ST JOSEPH'S UNIVERSITY, BENGALURU-27

DEPARTMENT OF MATHEMATICS

Syllabus for Bachelor of Science (Basic/Hons.)

Under National Education Policy

For Batch 2022-26

Name of the Degree Programme	**:** B.Sc./B.Sc. (Hons)
Open Elective	**:** Mathematics Semester 1 MTOE –2: Mathematics for Physics and Chemistry I
Total Credits for the Programme	**:** 176 (till 8 semesters)
Starting year of implementation	**:** 2022 -23

Open Elective - 2

(For students who have not chosen Mathematics as one of Core subjects)

MTOE – 2: Mathematics for Physics and Chemistry I	
Teaching Hours: 3 Hours / Week	Credits: 3
Total Teaching Hours: 42 Hours	Max. Marks: 100 (S.A: 60 + I.A: 40)

Course Learning Outcomes: This course will enable the students to

- Learn to solve system of linear equations.
- Solve the system of homogeneous and non-homogeneous linear equations by using concept of rank of matrix, finding eigenvalues and eigenvectors.
- Students will be familiar with the techniques of finding n^{th} derivatives of standard functions.
- Identify and apply the intermediate value theorems and L'Hospital's rule.
- Differentiate partially along with its applications.

Algebra-I

Unit-I: Matrices

Recapitulation of Symmetric and Skew Symmetric matrices, Algebra of Matrices; Row and column reduction to echelon form. Rank of a matrix; Finding rank of a matrix by reducing to row reduced echelon form and normal form. Solution of system of linear equations; Criteria for existence of non-trivial solutions of homogeneous system of linear equations. Solution of non-homogeneous system of linear equations. Eigenvalues and eigenvectors of square matrices, Cayley- Hamilton theorem (without Proof), inverse of a matrix by Cayley-Hamilton theorem. **14 Hours**

Unit-II: Differential Calculus

Limits, Continuity, Differentiability, and properties. Intermediate value theorem (without proof), Rolle's Theorem (without proof), Lagrange's Mean Value Theorem (without proof), Cauchy's Mean Value Theorem (without proof) and examples. Taylor's Theorem (without proof), Maclaurin's series, L' Hospital's rules-problems **14 Hours**

Unit-III: **Integral Calculus**

Recapitulation of Definite integrals and its properties. Computation of length of arc, area of plane curves, Surface area and volume of revolution in Cartesian form. **14 Hours**

Reference Books:

1. University Algebra - N.S. Gopala Krishnan, New Age International (P) Limited
2. Theory of Matrices - B S Vatsa, New Age International Publishers.
3. Matrices – A. R. Vasista, Krishna Prakashana Mandir.
4. Applications of Calculus, Debasish Sengupta, Books and Allied (P) Ltd., 2019.
5. Differential Calculus - Shanti Narayan, S. Chand & Company, New Delhi.
6. Calculus – Lipman Bers, Holt, Rinehart & Winston.
7. Calculus – S. Narayanan & T. K. Manicavachogam Pillay, S. Viswanathan (Printers & Publishers) Pvt. Ltd., Vol. I & II.
8. Schaum's Outline of Calculus - Frank Ayres and Elliott Mendelson, 5th ed. USA:Mc.Graw Hill.

Blueprint

	Unit-I	Unit-II	Unit-III	Number of Questions to be answered	Total
2 Marks	1	2	5	6/8	12
6 Marks	2/3	3/5	3/5	8/13	48
Total					60

Note: The end semester question paper will have a weightage of 25% of the questions from the first half of the syllabus (the portions covered for the mid-semester examination) and a weightage of 75% of the questions from the second half of the syllabus (the portions not covered for the mid-semester examination).