K. J. SOMAIYA COLLEGE OF SCIENCE AND COMMERCE , AUTONOMOUS

Certificate course in Basic Mathematics

Course Details

Department of Mathematics

2019-2020

This document contains the structure of course, details of syllabus and evaluation pattern.

❖ **Course type** : Certificate
❖ **Course Title** : Certificate Course in Basic Mathematics
❖ **Preamble** : Mathematics which is rightly called the 'Queen of all Sciences' is a subject that every Science subjects requires. For a better understanding of their subject it is imperative that they have a good background of Mathematics. Various institutes have made mathematics a mandatory course in the undergraduate for being eligible for admission in their institution. The course is planned for those students who requires a better understanding of Mathematics and has not taken Mathematics in their first year of their undergraduate programme. As the Primary aim is to give them a working knowledge, the theorems are not expected to be proved. Applications of theorems are expected and are required to be done in detail. The syllabus is divided into two parts viz: Calculus and Algebra. Calculus comprises of 70 % of the syllabus and 30 % of the syllabus concentrates on Algebra. This course is not to be considered as internal evaluation of any subject / paper. This course can also be considered as a sub-programme of Honour's programme or as an audit course. Students of undergraduate and Post graduate can utilize this course for their benefit.

❖ **Objectives of course** :

1. Give exposure of basic concepts of calculus and algebra to students who have not taken mathematics in their under graduate.

2. Emphasis is on understanding concept and application rather than studying theory behind it

❖ **Learning Outcomes :**

1. Student should be able to solve simple problems on derivative and integration and differential equation.
2. Should be able to deal with matrices, Eigen values and solve equation using matrices

❖ **Prerequisites / Eligibility Criteria :** 12th std science with or without mathematics

❖ **Intake Capacity :** 25 students

- ❖ **Duration** : 15 weeks

- ❖ **Course Coordinator** : Name: Subhash Krishnan

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- ❖ **Syllabus** :

	Paper /Module I: Continuity and Differentiation	
	Content	No of Lectures
1	Properties of Real Numbers Order properties, Interval, Archimedean properties, Bounded Sets, Infimum and Supremum Absolute value function.	5
2	Limits and Continuity Left hand limit, Right hand limit, Limit at infinity, Continuity of a function at a point, In an interval, Discontinuity, Removable and non-removable discontinuity,	5
3	Differentiation Definition, Leibnitz rule, Chain rule, L'hospital rule, Mean value theorem, Taylors theorem.	5
4	Application of Derivatives Increasing and decreasing function, Concave upwards and concave downwards, Optimization,	5
	Paper/Module II: Integration and Differential equation	
	Content	No of Lectures
1	Integration Various integration method Viz: substitution, by Parts, Partial fraction, etc. integration as limit of a Sum	5
2	Application of Integration Finding area, Volume, Surface area, Solid of revolution length of the curve.	6
3	Ordinary differential equation Formulation, Solving by separation, Substitution, Homogeneous and non-homogeneous differential equation, Exact differential equation, Integrating factor and solving the differential equation. Solving ODE by variation of parameters and Method of undetermined coefficients. D-operator method to solve higher order.	9
	Paper /Module III: Algebra	
	Content	No of Lectures
1	Function. Domain, range, Co-domain, 1-1 functions. Onto functions, bijective function	5

2	Logarithm Properties of logarithmic function, Solving mathematical expression using logarithm	5
3	Matrices Algebra of matrices, Types of matrices viz: symmetric, skew symmetric, etc. Singular and non-singular matrices, Algebra of matrices.	5
4	Solving system of equation and Eigen values and Eigen vectors Solving system of equation using Do-Little's LU decomposition. Finding Eigen values and the corresponding Eigen vectors.	5

❖ **Evaluation Pattern :**

	Internal	End of the course	Total Marks	Grades offered
Theory	30	60	100	yes
Practical				
Project work	10			

❖ **Reference Books :** Linear Algebra by Gilbert Strang
Differential Equation by G. F. Simmons