COURSE-WISE SYLLABUS

Semester I

Year	I	**Course Code:** 21BSC1C1MAT1L	**Credits**	04
Sem.	1	**Course Title:** Algebra - I and Calculus – I	**Hours**	56

Course Pre-requisites, if any	NA	
Formative Assessment Marks: 40	Summative Assessment Marks: 60	Duration of ESA:.02 hrs.

Course Outcomes	This course will enable the students to • Learn to solve system of linear equations. • Solve the system of homogeneous and non-homogeneous linear of m equations in n variables by using concept of rank of matrix, finding eigen values and eigen vectors. • Sketch curves in Cartesian, polar and pedal equations • Students will be familiar with the techniques of integration and differentiation of function with real variables. • Identify and apply the intermediate value theorems and L' Hospital rule.	
Unit No.	**Course Content**	**Hours**
Unit I	**Matrix:** Recapitulation of Symmetric and Skew Symmetric matrices, Cayley- Hamilton theorem, inverse of matrices by Cayley-Hamilton theorem (Without Proof). Algebra of Matrices; Row and column reduction to Echelon form. Rank of a matrix; Inverse of a matrix by elementary operations; 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. Eigen values and Eigen vectors of square matrices, real symmetric matrices and their properties, reduction of such matrices to diagonal form,	14
Unit II	**Polar Co-ordinates:** Polar coordinates, angle between the radius vector and tangent. Angle of intersection of two curves (polar forms), length of perpendicular from pole to the tangent, pedal equations. Derivative of an arc in Cartesian, parametric and polar forms, curvature of plane curve-radius of curvature formula in Cartesian, parametric and polar and pedal forms- center of curvature, asymptotes, evolutes and envelops.	14
Unit III	**Differential Calculus-I:** Limits, Continuity, Differentiability and properties. Properties of continuous functions. Intermediate value theorem, Rolle's Theorem , Lagrange's Mean Value theorem, Cauchy's Mean value theorem and examples. Taylor's theorem, Maclaurin's series, Indeterminate forms and evaluation of limits using	14

	L'Hospital rule.	
Unit IV	**Successive Differentiation**: nth Derivatives of Standard functions e^{ax+b}, $(ax+b)^m$, $\log(ax+b)$, $\sin(ax+b)$, $\cos(ax+b)$, $e^{ax}\sin(bx+c)$, $e^{ax}\cos(bx+c)$, Leibnitz theorem and its applications. Tracing of curves (standard curves)	14
Recommended Leaning Resources		
Print Resources	**References:** 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. Differential Calculus - Shanti Narayan, S. Chand & Company, New Delhi. 5. Applications of Calculus, Debasish Sengupta, Books and Allied (P) Ltd., 2019. 6. Calculus – Lipman Bers, Holt, Rinehart & Winston. 7. Calculus - S Narayanan & T. K. Manicavachogam Pillay, S. Viswanathan Pvt. Ltd., vol. I & II. 8. Schaum's Outline of Calculus - Frank Ayres and Elliott Mendelson, 5th ed. USA:Mc. Graw. 9. Text Book of B.Sc. Mathematics, G K Ranganath, S Chand & Company.	

Year	I	**Course Code:** 21BSC1C1MAT1P	**Credits**	02
Sem.	I	**Course Title:** Practical's on Algebra - I and Calculus – I	**Hours**	56

Course Pre-requisites, if any:	Knowledge of Programming	
Formative Assessment Marks: 25	Summative Assessment Marks: 25	Duration of ESA: 03 hrs.

Course Outcomes	This course will enable the students to • Learn Free and Open Source Software (FOSS) tools for computer programming Solve problem on algebra and calculus theory studied in MATDSCT 1.1 by using FOSS software. Acquire knowledge of applications of algebra and calculus through FOSS Practical/Lab Work to be performed in Computer Lab (FOSS) • Suggested Software's: Maxima/Scilab/Maple/MatLab/Mathematica/Phython/R
	Lab Practical's: **Part A:** Introduction to the software and commands related to the topic. 1. Computation of addition and subtraction of matrices, 2. Computation of Multiplication of matrices. 3. Computation of Trace and Transpose of Matrix 4. Computation of Rank of matrix and Row reduced Echelon form. 5. Computation of Inverse of a Matrix using Cayley-Hamilton theorem. 6. Solving the system of homogeneous and non-homogeneous linear algebraic equations. **Part B:** 7. Finding the nth Derivative of e^{ax} , trigonometric and hyperbolic functions 8. Finding the nth Derivative of algebraic and logarithmic functions. 9. Finding the nth Derivative of $e^{ax+b}\sin(bx+c)$, $e^{ax+b}\cos(bx+c)$. 10. Finding the Taylor's and Maclaurin's expansions of the given functions. 11. Finding the angle between the radius vector and tangent. 12. Finding the curvatures of the given curves. 13. Tracing of standard curves (Cartesian, polar and parametric)

Evaluation Scheme for Lab Examination

Assessment Criteria		Marks
Program – 1 from Part A	Writing Program	03
	Execution of Program	07
Program -2 from Part B	Writing Program	03
	Execution of Program	07
Viva-Voce		05
Total		**25**

OPEN-ELECTIVE SYLLABUS :

A: For students of Science stream who have not chosen Mathematics as one of Core Subjects

Year	I	**Course Code:** 21BSC1O1MAT1	**Credits**	03
Sem.	I	**Course Title:** Mathematics – I	**Hours**	42

Course Pre-requisites, if any	NA	
Formative Assessment Marks: 40	Summative Assessment Marks: 60	Duration of ESA:.02 hrs.

Course Outcomes	This course will enable the students to • Learn to solve system of linear equations. • Solve the system of homogeneous and non-homogeneous m linear equations by using the concept of rank of matrix, finding eigen values and eigen vectors. • Students will be familiar with the techniques of differentiation of function with real variables. • Identify and apply the intermediate value theorems and L' Hospital rule. • Learn to trace some standard curves.	
Unit No.	**Course Content**	**Hours**
Unit I	**Matrices:** Recapitulation of Symmetric and Skew Symmetric matrices, Cayley- Hamilton theorem, inverse of matrices by Cayley-Hamilton theorem (Without Proof). Algebra of Matrices; Row and column reduction, Echelon form. Rank of a matrix; Inverse of a matrix by elementary operations; 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. Eigen values and Eigen vectors of square matrices, real symmetric matrices and their properties, reduction of such matrices to diagonal form.	14
Unit II	**Differential Calculus:** Limits, Continuity, Differentiability and properties. Intermediate value theorem, Rolle's Theorem, Lagrange's Mean Value theorem, Cauchy's Mean value theorem and examples. Taylor's theorem, Maclaurin's series, Indeterminate forms and examples.	14
Unit III	**Successive Differentiation**: nth Derivatives of Standard functions e^{ax+b}, $(ax+b)^m$, $\log(ax+b)$, $\sin(ax+b)$, $\cos(ax+b)$, $e^{ax}\sin(bx+c)$, $e^{ax}\cos(bx+c)$, Leibnitz theorem and its applications. Tracing of curves (standard curves)	14
Recommended Leaning Resources		

Print Resources	**References:** 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 Pvt. Ltd.,vol. I & II. 8. Schaum's Outline of Calculus - Frank Ayres and Elliott Mendelson, 5th ed. USA: Mc.Graw. 9. Text Book of B.Sc. Mathematics, G K Ranganath, S Chand & Company.

B: For Students of other than Science Stream

Year	I	**Course Code:** 21BSC1O1MAT1	**Credits**	03
Sem.	I	**Course Title:** Business Mathematics – I	**Hours**	42
Course Pre-requisites, if any		NA		
Formative Assessment Marks: 40		Summative Assessment Marks: 60	Duration of ESA:.02 hrs.	
Course Outcomes	This course will enable the students to • Translate the real word problems through appropriate mathematical modellling. • Explain the concepts and use equations, formulae and mathematical expression and relationship in a variety of context. • Finding the extreme values of functions. • Analyze and demonstrate the mathematical skill require in mathematically intensive areas in economics and business.			
Unit No.	**Course Content**		**Hours**	
Unit I	**Algebra** – Set theory and simple applications of Venn Diagram, relations, functions, indices, logarithms, permutations and combinations. Examples on commercial mathematics.		14	
Unit II	**Matrices**: Definition of a matrix; types of matrices; algebra of matrices. Properties of determinants; calculations of values of determinants upto third order; Adjoint of a matrix, elementary row and column operations; solution of a system of linear equations having unique solution and involving not more than three variables. Examples on commercial mathematics.		14	
Unit III	**Differential Calculus**: Constant and variables, functions, Limits & continuity. Differentiability and Differentiation, partial differentiation, rates as a measure, maxima, minima, Partial Derivatives up to second order; Homogeneity of functions and Euler's Theorem; Total Differentials; Differentiation of implicit function with the help of total differentials, Maxima and Minima; cases of one variable involving second or higher order derivatives; Cases of two variables involving not more than one constraint		14	
Recommended Leaning Resources				
Print Resources	**References:** 1. Basic Mathematics, Allel R.G.A, Macmillan, New Delhi. 2. Mathematics for Economics, Dowling, E.T. , Schaum's Series, McGraw Hill, London. 3. Quantitative Techniques in Management, Vohra, N.D., Tata McGraw Hill, New Delhi.			

	4. Business Mathematics, Soni R.S., Pitamber Publishing House, Delhi