Gujarat University

National Education Policy-2020

Syllabus for B. Sc. Sem-II (Mathematics-Major)

Effective from June-2023

Subject Code For UG Science Courses: -MAT

Semester	Discipline Specific Courses - Core (DSC - C)	Minor (DSC - M)	Multi / Inter disciplinary courses (MDC / IDC)	Ability Enhancement Courses (Language) (AEC)	Enhancement Courses / Internship / Dissertation Skill	Common Value Added Courses (VAC / IKS)	Total Credits
I	DSC - C - MAT - 111T : 4 DSC - C - MAT - 112P : 4	DSC - M - MAT - 113T : 2 DSC - M - MAT - 113P : 2	MDC - MAT - 114T : 2 MDC - MAT - 114P : 2	AEC - 115 : 2	SEC - 116 : 2	IKS - 117 : 2	22
II	DSC - C - MAT - 121T : 4 DSC - C - MAT - 122P : 4	DSC - M - MAT - 123T : 2 DSC - M - MAT - 123P : 2	MDC - MAT - 124T : 2 MDC - MAT - 124P : 2	AEC - 125 : 2	SEC - 126 : 2	VAC - 127 : 2	22
III	DSC - C - MAT - 231T : 4 DSC - C - MAT - 232T : 4 DSC - C - MAT - 233P : 4	-	MDC - MAT - 234T : 2 MDC - MAT - 234P : 2	AEC - 235 : 2	SEC - 236 : 2	IKS - 237 : 2	22
IV	DSC - C - MAT - 241T : 4 DSC - C - MAT - 242T : 4 DSC - C - MAT - 243P : 4	DSC - M - MAT - 244T : 2 DSC - M - MAT - 244P : 2	-	AEC - 245 : 2	SEC - 246 : 2	VAC - 247 : 2	22
V	DSC - C - MAT - 351T : 4 DSC - C - MAT - 352T : 4 DSC - C - MAT - 353P : 4	DSC - M - MAT - 354T : 4 DSC - M - MAT - 355P : 4	-	-	SEC - 356 : 2	-	22
VI	DSC - C - MAT - 361T : 4 DSC - C - MAT - 362T : 4 DSC - C - MAT - 363P : 4	DSC - M - MAT - 364T : 2 DSC - M - MAT - 364P : 2	-	AEC - 365 : 2	Internship - 4	-	22
VII	DSC - C - MAT - 471T : 4 DSC - C - MAT - 472T : 4 DSC - C - MAT - 473P : 4	DSC - M - MAT - 474T : 2 DSC - M - MAT - 474P : 2	-	-	-	OJT / RP - 6	22
VIII	DSC - C - MAT - 481T : 4 DSC - C - MAT - 482T : 4 DSC - C - MAT - 483P : 4	DSC - M - MAT - 484T : 2 DSC - M - MAT - 484P : 2	-	-	-	OJT / RP - 6	22

Syllabus for B.Sc. Semester – II (MATHEMATICS)

Course: DSC - C - MAT - 121T: CALCULUS – II

Credit: 4

UNIT I (IKS)

a) Differentiations (in the context of IKS): Talyor series, Differentiation of power form (Eknyunen Purven sutra), chain rule by Vedic methods, UV rule (Urdhva Tiryagbhyam-vertical and crosswise methods), Higher order derivatives (Meru Prastara)

b) Integrations (in the context of IKS): Integration of power function (Eknyunen Purven, Ekadhikena Purven), Vedic formula Anurupyen, Integration by parts and partial fractions by Vedic sutras.

UNIT II

Homogeneous functions, Euler's theorem for homogeneous functions of n – variables, Taylor's theorem for function of two variables, Maclaurin's theorem, problems on Taylor and Maclaurin theorems, Concept of multiple points, double points, different types of double points and examples, radius of curvature for Cartesian – Parametric – Polar equations of a curve in R^2.

UNIT III

Multiple Integral: - Introduction to double Integral, repeated or iterated integral, double integral over a closed region, evaluation of double integral, changing the order of double integral, triple integrals, iterated triple integrals, Geometric interpretation of double and triple integrals, and problems-based on it, Introduction to Jacobian, transformation of double and triple integrals.

UNIT IV

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, Extreme values of functions of two variables and its theorems, Lagrange's method of undetermined multipliers.

Reference Books

1) Mathematical Analysis – S. C. Malik & Savita Arora, New Age Int. (P) Ltd, Fifth edition (2016)
2) Differential Calculus – Shanti Narayan, P. K. Mittal, S. Chand (2005)
3) Calculus – David V. Widder – PHI – Second Edition
4) Calculus Volume – II – T. M. Apostol, Wiley,
5) Calculus – James Stewart, Cengage Learning, Inc., Eighth edition (2015)
6) Calculus with Early Transcendental functions - James Stewart, Indian Edition, Engage learning India Pvt. Ltd, sixth edition (2008)
7) Calculus and Analytic Geometry - G. B. Thomas & R. L. Finney, Pearson Edu. India, Ninth edition (2010)
8) A course in Multivariable Calculus & Analysis – S. R. Ghorpade & B. V. Limaye, Springer, India, 2010th edition (2009)

Syllabus for B.Sc. Semester – II (Mathematics Practical)

Course: DSC - C - MAT – 122P: CALCULUS – II

Credit: 4

List of Practicals

1. Examples based on differentiability of functions of several variables
2. Examples based on Euler's theorem
3. Examples based on modified Euler's theorem
4. Examples based on implicit function
5. Examples based on extreme values of functions of two variables
6. Examples based on Lagrange's method of undetermined multipliers
7. Examples based on Taylor's theorem
8. Examples based on multiple points
9. Examples based on radius of curvature of cartesian curves
10. Examples based on radius of curvature of polar and parametric curves
11. Examples based on reduction formula of $\sin^n x$, $\cos^n x$, $\sin^m x \cos^n x$ on $\left[0, \frac{\pi}{2}\right]$
12. Examples based on Gamma function
13. Examples based on Beta function
14. Examples based on relation between Beta and Gamma functions
15. Examples based on multiple integral
16. Examples based on change the order of integral
17. Examples based on change the variables
18. Examples based on area by multiple integral
19. Examples based on volume by multiple integral
20. Examples based on line integral and volume integral
21. Examples based on surface integral
22. Examples based on Green's theorem
23. Examples based on Stoke's theorem
24. Examples based on Gauss's divergence theorem

Reference Books

1) Mathematical Analysis – S. C. Malik & Savita Arora, New Age Int. (P) Ltd, Fifth edition (2016)
2) Calculus – David V. Widder – PHI – Second Edition
3) Calculus Volume – II – T. M. Apostol, Wiley,
4) Calculus – James Stewart, Cengage Learning, Inc., Eighth edition (2015)
5) Calculus with Early Transcendental functions - James Stewart, Indian Edition, Engage learning India Pvt. Ltd, sixth edition (2008)
6) Calculus and Analytic Geometry - G. B. Thomas & R. L. Finney, Pearson Edu. India, Ninth edition (2010)