

Punyashlok Ahilyadevi Holkar Solapur University, Solapur



Name of the Faculty: Science & Technology

CHOICE BASED CREDIT SYSTEM

Syllabus: Mathematics

Name of the Course: B.Sc. I (Sem.-I & II)

(Syllabus to be implemented from w.e.f. June 2019)

1) Preamble

B.SC I 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 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, Calculus, Geometry, & Differential Equation.

Various deductions of theorems, corollaries and lemmas will be acquired by Students. Change is the Universal truth of the nature. So our aim is that Students should learn various techniques to find solutions. Students who opted F.Y.B.SC Mathematics have to complete 1 theory courses 1 each semester, one practicals entitled (Numerical Techniques in Laboratory) NTL [DSC- I A+I B] Courses (Annual). In the practical course of 100 marks students exercise the problem solving techniques for practical course. The details are mentioned in the syllabus.

2) Aims

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 include conceptual understanding in basic Phenomena, statements, theorems and development of appropriate problem solving skills suitable for applications and sufficient logical connectivity is provided.

3) Objective of the Course

- 1) To design the syllabus with specific focus on key Learning Areas.
- 2) To equip student with necessary fundamental concepts and knowledge base
- 3) To develop specific problem solving skills.
- 4) To impart training on abstract concepts, analysis, deductive techniques.
- 5) To prepare students for demonstrating the acquired knowledge.
- 6) To encourage student to develop skills for developing innovative ideas.
- 7) A student be able to apply their skills and knowledge that is translate information presented verbally into mathematical form select and use appropriate mathematical formulae or techniques in order to process the information and draw the relevant conclusion.
- 8) A Student should get adequate exposure to global and local concerns that explore them many aspects of mathematical sciences

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Faculty of Science: B.Sc. I

Choice Based Credit System (CBCS),(w.e.f.2019-20) Structure for B. Sc.-I

Subject/ Core Course	Name and Type of the Paper		No. of papers/ Practical	Hrs/week			Total Marks Per Paper	UA	CA	Credits	
	Type	Name		L	T	P					
Class :	B.Sc.- I Semester – I										
Ability Enhancement Course(AECC)	English(communication skill)		Paper- I	4.0			100	80	20	4.0	
Core (*Students can opt any Four Subjects from the Twelve Subjects Listed below. Out of these Four Subjects One Subject will be CORE and other Three will be ELECTIVE Subjects.)	DSC 1A	Paper-I	2.5	--	--	50	40	10	4.0		
		Paper-II	2.5	--	--	50	40	10			
	DSC 2A	Paper-I	2.5	--	--	50	40	10	4.0		
		Paper-II	2.5	--	--	50	40	10			
	DSC 3A	Paper-I	2.5	--	--	50	40	10	4.0		
		Paper-II	2.5	--	--	50	40	10			
	DSC 4A	Paper-I	2.5	--	--	50	40	10	4.0		
		Paper-II	2.5	--	--	50	40	10			
	Total				24	--	--	500	400	100	20
	Class :	B.Sc.- I Semester - II									
	Ability Enhancement Course(AECC)	English(communication skill)		Paper- II	4.0			100	80	20	4.0
	Core (*Students can opt any Four Subjects from the Twelve Subjects Listed below. Out of these Four Subjects One Subject will be CORE and other Three will be ELECTIVE Subjects.)	DSC 1B	Paper-III	2.5	--	--	50	40	10	4.0	
Paper-IV			2.5	--	--	50	40	10			
DSC 2B		Paper-III	2.5	--	--	50	40	10	4.0		
		Paper-IV	2.5	--	--	50	40	10			
DSC 3B		Paper-III	2.5	--	--	50	40	10	4.0		
		Paper-IV	2.5	--	--	50	40	10			
DSC 4B		Paper-III	2.5	--	--	50	40	10	4.0		
		Paper-IV	2.5	--	--	50	40	10			
		Democracy, Elections and Good Governance			3.0			50	40	10	NC
Total (Theory)					27	--	--	550	440	110	20
Core		DSC 1 A & 1B		Practical I and II	--	--	4	100	80	20	4.0

	DSC 2 A & 2B	Practical I and II	--	--	4	100	80	20	4.0
	DSC 3A & 3B	Practical I and II	--	--	4	100	80	20	4.0
	DSC 4A & 4B	Practical I and II	--	--	4	100	80	20	4.0
Total (Practical)					16	400	320	80	16
Grand Total			51		16	1450	1160	290	56

***Core Subjects**

**Chemistry/Physics/Electronics/Computer Science/Mathematics/Statistics/Botany/Zoology/
Microbiology/Geology/ Geography/Psychology**

Equivalent Subject for Old Syllabus

Sem. - I

Sr. No.	Name of the old Paper	Name of the new Paper
1	Paper-I : Algebra	Paper-I : Algebra
2	Paper-II : Calculus	Paper-II : Calculus

Sem.-II

Sr. No.	Name of the old Paper	Name of the new Paper
1	Paper-III : Geometry	Paper-III : Geometry
2	Paper-IV : Differential Equation	Paper-IV : Differential Equation

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Semester Pattern

Choice Based Credit System (CBCS) Syllabus

B.Sc.I

Mathematics

(w.e.f. June-2019)

Details of Re-Draft Syllabus of B. Sc. Part-I (MATHEMATICS)

Semester-wise pattern (Commencing from JUNE– 2019)

B.Sc. I (Mathematics) (Honors) semester-wise Choice Based Credit System [CBCS] pattern to be implemented from June 2019. This syllabus of Mathematics carries 300 marks. In semester –I Internal examination (college examination) of 10 marks and external examination (university examination) of 40 marks [Total 40 +10 =50] for Theory paper –I & for paper II each, also in semester – II for Theory paper –III & for paper IV each and at the end of second term for **Numerical Technique Laboratory [NTL – I] [DSC-I A+ I B]** will be held. The distribution of marks is as follows.

Semester –I (DSC-I A)

- | | |
|-------------------------------|---------------------------|
| (1) Paper-I: ALGEBRA | (Marks 40+10 = 50) |
| (2) Paper-II: CALCULUS | (Marks 40+10 = 50) |

Semester –II (DSC-I B)

- | | |
|--|---------------------------|
| (3) Paper -III: GEOMETRY | (Marks 40+10 = 50) |
| (4) Paper-IV: DIFFERENTIAL EQUATIONS | (Marks 40+10 = 50) |
| (5) Numerical Technique Laboratory [NTL - I] [DSC- I A + I B] (Marks 80 +20 =100) | |

Internal exam of 20 marks and annual examination of 80 marks on all the above two papers.

Note:-

- (1) Total teaching periods for Paper –I / Paper –II and for Paper –III / Paper –IV are five (5) per week for each semester.
- (2) Total teaching periods for [DSC- I A+I B] are four(4) per week for whole class as one batch.

Duration of Annual Examination:

- (i) For Paper –I /II (Three hours) in semester -I
- (ii) For Paper –III/IV (Three hours) in semester -II
- (ii) For NTL –I [DSC- I A+ I B] (Three hours for a batch of 20 students) annually.

Semester -I

Paper –I : Algebra

30 Periods

Unit 1 (A): Matrices : Symmetric and Skew symmetric, Elementary transformations, Rank of a Matrix(Echelon and Normal form), Characteristic equation of a matrix, Cayley Hamilton theorem and its use in finding the inverse of a matrix. [8]

Unit 1(B): Linear Equations: Application of matrices to a system of linear (both Homogeneous and non-homogeneous) equations, Eigen values and Eigen vectors. [7]

Unit 2(A): Complex Number: Modulus and Argument of a Complex Number, DeMoivre's Theorem and its applications, Roots of Unity, Roots of Complex Numbers. [8]

Unit 2(B) : Transcendental Functions : Circular Functions and their inverses and Hyperbolic Function of a complex variable with their inverses. [7]

Paper –II: Calculus

30 Periods

Unit. 1 (A) : Differentiation: Indeterminate forms and L' Hospital's Rule, Successive differentiation, n^{th} derivatives of standard functions, Leibnitz rule. Taylor's theorem and Maclaurin's Theorem (Only Statements). Series expansions of e^x , $\cos x$, $\sin x$, $(1+x)^n$, $\log(1+x)$ [8]

Unit. 1 (B) : Function of two variables: Limit and Continuity of function of two variables, Partial derivative, partial derivative of higher orders, Homogeneous functions, Euler's Theorem on Homogeneous functions. [7]

Unit. 2 (A) : Reduction Formulae:

$$\int_0^{\pi/2} \sin^n x \, dx \qquad \int_0^{\pi/2} \cos^n x \, dx \qquad \int_0^{\pi/2} \sin^n x \cos^m x \, dx$$

(Note that reduction to these forms are not expected) [7]

Unit. 2 (B) : Vector Calculus: Scalar point function, Vector point function, Directional derivatives, divergence and Curl and its properties. [8]

Semester -II

Paper –III: Geometry

30 Periods

Unit 1(A):-Change of Axis: Translations, Rotations, Invariants, and Identifications of conics from

General form of second degree equations, Polar Coordinates, Conversion formulae. [7]

Unit 1(B): Sphere: Centre radius form, General form, Diameter form, Equation of Tangent

Plane and condition for tangency, Family of spheres $S+\lambda S'=0$, $S+\lambda P=0$. [8]

Unit 2:-Plane: General equation of plane, Normal equation, Intercept form Angle between two planes, Plane through three points, Plane through a given point, Sides of a

Plane, Distance of a point from a plane, Family of planes. [15]

Paper- IV : Differential Equation

30 periods

Unit 1(A):- Differential Equations of first order and first degree :[Part-I]

Variables separable, Homogeneous, non- homogeneous differential Equations. [7]

Unit 1(B):- Differential Equations of first order and first degree: [Part-II]

Exact differential equations. Necessary and sufficient condition for exactness, Integrating

Factor with four rules, Linear differential equations of the form: $dy/dx+py=Q$; Bernoulli's Equation $dy/dx+Py=Qy^n$. [8]

Unit 2(A) :- Linear Differential Equations With Constant Coefficients :[Part-I]

Complementary function and particular integral, General solution of $f(D) y=X$, Solution

Off $(D)y=0$ for non-repeated , repeated, real and complex root. [7]

Unit 2(B) :- Linear Differential Equations With Constant Coefficients : [Part-II]

Solution of $f(D)y=X$, where X is of the form

e^{ax} , $\sin(ax)$, $\cos(ax)$, x^m , $e^{ax}V$, xV [8]

Numerical Technique Laboratory [NTL –I] [DSC – I A+I B]

4 Periods per week.

Assignment –1: Inverse of Matrix by Cayley-Hamilton Method.

Assignment –2: Solution of system of Linear Homogeneous Equation

Assignment –3: Solution of system of linear non-homogeneous Equation.

Assignment –4: n^{th} roots of a complex number.

Assignment –5: Leibnitz Rule

Assignment –6: Reduction formulae

Assignment– 7: Partial differentiation

Assignment –8: Numerical examples on gradient, divergence and curl.

Assignment – 9: Change of axis and invariants.

Assignment –10: Conversion between Polar and Cartesian of points and equations

Assignment –11: Family of Planes.

Assignment –12: Family of Spheres.

Assignment – 13: Linear differential equations.

Assignment –14: Particular Integrals of e^{ax} and x^m .

Assignment –15: Particular Integrals of $\sin(ax)$ and $\cos(ax)$.

Assignment –16: Particular Integrals of $e^{ax}\mathbf{V}$, $x\mathbf{V}$.

References

Paper -I: Algebra

Paper -II : Calculus

Paper – III: Geometry

Paper -IV : Differential Equation

1. **ALGEBRA, B. Sc. – I (Semester –I) MATHEMATICS- Paper-I by Prof. S. J. Alandkar, Prof. N. I. Dhanshetti, Prof. Dhone A. S. Prof. R. D. Mahimkar, Nirali Prakashan (Edition- July 2014) ISBN 978-93- 5164-169-8.**
2. **CALCULUS, B. Sc. – I (Semester –I) MATHEMATICS- Paper-II by Prof. S. J. Alandkar, Prof. N.I. Dhanshetti, Prof. Dhone A. S. Prof. R. D. Mahimkar, Nirali Prakashan (Edition- July 2014) ISBN 978- 93-5164-162-9.**
3. **GEOMETRY, B. Sc. – I (Semester –II) MATHEMATICS- Paper-III by Prof. S. J. Alandkar, Prof. N. I. Dhanshetti, Prof. Dhone A. S. Prof. R. D. Mahimkar, Nirali Prakashan (Edition- November 2014)ISBN 978-93-5164-339-5.**
4. **DIFFERENTIAL EQUATION , B. Sc. – I (Semester –II) MATHEMATICS- Paper-IV by Prof. S. J. Alandkar, Prof. N. I. Dhanshetti, Prof. Dhone A. S. Prof. R. D. Mahimkar, Nirali Prakashan (Edition- December 2014) ISBN 978-93-5164-445-3.**
5. **Algebra and Geometry by R. B. Kulkarni, J. D. Yadav, S. J. Alandkar, N. I. Dhanshetti. (SUMS Publication) B.Sc.-I Paper-I**
6. **Algebra and Geometry (B.Sc.-I Paper-I) by Dr. B. P. Jadhav , Prof.A.M.Mahajan ,Prof.S.P.Gade, Prof. Kokare B.D . [Phadke Prakashan]**
7. **Text Books of Matrices by Shanti Narayan.**
8. **A Text Book of Analytical Geometry of Two dimensions, by P. K. Jain and Khalil Ahmid , Wiley Eartern Ltd. 1994.**
9. **Calculus and Differential Equations (B.Sc. –I ,Paper –II)**
10. **Calculus and Differential Equations (B. Sc. I , Paper- II) by Dr. B. P. Jadhav , Prof.A.M.Mahajan , Prof.S.P.Gade, Prof. Kokare B.D . [Phadke Prakashan]**
10. **Differential Calculus by Shanti Narayan**
11. **Differential Calculus by Shanti Narayan**
12. **A text book of Vector Calculus , by Shanti Narayan.**
13. **Differential equations, by G. S. Diwan, D. S. Agashe. Popular Prakashn , Bombay.**
14. **Introductory course in Differential Equation by D. A. Murray Orient Longman**