

SOLAPUR UNIVERSITY, SOLAPUR



NAAC Accredited-2015
'B' Grade (CGPA 2.62)

Faculty of Science

CBCS Pattern Syllabus

B.Sc.II (Sem-III&IV)

Mathematics

With effect from June-2017

B.Sc.II - Mathematics :

Preamble :

B.Sc.II Mathematics is framed to provide the tools to get the easy and precise outcome to various applications of science and technology. Also logical development of the various algebraic statements can be made to develop the innovative approach of various concepts and it can be applied to various abstract things. In the theory courses of algebra, analysis and differential calculus and differential equations various deductions of the theorems, corollaries and lemmas will be acquired by the students. Change is the universal truth of the nature and it can be presented with the help of dependent and independent variables in the form of functions and differential equations. So our aim is that students should learn various techniques to find solutions of differential equations. Students who opted S.Y.B.Sc. Mathematics have to complete 4 theory courses 2 each semester, two practicals entitled (Numerical Techniques in Laboratory) NTL-II courses (Annual). In the practical course of 200 marks students exercise the problem solving techniques for practical course I and II. The details are mentioned in the syllabus..

Objectives of the course : The aim of the course is to generate intelligent and skillful human beings with adequate theoretical and practical knowledge of the various mathematical systems. To inculcate conceptual understanding in basic phenomena, statements, theorems and development of appropriate problem solving skills suitable for applications and abstract algebraic techniques, sufficient logical connectivity is provided.

Following are the objectives-

- i. To design the syllabus with specific focus on key Learning Areas.
- ii. To equip student with necessary fundamental concepts and knowledge base.
- iii. To develop specific problem solving skills.
- iv. To impart training on abstract concepts, analysis, deductive techniques.
- v. To prepare students for demonstrating the acquired knowledge.
- vi. To encourage student to develop skills for developing innovative ideas.

Solapur University, Solapur
Faculty of Science
Syllabus for B.Sc.II-Mathematics
Semester System
Choice Based Credit System (CBCS) Pattern
To be implemented from Academic Year 2017-18

1. Course Structure:

Sr. No	Semester	Paper No.	Title	No. of Lectures	Credit Point	Total Marks
1.	Semester-III	V	Differential Calculus	45	3	100
		VI	Real analysis	45	3	100
2.	Semester-IV	VII	Differential Equations	45	3	100
		VIII	Abstract algebra-I	45	3	100
3.	Semester III and IV (Annual)		Numerical Techniques in Laboratory[NTL-II A & B] Practical Course (Annual)		8	200
Total Marks					20	600

2. Distribution of each Theory paper (Marks 100)

University Assessment (UA) : 70 Marks

College Assessment (CA) : 30 Marks

Scheme of College Assessment

1. Unit Test : 15 Marks

2. Home Assignment : 15 Marks

3. Distribution of Practical Marks (200)

Practical examination will be at the end of fourth semester. The candidate has to perform four practicals, one from each group.

A. University Practical Examination (140) Marks: (UA)

a) Problems from paper-V : 30

b) Problems from paper-VI : 30

c) Problems from paper-VII : 30

d) Problems from paper-VIII : 30

e) Journal : 20

B. Practical : Internal Continuous Assessment (60 marks)

Scheme of Marking: **30 Marks:** Internal Test on any four practicals,

30 Marks: Home assignment/oral/Seminars/Conference /Industrial Visit/Group Discussion/Viva, etc.

Semester -III

Paper –V (Differential Calculus)

Unit-1. Tangents and Normals:

Equations of tangents and Normals, Angle of intersection of two curves, Length of tangent, normal, subtangent, subnormal at any point of a curve, Pedal equations or p, r equations (Cartesian form), Angle between radius vector and tangent, Length of the perpendicular from pole to the tangent, Length of polar subtangent and polar sub-normal, Pedal equations (polar form), Derivative of length of an arc(Cartesian form), Derivative of arc length(Polar Formula) and Other formulae. [13]

Unit-2. Curvature :

Definition of Curvature ,Length of arc as a function, Radius of curvature, Cartesian Equation, Parametric Equations, Polar Equations, Pedal Equations. [12]

Unit-3. Jacobians:

Definition of a Jacobian, Jacobian of a function of function, Jacobian of implicit function, Condition of dependent functions (statement only). [08]

Unit- 4. Maxima and Minima :

Definiton of Maximum value and minimum value of a function of one, two variables, Necessary condition for extreme values(Statements only), sufficient condition for extreme values (Statements only), Use of second order derivatives. Maxima and Minima of a function of two variables, Lagrange's Method of undetermined multipliers of two variables. [12]

Recommended Book(Scope of Syllabus):

Differential Calculus by *Shanti Narayan and P.K.Mittal* *S.Chand Publication Revised Edition 2005.*

Unit 1 :7.2,7.3,7.4,7.5,7.6,7.7,7.8,7.9,7.10,7.11,7.12,7.13.

Unit 2 :14.1,14.2,14.3.

Unit 3 :12.1,12.2,12.3,12.4

Unit 4 : 9.1,9.2,9.3,9.4, 9.6.(Examples restricted upto two variables only)

Reference Books

1. Dr. Alandkar S. J., Prof. Dhanshetti N. I., Prof. Dhone A. S. and Prof. Mahimkar R. D. , B. Sc. – II (Mathematics) Semester-III, Paper –V Differential Calculus , Nirali Prakashan Pune.
2. Gorakh Prasad, Differential Calculus, Pothishala Pvt. Ltd., Allahabad
3. N. Piskunov, Differential and Integral Calculus, Peace Publishers, Moscow
4. P. N. Wartikar and J. N. Wartikar, A Text Book of Applied Mathematics, Vol. I, Poona Vidyarthi Griha Prakashan, Poona 30.
5. Tom M. Apostol, Calculus Vol I and II, Wiley Publication.

Paper-VI Real Analysis

Unit -1 : Real Numbers

[15]

1. Introduction
2. Field Structure and Order Structure
3. Bounded and Unbounded Sets: Supremum, Infimum
4. Completeness in the Set of Real Numbers
5. Absolute Value of a Real Number

Unit –2 : Real Sequences [15]

1. Sequences
2. Limit Points of a Sequence
3. Limit Inferior and Superior
4. Convergent Sequences
5. Nonconvergent Sequences(Definitions)
6. Cauchy's General Principle of Convergence
7. Algebra of Sequences
8. Some Important Theorems
9. Monotonic Sequences

Unit– 3: Infinite Series [15]

1. Introduction
2. Positive Term Series
3. Comparison Tests for Positive Term Series
4. Cauchy's Root Test
5. D'Alembert's Ratio Test
6. Raabe's Test (Only Statement and Examples)
7. Logarithmic Test(Only Statement and Examples)

Recommended Book (Scope of Syllabus):

**Mathematical Analysis by S. C. Malik and Savita Arora(Third Revised Edition- 2008)
New Age International Publishers.**

Real Analysis

Unit–1 : (Real Numbers) Art: 1 to 5

Unit –2 : (Real Sequences) Art: 1 to 9

Unit–3: (Infinite Series) Art: 1 to 9

Reference books

1. Dr. Alandkar S. J., Prof. Dhanshetti N. I., Prof. Dhona A. S. and Prof. Mahimkar R. D. ,
B. Sc. – II (Mathematics) Semester-III, Paper –VI Real Analysis, Nirali Prakashan Pune.
2. A first course in mathematical analysis by D. Somasundaram & B.Choudhary Narosa
Publishing House.
3. Real Analysis by R.R. Goldberg.
- 4.Principles of Mathematical analysis by Rudin W. McGraw-Hill, NewYork .
- 5.A Course of Mathematical Analysis by Shanti Narayan, S.Chand and Company New Delhi.

Semester – IV

Paper – VII Differential Equations

Unit 1:- Differential Equations of the first order and of degree higher than the first :

Equations that can be resolved into factors of the first degree, Equations solvable for x,
Equations solvable for y, Clairaut's equation, Equations reducible to Clairaut's form. [10]

Unit 2 : Linear Equations of the second order :

General form of the second order linear equation, Complete solution when one integral
belonging to complementary function is known ,Rules of getting an integral belonging to
complementary function , Removal of the First order Derivative. Transformation of the
linear equation of second order by Changing the independent variable. [15]

Unit 3 : Homogeneous linear equations :

Homogeneous linear equations, Working rule for finding the solution, Equations reducible to
Homogeneous form. [10]

Unit 4. Simultaneous Equations & Total Differential Equations:

Nature of the solution of simultaneous equations, Rules of solving the Equation, Total Differential Equation, Necessary and sufficient condition for the integrability of total differential equation (proof of Necessity only), Condition for exactness, Criterion for exactness, Method of Solving the Equation. [10]

Recommended Book :

Differential Equation :

Ordinary and Partial Differential Equations :by M.D.Raisinghania,S.Chand Co.Ltd.Ramanagar,New Delhi-110055(Edition2002)

Unit 1 (Part I) :6.1, 6.2, 6.3, 6.4, 6.5, 6.6, 6.7, 6.9, 6.10, 6.11, 6.12.

Unit 2 (Part I) :5.1, 5.2, 5.3, 5.6, 5.7.

Unit 3 (Part II) :4.1, 4.2, 4.3, 4.4, 4.5, 4.6, 4.7, 4.8, 4.9, 4.10, 4.11.

Unit 4 (Part II) :5.1,5.2, 5.4,5.5,5.6,5.7.

Unit 5 (Part II) :6.2,6.3,6.4,6.5,6.6,6.7.

1. Dr. Alandkar S. J., Prof. Dhanshetti N. I., Prof. Dhone A. S. and Prof. Mahimkar R. D., B. Sc. – II (Mathematics) Semester-IV, Paper –VII Differential Equation, Nirali Prakashan Pune.
2. Differential Equation by Murrey.
3. Differential Equation by Diwan and Agashe
4. Differential Equation by Sharma-Gupta, Krishna Prakashan Media (Pvt.) Ltd, Meerut

Paper –VIII Abstract Algebra

Unit-1: Introduction to Groups [10]

Definition and Example of Groups, Permutations, Subgroups, Groups and Symmetry.

Unit -2: Equivalence, Congruence, Divisibility [10]

Equivalence relation and partitions, Congruence and Division Algorithm, Integer Modulo n , Greatest Common Divisors, The Euclidean Algorithm, Factorization, Euler's Phi Function.

Unit-3: Groups [10]

Elementary Properties of Groups, Generators, Direct products, Cosets, Lagrange's Theorem, Isomorphism, More on Isomorphism, Cayley's Theorem.

Unit-4: Group Homomorphism [10]

Homomorphism of Groups, Kernels, Quotient Groups, The Fundamental theorem of Homomorphism.

Recommended books (Scope of Syllabus):

Modern Algebra-An Introduction, by John R. Durbin, John Wiley & Sons, Inc. Fifth Edition

Unit – 1 : Chapter-II: Art. 5,6,7,8

Unit – 2 : Chapter-III: Art. 9,10,11,12

Unit – 3 : Chapter-IV : Art. 14,15,16,17,18,19,20 Ch- V :21,22,23

Unit – 4 : Ch- V :21,22,23

Reference Books:

1. Dr. Alandkar S. J., Prof. Dhanshetti N. I., Prof. Dhone A. S. and Prof. Mahimkar R. D., B. Sc. – II (Mathematics) Semester-IV, Paper –VIII: Abstract Algebra -I, Nirali Prakashan Pune.
2. A First Course In Abstract Algebra J. B. Fraleigh Pearson Education 7th edition.
3. University Algebra N.S. Gopalkrishnan.
4. Abstract Algebra David S. Dummit & Richard M. Foote Wiley & Sons, Inc.
5. Fundamentals of Abstract Algebra D. S. Malik & N. Mordeson & M. K. Sen Mc. Graw Hill International Edition.
6. A Course in Abstract Algebra by Vijay K. Khanna and S.K. Bhambri, Vikas Publishing House Pvt. Ltd.

Numerical Technique in Laboratory -II [NTL - II]
(Differential Calculus , Real Analysis, Differential Equation, Abstract Algebra)

[NTL – IIA]

Assignment No.1: Tangents and Normals

Assignment No.2: Curvature

Assignment No.3 : Jacobians

Assignment No. 4 : Maxima and Minima

Assignment No. 5 : Real Numbers

Assignment No. 6 : Open Sets, Closed Sets and Countable Sets

Assignment No. 7: Real Sequences

Assignment No. 8: Infinite Series

[NTL – IIB]

Assignment No. 9: Differential Equations of the first order and of degree higher than the first .

Assignment No. 10: Linear Equations of the second order (Part –I)

Assignment No. 11: Linear Equations of the second order & Homogeneous linear equations
(Part –II)

Assignment No.12: Simultaneous Equations & Total Differential Equations

Assignment No.13: Introduction to Groups

Assignment No.14: Equivalence, Congruence, Divisibility

Assignment No.15: Groups

Assignment No.16: Group Homomorphism

Equivalent Subject for Old Syllabus

Sr. No.	Name of the Old Paper	Name of the New Paper
1)	Paper-III :Differential Calculus	Paper-V :Differential Calculus
2)	Paper-IV: Real Analysis	Paper-VI: Real Analysis
3)	Paper-V: Differential Equation	Paper-VII: Differential Equation
4)	Paper-VI : Abstract Algebra - I	Paper-VIII : Abstract Algebra - I
	Numerical Techniques in Laboratory [NTL-II A & B] Practical Course (Annual)	Numerical Techniques in Laboratory [NTL-II A & B] Practical Course (Annual)