

Solapur University, Solapur.
Semester Pattern
Syllabus
B.Sc.II (Mathematics)
(w.e.f. June 2014)

Framework of Syllabus of B.Sc.II MATHEMATICS

- There will be **Two** theory Papers in each semester.
- **Three Theory periods** per week for each theory paper.
- **Three periods** per week for a **Problem Solving Session[PSS – IIA & IIB]**.

Theory Papers:

	Semester – III	
Paper – V Differential Calculus		Marks 50
Paper – VI Real Analysis		Marks 50
	Semester – IV	
Paper – VII Differential Equations		Marks 50
Paper – VIII Abstract Algebra		Marks 50
Problem Solving Session[PSS - II]:		
PSS – II[A] Differential Calculus and Real Analysis		Marks 50
PSS – II[B] Abstract Algebra and Differential Equation (Three Hours in a week with whole Class as a Batch)		Marks 50
Four Theory Papers (Paper-V , VI , VII, VIII) [50 x 4]		Marks 200
Problem Solving Sessions (PSS – IIA & PSS- IIB) [50 x 2]		Marks 100
	Total :	Marks 300

Details of Syllabus

Semester -III

Paper –V (Differential Calculus)

(Teaching Periods 45)

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 (15)

Unit-2. Curvature :

Definition of Curvature ,Length of arc as a function, Radius of curvature, Cartesian Equation, Parametric Equations, Polar Equations, Pedal Equations. (10)

Unit-3. Jacobians:

Definition of a Jacobian, Jacobian of a function of function, Jacobian of implicit function, Condition of dependent functions (statement only). (05)

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. (15)

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. Gorakh Prasad, Differential Calculus, Pothishala Pvt. Ltd., Allahabad
2. N. Piskunov, Differential and Integral Calculus, Peace Publishers, Moscow
3. P. N. Wartikar and J. N. Wartikar, A Text Book of Applied Mathematics, Vol. I, Poona Vidyardhi Griha Prakashan, Poona 30.
4. Tom M. Apostol, Calculus Vol I and II, Wiley Publication.

Unit -1 : Real Numbers [05]

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 : Open Sets, Closed Sets and Countable Sets [05]

1. Introduction
2. Limit Points of a Set
3. Closed Sets: Closure of a Set
4. Countable and Uncountable Sets

Unit –3 : 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–4: Infinite Series [20]

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
7. Logarithmic Test
8. Integral Test
9. Gauss's Test
10. Series with Arbitrary Terms
11. Rearrangement of Terms.

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 : (Open Sets, Closed Sets and Countable Sets) Art: 1 to 4

Unit –3 : (Real Sequences) Art: 1 to 9

Unit–4 : (Infinite Series) Art: 1 to 11

Reference books

1. A first course in mathematical analysis by D. Somasundaram & B.Choudhary Narosa Publishing House
2. Real Analysis by R.R. Goldberg.
3. Principles of Mathematical analysis by Rudin W. McGraw-Hill, New York
4. A Course of Mathematical Analysis by Shanti Narayan S.Chand & Company New Delhi.

Semester – IV
Paper – VII Differential Equations (Teaching Periods 45)

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 (Part –I) :

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. (10)

Unit 3 : Linear Equations of the second order & Homogeneous linear equations(Part –II) :

Transformation of the linear equation of second order by Changing the independent variable, 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. (15)

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.

Paper –VIII Abstract Algebra (Teaching Periods 45)

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 [15]

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. A First Course In Abstract Algebra J. B. Fraleigh Pearson Education 7th edition

2. University Algebra N.S. Gopalkrishnan

3. Algebra M. Artin Prentice Hall of India

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.

Problem Solving Session [PSS - II]
(Differential Calculus , Real Analysis, Differential Equation, Abstract Algebra)

[PSS – 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

[PSS – 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

