

# Gujarat University

## Choice-Based Credit System (NEP)

Syllabus for Under Graduate (B. Sc.) Mathematics

Effective from June-2023



# SYLLABUS OF SEMESTER – I (MATHEMATICS)

## MAT101: CALCULUS - I

**Credit: 3**

**Hours/week: 3**

### UNIT I

- (a) Successive Derivatives, Standard results for n derivative, Leibniz's theorem.
- (b) Taylor's and Maclaurin's theorems, Using Taylor's and Maclaurin's theorems find Maclaurin power series expansion of  $\log(1+x)$ , etc.

### UNIT II

- (a) Roll's Theorem, Lagrange's and Cauchy's Mean Value Theorem, Increasing and decreasing functions.
- (b) Indeterminate forms: L' Hospital Rules.

### UNIT III

- (a) Introduction to function of several variables, Limit – Continuity of function of several variables and partial differentiation and related examples.
- (b) Vector Analysis, different notations and its geometric interpretation.

### Reference Books:

- 1) Calculus and Analytic Geometric – G. B. Thomas & R. L. Finney. Pearson Education. Indian Reprint
- 2) Calculus – James Stewart, Sixth Edition (E -Book)
- 3) Calculus - T. M. Apostol. Volume – I
- 4) Differential Calculus – Shanti Narayan, P. K. Mittal, S. Chand & Co
- 5) Differential Calculus – Harikishan, Atlantic Publishers
- 6) Calculus – M. Spivak
- 7) Mathematical Analysis – S. C. Malik & Savita Arora, Second Edition, New Age Int. (P) Ltd
- 8) Differential Calculus – Shanti Narayan
- 9) Calculus – James Stewart

## **SYLLABUS OF SEMESTER – I (MATHEMATICS)**

### **MAT102: CALCULUS - I PRACTICAL**

**Credit: 2**

**Hours/week: 4**

#### **UNIT I:**

Problems based -Successive Derivative, Leibniz's theorem

#### **UNIT II:**

Examples of Limit, Continuity, & Differentiation of function of several variables using the definition

#### **UNIT III:**

- (a) Examples based on partial differentiation and related examples.
- (b) Examples based on Vector Analysis, different notations, and their geometric interpretation.

#### **Reference Books:**

- 1) Calculus and Analytic Geometric – G. B. Thomas & R. L. Finney. Pearson Education. Indian Reprint
- 2) Calculus – James Stewart, Sixth Edition (E -Book)
- 3) Calculus - T. M. Apostol. Volume – I
- 4) Differential Calculus – Shanti Narayan, P. K. Mittal, S. Chand & Co
- 5) Differential Calculus – Harikishan, Atlantic Publishers
- 6) Calculus – M. Spivak
- 7) Mathematical Analysis – S. C. Malik & Savita Arora, Second Edition, New Age Int. (P) Ltd
- 8) Differential Calculus – Shanti Narayan
- 9) Calculus – James Stewart

## SYLLABUS OF SEMESTER – II (MATHEMATICS)

### MAT103: CALCULUS – II

**Credit: 3**

**Hours/week: 3**

#### UNIT I

Differentiability of function of several variables:

Differential of function of two variables, Total derivative, Harmonic function, Schwartz's theorem and Young's theorem, Derivatives of implicit functions.

#### UNIT II

Homogeneous functions, Euler's theorem for homogeneous functions of  $n$  – variables, Extreme values of functions of two variables and its theorems, Lagrange's method of undetermined multipliers.

#### UNIT III

Applications of Partial derivatives:

Taylor's theorem for function of two variables, Maclaurin's theorem, problems on Taylor and Maclaurin theorems, radius of curvature for Cartesian – Parametric – Polar equations of a curve in  $R^2$ .

#### Reference Books:

- 1) Mathematical Analysis – S. C. Malik & Savita Arora, Second Edition, New Age Int. (P) Ltd
- 2) Differential Calculus – Shanti Narayan
- 3) Calculus – David V. Widder – PHI – Second Edition
- 4) Advance Calculus Volume – II – T. M. Apostol
- 5) Calculus – James Stewart
- 6) Calculus with Early Transcendental functions - James Stewart, Indian Edition, Engage learning India Pvt. Ltd.
- 7) Calculus and Analytic Geometry - G. B. Thomas & R. L. Finney Addition, Wesley pub. India
- 8) A course in Multivariable Calculus & Analysis – S. R. Ghorpade & B. V. Limaye, Springer, India

## SYLLABUS OF SEMESTER – II (MATHEMATICS)

### MAT104: CALCULUS – II PRACTICAL

**Credit: 2**

**Hours/week: 4**

#### UNIT I

Practical based on Differentiability of function of several variables: - Practical based on Homogeneous functions of  $n$  – variables, Extreme values of functions of two variables, Lagrange’s method of undetermined multipliers.

#### UNIT II

Practical based on Applications of Partial Derivatives: - Problems on Taylor’s theorems, radius of curvature for Cartesian – Parametric – Polar equations of a curve in  $\mathbb{R}^2$ .

#### UNIT III

Example based on provided formula sheet of Beta and Gamma function: - Beta and gamma function examples using Definition and properties, examples using the relation between beta and gamma functions, examples using duplication formula, examples using evaluation of definite integrals.

#### Reference Books:

- 1) Mathematical Analysis – S. C. Malik & Savita Arora, Second Edition, New Age Int. (P) Ltd
- 2) Differential Calculus – Shanti Narayan
- 3) Calculus – David V. Widder – PHI – Second Edition
- 4) Advance Calculus Volume – II – T. M. Apostol
- 5) Calculus – James Stewart
- 6) Calculus with Early Transcendental functions - James Stewart, Indian Edition, Engage Learning India Pvt. Ltd.
- 7) Calculus and Analytic Geometry - G. B. Thomas & R. L. Finney Addition, Wesley pub. India
- 8) A course in Multivariable Calculus & Analysis – S. R. Ghorpade & B. V. Limaye, Springer, India