Progressive Education Society's

Modern college of Arts, Science and Commerce,

Ganeshkhind,Pune-16

Autonomous

NEP 2020 (2)

Four Year B.Sc. Degree Program in Mathematics

(Faculty of Science and Technology)

F.Y.B.Sc. (Regular)

Mathematics

Choice Based Credit System Syllabus

To be implemented from Academic Year 2024-25

F. Y. B. Sc. (Regular) : Mathematics

Semester	Paper No.	Paper Code	Title of the Paper	Theory / Practical	No. of Credits
I	I	24MAT11101	Paper-1 : Basic Course in Algebra	Theory	2
	II	24MAT11102	Paper-2 : Practical based on Basic Course in Algebra	Practical	2
II	I	24MAT12101	Paper-1 : Calculus of one Variable	Theory	2
	II	24MAT12102	Paper-2 : Practical based on Calculus of one Variable	Practical	2

Syllabus for F.Y.B.Sc. (Mathematics)

(With effect from June 2024)

Academic Year : 2024-25

Semester - 1

Paper No. : I **Paper Code : 24MAT11101**

Name of the Paper : Basic Course in Algebra (Theory)

Total No. of Credits : 2 **Total No. of lectures : 30**

Course Outcome	
CO	**Details**
CO1	Student gets the knowledge about fundamental concepts of Mathematics such as set theory and number theory.
CO2	Student will learn Algebra , Polynomials and some tools to find the roots of Polynomials.
CO3	Computational skills are enhanced.
CO4	Student will learn complex numbers and it's properties.

Details of Syllabus

Unit	Sub unit	Content	No. of lectures
1		**Sets Relations and Functions**	**8**
	1.1	Sets , Relations , Equivalence relations , Equivalence classes and partitions of a set. (Exclude proof of the theorems. Only examples)	
	1.2	Functions , Basic terminology , Types of functions , Inverse of a function , Composition of functions (Exclude proof of the theorems. Only examples).	
2		**Integers**	**10**
	2.1	Mathematical Induction .	
	2.2	Integers , divisibility , Division Algorithm , The Greatest Common Divisor , The Least Common Multiple , The Euclidean Algorithm (Without proof).	
	2.3	Prime Numbers , Euclide's Lemma , Basic Properties of Congruence , Fermat's Theorem.	
3		**Polynomials**	**6**
	3.1	Algebra of Polynomials , Divisibility , Division Algorithm , GCD of polynomials.	
	3.2	Factor Theorem , Remainder Theorem , Roots of the Polynomials.	
4		**Complex Numbers**	**6**
	4.1	Sums and Products , Basic Algebraic Properties , Moduli , Complex Conjugate , Exponential form , Products and Quotients , De-Moiver's Theorem (Only for positive integer).	
	4.2	Roots of Complex Numbers , The n^{th} roots of Unity.	
	4.3	Regions in the Complex Plane.	

Text Books

1) A foundation Course in Mathematics : Ajit Kumar , S. Kumeresan and Bhaba Kumar Sarma (Narsoa Publication House)[Unit 1 : Chapter 2 :

Section 2.1 to 2.5 , Chapter 3 : Section 3.1 to 3.6 , Chapter 4 : Section 4.1 to 4.4.

2) Elementary Number Theory : David M. Burton (Tata McGraw Hill – Sixth Edition).[Unit 2 : Textbook 2 : Chapter1 : Section 1.1 , Chapter 2 : Section : 2.2 to 2.4 , Chapter 3 : Section 3.1 , Chapter 4 : Section 4.1 , 4.2 , Chapter 5 : Section 5.2].
3) College Algebra : Cynthiya Y. Young (Wiley India Edition-Third Edition Original)[Unit 3 : Textbook 3 : Chapter 4 : Section 4.2 , 4.3 , 4.4 , 4.5].
4) Complex Variables and Applications : James Ward Brown and Ruel V. Churchill (McGraw Hill – Seventh Edition).[Unit 4 : Textbook 4 : Chapter 1 : Section 1 to 10].

Reference Books

1) Textbook of Algebra : S. K. Shah and S. C. Garg (Vikas Publishing House Pvt. Ltd. – Edition 2017).
2) Introduction to Real Analysis : R. G. Bartle and D. R. Sherbert (John Wiley and Sons Inc.).

Paper No. : II **Paper Code : 24MAT11102**

Name of the Paper : Practical based on Basic Course in Algebra

Total No. of Credits : 2 **Total No. of Practical : 15**

List of Practical

Practical 1. Written practical on Unit .

Practical 2. Written practical on Unit 1.

Practical 3. Written practical on Unit 1.

Practical 4. Written practical on Unit 2.

Practical 5. Written practical on Unit 2.

Practical 6. Written practical on Unit 2.

Practical 7. Written practical on Unit 3.

Practical 8. Written practical on Unit 3.

Practical 9. Written practical on Unit 4.

Practical 10. Written practical on Unit 4.

Practical 11. Written practical on Unit 4.

Practical 12. Miscellaneous.

Practical 13. Miscellaneous.

Practical 14. Miscellaneous.

Practical 15. Miscellaneous.

Semester - II

Paper No. : I **Paper Code : 24MAT12101**

Name of the Paper : Calculus of one Variable (Theory)

Total No. of Credits : 2 **Total No. of lectures : 30**

Course Outcome	
CO	**Details**
CO1	Student will learn basic concept in Calculus.
CO2	Student will be able to draw the graphs of some standard functions and learn their properties.
CO3	Student will be able to calculate left hand and right hand limit of a function.
CO4	Student can apply the Mathematical concepts in real life problem.

Details of Syllabus

Unit	Sub unit	Content	No. of lectures
1	**Limit**		**6**
	1.1	Real Numbers and their Properties , Absolute value function and it's properties.	

Unit	Sub unit	Content	No. of lectures
1		**Limit**	
	1.2	Intervals , Neighbourhood of a point on real line , Functions and their graphs.	
	1.3	Limit of a function , Right hand limit , Left hand limit , Squeez Theorem (Statement only) , Infinite limit and limit at infinity.	
2		**Continuity**	**10**
	2.1	Continuous function , continuity at end point of interval , continuity on interval [a , b]	
	2.2	Algebra of continuous functions. Continuity of some elementary functions.	
	2.3	Properties of continuous functions. Boundedness Theorem (Without Proof) , Maximum-Minimum Theorem (Without Proof) , Location of Roots Theorem (Without Proof) , Bolzano's Intermediate Value Theorem (Without Proof).	
3		**Differentiation**	**10**
	3.1	Definition , Left hand and Right hand derivative	
	3.2	Rolle's Theorem , Lagrange's Mean Value Theorem , Cauchy's Mean Value Theorem	
	3.3	Indeterminate forms and L'Hospital's Rules	
4		**Applications of Differentiation**	**4**
	4.1	Extreme Values.	
	4.2	Applications.	

Text Book : Calculus by Thomas Ville

Paper No. : II **Paper Code : 24MAT12102**

Name of the Paper : Practical based on Calculus of One Variable.

(Practical)

Total No. of Credits : 2 **Total No. of Practical : 15**

List of Practical

Practical 1. Written practical on Unit .

Practical 2. Written practical on Unit 1.

Practical 3. Written practical on Unit 1.

Practical 4. Written practical on Unit 2.

Practical 5. Written practical on Unit 2.

Practical 6. Written practical on Unit 2.

Practical 7. Written practical on Unit 3.

Practical 8. Written practical on Unit 3.

Practical 9. Written practical on Unit 3.

Practical 10. Written practical on Unit 4.

Practical 11. Written practical on Unit 4.

Practical 12. Miscellaneous.

Practical 13. Miscellaneous.

Practical 14. Miscellaneous.

Practical 15. Miscellaneous.

Modalities for conducting practical and practical Examination:

1) There will be 4 hour practical session per 15 students batch per week.
2) A question bank consisting of 50 problems in all for each semester, will be the course work for this paper. Question bank will be prepared by the individual subject teacher and the problems included should be changed every year.

3) Each student will maintain a journal to be provided by the college.
4) The internal 10 marks will be given on the basis of journal prepared by student and the cumulative performance of student at practicals.
5) Practical examination will consist of written examination of 30 marks which will be converted to marks out of 15.
6) Written examination will be of 25 marks and oral examination 5 marks.
7) The pattern for the practical written examination will be as follows:

- **Solve any 5 questions out of 8 questions.**
- **Each question will be of 5 marks.**

8) Study tours may be arranged at places having important mathematical institutes orhistorical places.

9) **Special Instruction**:
   a) Before starting each practical necessary introduction, basic definitions and prerequisites must be discussed.
   b) Examiners should set separate question papers, solutions and scheme of marking for each batch and claim the remuneration as per rule.