

**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-M101	<b>Category :</b> Basic Science Course
<b>Course Title :</b> Mathematics – I A	<b>Semester :</b> First (CSE & IT)
<b>L-T-P : 3-1-0</b>	<b>Credit: 4</b>
<b>Pre-Requisites: High School Mathematics</b>	

<b>Module No.</b>	<b>Description of Topic</b>	<b>Lectures Hours</b>
1	<b>Calculus (Integration):</b> Evolutes and involutes; Evaluation of definite and improper integrals; Beta and Gamma functions and their properties; Applications of definite integrals to evaluate surface areas and volumes of revolutions.	8
2	<b>Calculus (Differentiation):</b> Rolle's Theorem, Mean value theorems, Taylor's and Maclaurin's theorems with remainders; Indeterminate forms and L'Hospital's rule; Maxima and minima.	6
3	<b>Matrices:</b> Matrices, Vectors: addition and scalar multiplication, matrix multiplication; Linear systems of equations, linear Independence, rank of a matrix, determinants, Cramer's Rule, inverse of a matrix, Gauss elimination and Gauss-Jordan elimination.	7
4	<b>Vector Spaces:</b> Vector Space, linear dependence of vectors, Basis, Dimension; Linear transformations (maps), Range and Kernel of a linear map, Rank and Nullity, Inverse of a linear transformation, Rank-Nullity theorem, composition of linear maps, Matrix associated with a linear map.	9
5	<b>Vector Spaces (Continued):</b> Eigenvalues, Eigenvectors, Symmetric, Skew-symmetric, and Orthogonal Matrices, Eigenbases. Diagonalization; Inner product spaces, Gram-Schmidt orthogonalization.	10

**Course Outcomes:**

The students will be able to:

Apply the concept and techniques of differential and integral calculus to determine curvature and evaluation of different types of improper integrals.

Understand the domain of applications of mean value theorems to engineering problems.

Learn different types of matrices, concept of rank, methods of matrix inversion and their applications.

Understand linear spaces, its basis and dimension with corresponding applications in the field of computer science.

Learn and apply the concept of eigen values, eigen vectors, diagonalisation of matrices and orthogonalization in inner product spaces for understanding physical and engineering problems

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**Learning Resources:**

1. Reena Garg, Engineering Mathematics-I, Khanna Publishers.
2. Erwin Kreyszig, Advanced Engineering Mathematics, John Wiley & Sons.
3. Michael Greenberg, Advanced Engineering Mathematics, Pearson.
4. B.S. Grewal, Higher Engineering Mathematics, Khanna Publishers.
5. Kanti B. Dutta, Mathematical Methods of Science and Engineering, Cenage Learning.
6. Veerarajan T., Engineering Mathematics for first year, Tata McGraw-Hill, New Delhi.
7. S.K. Mapa, Higher Algebra: Abstract and Linear, Sarat Book House Pvt.Ltd.
8. Hoffman and Kunze: Linear algebra, PHI.