Annexure 2 Detailed Syllabus for Each Course B.Sc. (Hons.) Mathematics

Semester-1

MAM111T: Calculus and Matrix Algebra

Semester: I	Course Title: Calculus and Matrix Algebra	Credit: 4
Course No.: 111T	Major-1 (T)	Hours: 4/week

COs with cognitive Abilities:

COs	COGNITIVE ABILITIES	COURSE OUTCOMES
CO1	REMEMBERING	Memorize the basics of various matrices of real and complex numbers.
CO2	UNDERSTANDING	Explain and discuss the basics of Eigenvalues and Eigenvectors and Application of Matrix in solving linear equations
CO3	APPLYING	Demonstrate the convergent and divergent series using different methods
CO4	ANALYSING	Calculate the limit of indeterminate forms
CO5	EVALUATING	Evaluate Taylor's and Maclaurin's series to find power series in one variable
CO6	CREATING	Define successive derivatives of nth order

CO-PO Mapping:

	PO 1	PO 2	PO 3	PO 4	PO 5
CO 1	1	2	1		
CO 2	1	1	1		
CO 3	1	2	1		
CO 4		1	2		
CO 5	1	1	2		
CO 6		2	1	1	1

Unit	Detailed Syllabus	No. of Hours of Teaching
I	Different Matrices and Rank of Matrix. Introduction to matrices, different types of matrices, operations on matrices, Theorems on matrices, Elementary operations on matrices and types of matrices, Symmetric and skew-symmetric matrices, Hermitian and skew-Hermitian matrices. Linear dependence and independence of row and column matrices. Row rank, column rank and rank of a matrix. Row Reduced Echelon (RRE) form of a matrix and matrix inversion using it.	15

II	Cayley Hamilton Theorem. Eigen values, Eigen vectors and the characteristic equation of a matrix. Cayley- Hamilton (CH) theorem and its use in finding inverse of a matrix. Application of matrices in solving a system of simultaneous linear equations. Cramer's rule. Theorems on consistency of a system of simultaneous linear equations.	15
III	 Successive derivatives and power series. a) Successive Derivatives, standard results for nth derivative, Leibniz's Theorem. b) Definition of limit of a sequence, Convergence and divergence of an infinite series, Alternating Series (without proof). Comparison test, Ratio test and Root test, Power series 	15
IV	 Mean value theorems and L'Hospital rule. a) Rolle's Theorem, Lagrange's and Cauchy's Mean Value Theorems, Increasing and decreasing functions, Taylor's, and Maclaurin's Theorems (both without proof). Using Taylor's and Maclaurin's Theorem find Maclaurin power series expansion of sinx, cosx, log (1+ x), e^x, (1+ x)ⁿunder proper restrictions (if any). b) Indeterminate forms: all forms of L'Hospital's Rules. 	15

Suggested Reference Books:

- 1. Calculus and Analytic Geometry G. B. Thomas and R. L. Finney. Pearson Education. Indian Reprint.
- 2. Calculus James Stewart, Sixth edition,(E-Book).
- 3. Calculus T. M. Apostol. VolumeI.
- 4. Differential Calculus Shanti Narayan, P.K. Mittal, S. Chand and Co.
- 5. Differential Calculus Harikishan, AtlanticPublishers.
- 6. Calculus M.Spivak.
- 7. An Introduction to Linear Algebra I. K. Rana, Ane Books Pvt.Ltd.
- 8. Linear Algebra Theory and Applications Ward Cheney, David Kincaid. Jones and Bartlet India Pvt.Ltd.
- 9. Introduction to Linear Algebra Serge Lang. Springer(India).
- 10. Matrix and Linear Algebra K. B. Dutta, PrenticeHall.
- 11. A Textbook of Matrices Shanti Narayan, P K Mittal, S. ChandGroup.
- 12. Introduction to Linear Algebra V. Krishnamurthy, Affiliated East-west Press PvtLtd.

MAM112P: Mathematics Major Practical-112

Semester: I	Course Title: Mathematics Major Practical-112	Credit: 4
Course No.: 112P	Major-2	Hours: 8/week

COs with Cognitive Abilities

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COs	COGNITIVE ABILITIES	COURSE OUTCOMES
CO1	REMEMBERING	Memorize and apply reduction formulas
CO2	UNDERSTANDING	Discuss the concepts related to lines and planes in space to solve problems
CO3	APPLYING	solve systems of linear equations using different methods
CO4	ANALYSING	Examine how to derive row echelon form and reduced row echelon form
CO5	EVALUATING	Evaluate examples on successive differentiation

CO-PO Mapping

	PO 1	PO 2	PO 3	PO 4	PO 5
CO 1	1	2	1		
CO 2	1	1	1		
CO 3	1	2	1		
CO 4		1	2		
CO 5	1	1	2		

(Manual/Computer)

Sr.	Title of the Practical	No. of Hours
No.		of Teaching
1.	Examples based on Reduction formula-I	5
2.	Examples based on Reduction formula-II	5
3.	Examples based on Reduction formula-III	5
4.	Examples on Line in space	5
5.	Examples on Plane in space-I	5
6.	Examples on Plane in space-II	5
7.	Gauss elimination method.	5
8.	Gauss Jacobi iterative method.	5
9.	Gauss Seidel iterative method.	5
10.	Examples on row echelon form.	5
11.	Examples on reduced row echelon form.	5
12.	Examples on application of Leibnitz theorem.	5
13.	Examples on n th derivative.	5
14.	Examples of convergence of infinite series.	5
15.	Examples on Taylor series.	5
16.	Examples on Maclaurin series.	5
17.	Examples of limit using L'Hospital rule.	5
18.	Examples on eigen value and eigenvector.	5
19.	verification of Cayley Hamilton Theorem.	5