

| CO-wise Syllabus |      |           |                                                                                                                                                                                                                                                                                                                                                                                          |
|------------------|------|-----------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 1                | CO-1 | Statement | Apply the concept of matrices for solving linear simultaneous equations.                                                                                                                                                                                                                                                                                                                 |
|                  |      | Syllabus  | <b>Matrices</b><br>Elementary transformations, Inverse of a matrix, Rank of matrix, Solution of system of linear equations, Characteristic equation, Cayley-Hamilton Theorem and its application, Linear Dependence and Independence of vectors, Eigen values and Eigen vectors, Complex Matrices, Hermitian, Skew-Hermitian and Unitary Matrices, Applications to Engineering problems. |
| 2                | CO-2 | Statement | Apply the concept of differentiation in successive derivatives, Leibnitz theorem, partial and total derivative.                                                                                                                                                                                                                                                                          |
|                  |      | Syllabus  | <b>Differential Calculus</b><br>ISuccessive Differentiation (nth order derivatives), Leibnitz theorem, Curve tracing, Partial derivatives, Euler's Theorem for homogeneous functions, Total derivative.                                                                                                                                                                                  |
| 3                | CO-3 | Statement | Apply partial differentiation for evaluating extreme values, expansion of function and Jacobian, approximation of errors.                                                                                                                                                                                                                                                                |
|                  |      | Syllabus  | <b>Differential Calculus-II</b><br>Expansion of functions by Taylor's and Maclaurin's theorems for functions of one and two variables, Maxima and Minima of functions of several variables, Lagrange's method of multipliers, Jacobians, Approximation of errors.                                                                                                                        |
| 4                | CO-4 | Statement | Apply the methods of multiple integral and concept of beta and gamma functions for finding area, volume and mass.                                                                                                                                                                                                                                                                        |
|                  |      | Syllabus  | <b>Multiple integration</b><br>Double integral, Triple integral, Change of order of integration, Change of variables, Beta and Gama function and their properties, Dirichlet's integral and its applications to area and volume, Liouville's extensions of Dirichlet's integral.                                                                                                         |
| 5                | CO-5 | Statement | Apply the concept of vector for evaluating directional derivatives, line, surface and volume integrals.                                                                                                                                                                                                                                                                                  |
|                  |      | Syllabus  | <b>Vector Calculus</b><br><b>Vector differentiation:</b> Gradient, Curl and Divergence and their Physical interpretation, Directional derivatives.<br><b>Vector Integration:</b> Line integral, Surface integral, Volume integral, Gauss's Divergence theorem, Green's theorem and Stoke's theorem (without proof) and their applications.                                               |

**B.Tech First Year: Regular Course Lecture Plan Session 2023-24**

|                     |                                            |
|---------------------|--------------------------------------------|
| <b>Subject Name</b> | <b>Engineering Mathematics-I (BAS-103)</b> |
|---------------------|--------------------------------------------|

| Unit No. | CO No.   | Unit Name                       | Syllabus Topics                                                                         | Lecture No |
|----------|----------|---------------------------------|-----------------------------------------------------------------------------------------|------------|
| <b>1</b> | <b>1</b> | <b>Matrices</b>                 | Symmetric, Skew-symmetric, Orthogonal Matrices                                          | 1          |
|          |          |                                 | Complex Matrices and problems                                                           | 2          |
|          |          |                                 | Inverse of matrix using elementary transformations                                      | 3          |
|          |          |                                 | Rank of matrix using elementary transformations(Echelon Form)                           | 4          |
|          |          |                                 | Rank of matrix using elementary transformations(Normal Form)                            | 5          |
|          |          |                                 | Solution of Non-Homogeneous system of linear equations                                  | 6          |
|          |          |                                 | Solution of Non-Homogeneous system of linear                                            | 7          |
|          |          |                                 | Solution of Homogeneous system of linear equations                                      | 8          |
|          |          |                                 | Linear Dependence and Independence of vectors                                           | 9          |
|          |          |                                 | Eigen values Eigen vectors                                                              | 10         |
|          |          |                                 | Eigen values Eigen vectors                                                              | 11         |
|          |          |                                 | Cayley-Hamilton Theorem and its application,                                            | 12         |
| <b>2</b> | <b>2</b> | <b>Differential Calculus-I</b>  | Introduction of Successive Differentiation, nth derivative of some elementary functions | 13         |
|          |          |                                 | Leibnitz's Theorem & nth derivative of product of functions                             | 14+        |
|          |          |                                 | To find nth derivative of a function at $x=0$                                           | 15         |
|          |          |                                 | Introduction to partial differentiation and partial derivatives                         | 16         |
|          |          |                                 | problems on partial derivatives                                                         | 17         |
|          |          |                                 | Introduction to total derivatives                                                       | 18         |
|          |          |                                 | Euler's Theorem for homogeneous functions                                               | 19         |
|          |          |                                 | Deductions from Euler's Theorem                                                         | 20         |
| <b>3</b> | <b>3</b> | <b>Differential Calculus-II</b> | Taylor & Maclaurin's theorems for a function of one and two variables                   | 21+        |
|          |          |                                 | Maxima and Minima of functions of several variables                                     | 22         |
|          |          |                                 | Lagrange Method of Multipliers                                                          | 23+        |
|          |          |                                 | Introduction to Jacobian, Properties of Jacobian                                        | 24+        |
|          |          |                                 | Jacobian of Implicit Functions                                                          | 25         |
|          |          |                                 | Approximation of errors                                                                 | 26+        |

**B.Tech First Year: Regular Course Lecture Plan Session 2023-24**

|                     |                                            |
|---------------------|--------------------------------------------|
| <b>Subject Name</b> | <b>Engineering Mathematics-I (BAS-103)</b> |
|---------------------|--------------------------------------------|

| Unit No. | CO No. | Unit Name                | Syllabus Topics                                                                        | Lecture No |
|----------|--------|--------------------------|----------------------------------------------------------------------------------------|------------|
| 4        | 4      | Multivariable Calculus-I | Introduction to Double integral                                                        | 27         |
|          |        |                          | Double integral in Polar coordinate                                                    | 28         |
|          |        |                          | Change of order of integration                                                         | 29         |
|          |        |                          | Area by Double integral                                                                | 30         |
|          |        |                          | Introduction of Triple integral, Volume by triple integral                             | 31         |
|          |        |                          | Change of variables in Double and Triple integral                                      | 32+        |
|          |        |                          | Beta and Gamma Function                                                                | 33         |
|          |        |                          | Properties and Problems on Beta and Gamma Function                                     | 34         |
|          |        |                          | Dirichlet's integral and its applications to area and volume                           | 35         |
|          |        |                          | Liouville's extensions of Dirichlet's integral.                                        | 36         |
| 5        | 5      | Vector Calculus          | Gradient, Directional Derivatives                                                      | 37+        |
|          |        |                          | Divergence of a vector and it's physical interpretations                               | 38         |
|          |        |                          | Curl of a vector and it's physical interpretations & Vector identities (without proof) | 39         |
|          |        |                          | Line, Surface and Volume Integrals                                                     | 40         |
|          |        |                          | Applications of Green's Theorem                                                        | 41+        |
|          |        |                          | Applications of Stoke's Theorem                                                        | 42+        |
|          |        |                          | Applications of Gauss Divergence Theorem                                               | 43+        |
| 2        | 2      | Differential Calculus-I  | Curve tracing                                                                          | 44         |