartesian), change of order of integration in double integrals, change of variables (Cartesian to Polar), Applications: Areas and volumes, Center of mass and Gravity (constant and variable densities); Triple integrals (Cartesian), Orthogonal curvilinear coordinates, Simple applications involving cubes, sphere and rectangular parallelepipeds; Scalar line integrals, vector line integrals, scalar surface integrals, vector surface integrals, Theorems of Green, Gauss and Stokes.</p>	11
2	<p><b><i>First order ordinary differential equations:</i></b></p> <p>Exact, linear and Bernoulli's equations, Equations not of first degree: equations solvable for p, equations solvable for y, equations solvable for x and Clairaut's type.</p>	5
3	<p><b><i>Ordinary differential equations of higher orders:</i></b></p> <p>Second order linear differential equations with constant coefficients, Use of D-operators, Second order linear differential equations with variable coefficients, method of variation of parameters, Cauchy-Euler equation; Power series solutions; Legendre polynomials, Bessel functions of the first kind and their properties.</p>	9
4	<p><b><i>Complex Variable – Differentiation</i></b></p> <p>Differentiation of complex functions, Cauchy-Riemann equations, Analytic functions, Harmonic functions, determination of harmonic conjugate, elementary analytic functions (exponential, trigonometric, logarithmic) and their properties; Conformal mappings, Möbius transformations and their properties.</p>	6
5	<p><b><i>Complex Variable – Integration</i></b></p> <p>Contour integrals, Cauchy-Goursat theorem (without proof), Cauchy integral formula (without proof), Liouville's theorem and Maximum-Modulus theorem (without proof); Taylor's series, Zeros of analytic functions, Singularities, Laurent's series; Residues, Cauchy residue theorem (without proof), Evaluation of definite integral involving sine and cosine, Evaluation of certain improper integrals using the Bromwich contour.</p>	9

# **Maulana Abul Kalam Azad University of Technology, West Bengal**

*(Formerly West Bengal University of Technology)*

## **1<sup>st</sup> Year Curriculum Structure for B.Tech courses in Engineering & Technology**

(Applicable from the academic session 2018-2019)

### **Course Outcomes:**

The students will be able to:

- Learn the methods for evaluating multiple integrals and their applications to different physical problems.
- Understand different techniques to solve first and second order ordinary differential equations with its formulation to address the modelling of systems and problems of engineering sciences.
- Learn different tools of differentiation and integration of functions of a complex variable that are used with various other techniques for solving engineering problems.
- Apply different types of transformations between two 2- dimensional planes for analysis of physical or engineering problems.

### **Learning Resources:**

1. Erwin Kreyszig, Advanced Engineering Mathematics, John Wiley & Sons.
2. Michael Greenberg, Advanced Engineering Mathematics, Pearson.
3. B.S. Grewal, Higher Engineering Mathematics, Khanna Publishers.
4. Kanti B. Dutta, Mathematical Methods of Science and Engineering, Cengage Learning.
5. Veerarajan T., Engineering Mathematics for first year, Tata McGraw-Hill, New Delhi.
6. E. L. Ince, Ordinary Differential Equations, Dover Publications.
7. J. W. Brown and R. V. Churchill, Complex Variables and Applications, Mc-Graw Hill.
8. Reena Garg, Chandrika Prasad, Advanced Engineering Mathematics, Khanna Publishers.