PERIYAR UNIVERSITY
PERIYAR PALKALAI NAGAR
SALEM- 636 011

DEGREE OF BACHOLAR OF MATHEMATICS

CHOICE BASED CREDIT SYSTEM

Syllabus For
B.SC., MATHEMATICS

(SEMESTER PATTERN)

(For Candidates Admitted in the Colleges Affiliated to Periyar University from 2023-2024 onwards)

B.SC – MATHEMATICS SYLLABUS

PROGRAMME OBJECTIVES

Mentor the young students to face global challenges with unique

Proficiency in Mathematics.

To apply basic Mathematics principles in everyday life.

Promote analytical thinking and experimental skills in mathematics.

PROGRAMME OUTCOMES

Acquire academic excellence with an aptitude

for higher studies and research.

Apply appropriate scientific methods and modern

technology to solve complex problems related to society.

LEARNING OUTCOMES-BASED CURRICULUM FRAMEWORK GUIDELINES BASED REGULATIONS FOR UNDER GRADUATE PROGRAMME	
Programme:	**B.Sc. Mathematics**
Programme code:	
Duration:	**3 Years (UG)**
Programme Outcomes:	**PO1: Disciplinary Knowledge:** Capable of demonstrating comprehensive knowledge and understanding ofone or more disciplines that form a part of an undergraduate programme of study. **PO2: Critical Thinking:** Capability to apply analytic thought to a body of knowledge; analyze and evaluate evidence, arguments, claims, beliefs on the basis of empirical evidence; identify relevant assumptions or implications; formulate coherent arguments; critically evaluate practices, policies and theories by following scientific approach to knowledge development. **PO3: Problem Solving:** Capacity to extrapolate from what one has learned and apply their competencies to solve different kinds of non-familiar problems, rather than replicate curriculum content knowledge; and apply one's earning to real life situations. **PO4: Analytical Reasoning:** Ability to evaluate the reliability and relevance of evidence; identify logical flaws and holes in the arguments of others; analyze and synthesize data from a variety of sources; draw valid conclusions and support them with evidence and examples and addressing opposing viewpoints. **PO5: Scientific Reasoning:** Ability to analyse, interpret and draw conclusions from quantitative / qualitative data; and critically evaluate ideas, evidence, and experiences from an open minded and reasoned perspective. **PO6: Self-directed & Lifelong Learning:** Ability to work independently, identify and manage a project. Ability to acquire knowledge and skills, including ‒learning how to learn‖, through self-placed and self- directed learning aimed at personal development, meeting economic, social and cultural objectives.

Programme Specific Outcomes:

PSO1: Acquire good knowledge and understanding, to solve specific theoretical & applied problems in different area of mathematics & statistics.

PSO2: Understand, formulate, develop mathematical arguments, logically and use quantitative models to address issues arising in social sciences, business and other context /fields.

PSO3: To prepare the students who will demonstrate respectful engagement with other‘s ideas, behaviors, beliefs and apply diverse frames of references to decisions and actions. To create effective entrepreneurs by enhancing their critical thinking, problem solving, decision making and leadership skill that will facilitate startups and high potential organizations.

Mapping of Course Learning Outcomes (CLOs) with Programme Outcomes (POs) and ProgrammeSpecific Outcomes (PSOs)can be carried out accordingly, assigning the appropriate level in the grids:

	POs							PSOs		
	1	2	3	4	5	6	…	1	2	…
CLO1										
CLO2										
CLO3										
CLO4										
CLO5										

COURSE	FIRST SEMESTER – FOUNDATION COURSE
COURSE TITLE	BRIDGE MATHEMATICS
CREDITS	2
COURSE OBJECTIVES	To bridge the gap and facilitate transition from higher secondary to tertiary education; To instil confidence among stakeholders and inculcate interest for Mathematics;

Course Learning Outcome

After completion of this course successfully, the students will be able to

CLO1: Prove the binomial theorem and apply it to find the expansions of any $(x + y)^n$ and also, solve the related problems

CLO2: Find the various sequences and series and solve the problems related to them. Explainthe principle of counting.

CLO3: Find the number of permutations and combinations in different cases. Apply the principle of counting to solve the problems on permutations and combinations

CLO4: Explain various trigonometric ratios and find them for different angles, including sum of the angles, multiple and submultiple angles, etc. Also, they can solve the problems using the transformations.

CLO5: Find the limit and derivative of a function at a point, the definite and indefinite integral of a function. Find the points of min/max of a function.

Mapping of Course Learning Outcomes (CLOs) with Programme Learning Outcomes (PLOs) and Programme Specific Outcomes (PSOs)

	Pos						PSOs	
	1	2	3	4	5	6	1	2
CLO1	1	1	1	1	1	1	1	1
CLO2	2	1	1	2	2	1	2	1
CLO3	2	1	1	2	2	1	2	1
CLO4	1	1	1	1	1	1	2	1
CLO5	1	1	1	1	1	1	2	1

COURSE	FIRST SEMESTER – CORE COURSE -1
COURSE TITLE	ALGEBRA & TRIGONOMETRY
CREDITS	4
COURSE OBJECTIVES	• Basic ideas on the Theory of Equations, Matrices and NumberTheory. • Knowledge to find expansions of trigonometry functions, solve theoretical and applied problems.
COURSE OUTCOMES	**CLO 1:** Classify and Solve reciprocal equations **CLO 2:** Find the sum of binomial, exponential and logarithmic series **CLO 3:** Find Eigen values, eigen vectors, verify Cayley – Hamilton theorem and diagonalize agiven matrix **CLO 4:** Expand the powers and multiples of trigonometric functions in terms of sine and cosine **CLO 5:** Determine relationship between circular and hyperbolic functions and the summation oftrigonometric series **CLO 5:** Determine relationship between circular and hyperbolic functions and the summation oftrigonometric series

	Pos						PSOs		
	1	2	3	4	5	6	1	2	3
CLO1	3	1	3	-	-	-	3	2	1
CLO2	2	1	3	1	-	-	3	2	1
CLO3	3	1	3	1	-	-	3	2	1
CLO4	3	1	3	-	-	-	3	2	1
CLO5	3	1	3	-	-	-	3	2	1

COURSE TITLE	**DIFFERENTIAL CALCULUS**
CREDITS	4
COURSE OBJECTIVES	• The basic skills of differentiation, successive differentiation, andtheir applications. • Basic knowledge on the notions of curvature, evolutes, involutes and polar co-ordinates and in solving related problems
COURSE OUTCOMES	**CLO 1:** Find the nth derivative, form equations involving derivatives and apply Leibnitzformula **CLO 2:** Find the partial derivative and total derivative coefficient **CLO 3:** Determine maxima and minima of functions of two variables and to use the Lagrange'smethod of undetermined multipliers **CLO 4:** Find the envelope of a given family of curves **CLO 5:** Find the evolutes and involutes and to find the radius of curvature using polar co-ordinates

	POs						PSOs		
	1	2	3	4	5	6	1	2	3
CLO1	3	1	3	-	-	-	3	2	1
CLO2	2	1	3	-	-	-	3	2	1
CLO3	3	2	3	2	-	-	3	2	1
CLO4	3	2	3	2	1	-	3	2	1
CLO5	3	2	3	2	1	-	3	2	1

Website and e-Learning Source	https://nptel.ac.in

COURSE TITLE	**ANALYTICAL GEOMETRY (TWO & THREE DIMENSIONS)**
CREDITS	4
COURSE OBJECTIVES	• Necessary skills to analyse characteristics and properties of two- and three-dimensional geometric shapes. • To present mathematical arguments about geometric relationships. To solve real world problems on geometry and its applications
COURSE OUTCOMES	**CLO 1:** Find pole, polar for conics, diameters, conjugate diameters for ellipse and hyperbola **CLO 2:** Find the polar equations of straight line and circle, equations of chord, tangent andnormal and to find the asymptotes of hyperbola **CLO 3:** Explain in detail the system of Planes **CLO 4:** Explain in detail the system of Straight lines **CLO 5:** Explain in detail the system of Spheres

		Pos					PSOs		
	1	2	3	4	5	6	1	2	3
CLO1	2	2	2	1	-	-	3	2	1
CLO2	2	2	2	1	-	-	3	2	1
CLO3	3	2	2	1	-	-	3	2	1
CLO4	3	2	3	1	-	-	3	2	1
CLO5	3	2	3	1	-	-	3	2	1

Website and e-Learning Source	https://nptel.ac.in

COURSE TITLE	INTEGRAL CALCULUS
CREDITS	4
COURSE OBJECTIVES	• Knowledge on integration and its geometrical applications, double, triple integrals and improper integrals. • Knowledge about Beta and Gamma functions and their applications. Skills to Determine Fourier series expansions.
COURSE OUTCOMES	**CLO 1:** Determine the integrals of algebraic, trigonometric and logarithmic functions and to find the reduction formulae **CLO 2:** Evaluate double and triple integrals and problems using change of order of integration **CLO 3:** Solve multiple integrals and to find the areas of curved surfaces and volumes of solidsof revolution **CLO 4:** Explain beta and gamma functions and to use them in solving problems of integration **CLO 5:** Explain Geometric and Physical applications of integral calculus WEBSITE AND e-Learning Source : https://nptel.ac.in

		Pos					PSOs		
	1	2	3	4	5	6	1	2	3
CLO1	3	1	3	-	-	-	3	2	1
CLO2	3	1	3	-	-	-	3	2	1
CLO3	3	1	3	-	-	-	3	2	1
CLO4	3	1	3	-	-	-	3	2	1
CLO5	3	1	3	-	2	1	3	2	1

COURSE TITLE (**SEMESTER III)**	**VECTOR CALCULUS AND ITS APPLICATIONS**
CREDITS	**4**
COURSE OBJECTIVES	• Knowledge about differentiation of vectors and on differential operators. Knowledge about derivatives of vector functions. • Skills in evaluating line, surface and volume integrals. The ability to analyze the physical applications of derivatives of vectors.
COURSE OUTCOMES	**CLO 1:** Find the derivative of vector and sum of vectors, product of scalar and vector point function and to Determine derivatives of scalar and vector products **CLO 2:** Applications of the operator _del' and to Explain soleonidal and ir-rotational vectors **CLO 3:** Solve simple line integrals **CLO 4:** Solve surface integrals and volume integrals **CLO 5:** Verify the theorems of Gauss, Stoke's and Green's(Two Dimension) **Website and e-Learning Sources: https://nptel.ac.in**

		Pos					PSOs		
	1	2	3	4	5	6	1	2	3
CLO1	3	2	3	1	-	-	3	2	1
CLO2	3	2	3	1	2	-	3	2	1
CLO3	3	3	3	3	-	-	3	3	1
CLO4	3	3	3	3	-	-	3	3	1
CLO5	3	3	3	3	2	-	3	3	1

COURSE TITLE (**SEMESTER III)**	**DIFFERENTIAL EQUATIONS AND ITS APPLICATIONS**
CREDITS	**4**
COURSE OBJECTIVES	• Knowledge about the methods of solving Ordinary and Partial Differential Equations. • The understanding of how Differential Equations can be used as a powerful tool in solving problems in science.
COURSE OUTCOMES	**CLO 1:** Determine solutions of homogeneous equations, non-homogeneous equations of degree one in two variables, solve Bernoulli's equations and exact differential equations **CLO 2:** Find the solutions of equations of first order but not of higher degree and to Determine particular integrals of algebraic, exponential, trigonometric functions and their products **CLO 3:** Find solutions of simultaneous linear differential equations, linear equations of second order and to find solutions using the method of variations of parameters **CLO 4:** Form a PDE by eliminating arbitrary constants and arbitrary functions,find complete, singular and general integrals, to solve Lagrange's equations **CLO 5:** Explain standard forms and Solve Differential equations using Charpit's method. **Website and e-Learning Sources: https://nptel.ac.in**

		Pos					PSOs		
	1	2	3	4	5	6	1	2	3
CLO1	3	1	3	2	1	-	3	2	1
CLO2	3	1	3	2	1	-	3	2	1
CLO3	3	1	3	2	1	-	3	3	1
CLO4	3	1	3	2	2	1	3	3	1
CLO5	3	1	3	2	2	1	3	3	1

COURSE TITLE (**SEMESTER IV)**	**INDUSTRIAL STATISTICS**
CREDITS	**3**
COURSE OBJECTIVES	To bridge the gap between industry academia interface – to apply the theory learnt to industrial applications
COURSE OUTCOMES	**CLO 1:** Define Combinatorial Methods and few examples. **CLO 2:** Define Sample spaces and The Probability of event. CLO 3: Describe Independent Events and problems CLO 4: Define probability Distributions, Continuous Random variables. CLO 5: Describe conditional distributions and mathematical expectations. **Website and e-Learning Sources: https://nptel.ac.in**

		Pos					PSOs		
	1	2	3	4	5	6	1	2	3
CLO1	3	2	2	3	3	2	3	3	1
CLO2	2	3	3	3	3	2	3	3	1
CLO3	3	3	3	3	3	2	3	3	1
CLO4	2	3	3	2	3	2	3	3	1
CLO5	2	3	3	3	3	2	3	3	1

COURSE TITLE (**SEMESTER IV)**	**ELEMENTS OF MATHEMATICAL ANALYSIS**
CREDITS	**4**
COURSE OBJECTIVES	• Identify and characterize sets and functions and Understand, test and analyze the convergence and divergence of sequences, series. Understand metric spaces with suitable examples
COURSE OUTCOMES	**CLO 1:** Explain in detail about sets and functions, equivalence and countability and the LUB axiom **CLO 2:** Explain Sequence and Subsequence of real numbers and to find the limit of sequence to test for convergent, divergent, bounded and monotone sequences **CLO 3:** Explain the operations on convergent and divergent sequences and to Explain the concepts of limit superior and limit inferior and the notion of Cauchy sequences **CLO 4:** Classify the series of real numbers and the alternating series and their convergence and divergence, the conditional convergence and absolute convergence and solve problems on convergence of the sequences **CLO 5:** Explain about the metric spaces and functions continuous on a Metric space. **Website and e-Learning Sources: https://nptel.ac.in**

		Pos					PSOs		
	1	2	3	4	5	6	1	2	3
CLO1	3	3	2	3	2	-	3	2	1
CLO2	3	3	2	3	2	-	3	2	1
CLO3	3	3	3	3	2	-	3	2	1
CLO4	3	3	3	2	2	-	3	2	1
CLO5	3	3	2	3	2	-	3	2	1

COURSE TITLE (**SEMESTER V)**	**ABSTRACT ALGEBRA**
CREDITS	**4**
COURSE OBJECTIVES	• Concepts of Sets, Groups and Rings. Construction, characteristics and applications of the abstractalgebraic structures
COURSE OUTCOMES	**CLO 1:** Explain groups, subgroups and cyclic groups **CLO 2:** Explain about Normal subgroup, Quotient **CLO 3:** Explain Permutation groups and apply Cayley's theorem to problems **CLO 4:** Explain Rings, Ideals and Quotient Rings and examine their structure **CLO 5:** Discuss about the field of quotient of an integral domain and to Explain in detail about Euclidean Rings **Website and e-Learning Sources: https://nptel.ac.in**

		Pos					PSOs		
	1	2	3	4	5	6	1	2	3
CLO1	3	3	2	3	1	-	3	3	1
CLO2	3	3	2	3	1	-	3	3	1
CLO3	3	3	2	3	2	-	3	3	1
CLO4	3	3	2	3	1	-	3	3	1
CLO5	3	3	2	3	2	-	3	3	1

COURSE TITLE (**SEMESTER V)**	**REAL ANALYSIS**
CREDITS	**4**
COURSE OBJECTIVES	• Real Numbers and properties of Real–valued functions. • Connectedness, Compactness, Completeness of Metric spaces. Convergence of sequences of functions, Examples and counter examples
COURSE OUTCOMES	**CLO 1:** Explain the concepts of Continuous and Discontinuous functions, open and close sets, Connectedness, Completeness and Compactness **CLO 2:** Explain the concepts of bounded and totally bounded sets, continuity of inverse functions and Uniform continuity **CLO 3:** Define the sets of measure zero, to Explain about the existence and properties of Riemann integral **CLO 4:** Explain the concept of differentiability and to Explain Rolle's theorem, Law of mean,and Fundamental theorem of calculus **CLO 5:** Explain the point wise and uniform convergence of sequence of function and to derive the Taylor's theorem **Website and e-Learning Sources: https://nptel.ac.in**

		Pos					PSOs		
	1	2	3	4	5	6	1	2	3
CLO1	3	3	1	3	1	-	3	1	1
CLO2	3	3	1	3	1	-	3	1	1
CLO3	3	3	1	3	1	-	3	1	1
CLO4	3	3	1	3	1	-	3	1	1
CLO5	3	3	1	3	1	-	3	1	1

COURSE TITLE (**SEMESTER V)**	**MATHEMATICAL MODELLING**
CREDITS	**4**
COURSE OBJECTIVES	• Construction and Analysis of Mathematical models found in real life problems. Modelling through differential and difference equations
COURSE OUTCOMES	**CLO 1:** Explain simple situations requiring Mathematical Modelling and to Determine the characteristics of such models **CLO 2:** Model using differential equations in-terms of linear growth and Decay models **CLO 3:** Model using systems of ordinary differential equations of first order, to discuss aboutvarious models under the categories _Epidemics‘ and _Medicine‘ **CLO 4:** Explain in detail about difference equations **CLO 5:** Model using difference equations **Website and e-Learning Sources: https://nptel.ac.in**

		Pos					PSOs		
	1	2	3	4	5	6	1	2	3
CLO1	2	3	3	3	2	2	2	3	2
CLO2	2	3	3	3	2	2	2	3	2
CLO3	2	3	3	3	2	2	2	3	2
CLO4	3	2	2	2	-	1	2	3	2
CLO5	3	3	3	3	2	2	2	3	2

COURSE TITLE (**SEMESTER V)**	**OPTIMIZATION TECHNIQUES**
CREDITS	**4**
COURSE OBJECTIVES	• To provide knowledge on Formulating real life problems into LP.P To teach the techniques for converting the industrialproblems as mathematical problems and solving them.
COURSE OUTCOMES	**CLO 1 :** Define linear programming problem and to solve the problems using graphical method, Simplex method and Big-M method. **CLO 2 :** Solve Transportation problems and Assignment problems. **CLO 3 :** Find solutions for sequencing problems. **CLO 4 :** Discuss game, strategies on dominance property. **CLO 5 :** Construct network and do PERT calculations. **Website and e-Learning Sources: https://nptel.ac.in**

		Pos					PSOs		
	1	2	3	4	5	6	1	2	3
CLO1	3	2	3	3	2	1	3	3	3
CLO2	3	2	3	3	2	1	3	3	3
CLO3	3	2	3	3	2	1	3	3	3
CLO4	3	2	3	3	2	1	3	3	3
CLO5	3	2	3	3	2	1	3	3	3

COURSE TITLE (**SEMESTER VI)**	**LINEAR ALGEBRA**
CREDITS	**4**
COURSE OBJECTIVES	• Vector Spaces, linear dependence and independence of vectors . Dual spaces, Inner product and norm – orthogonalization process. Linear transformations. Various operators on vector spaces
COURSE OUTCOMES	**CLO 1:** Acquire a detailed knowledge about vector spaces and subspaces **CLO 2:** Explain the concepts of Linear Dependence, Linear Independence, Bases and Dimension of basis **CLO 3:** Explain the concept of Linear Transformations, their Matrix representation and thenotion of dual spaces **CLO 4:** Find the Eigen values and Eigen vectors, to apply the concepts for diagonalisation **CLO5:** Explain about Inner product and norms and to apply Gram Schmidt Orthogonalization Process to problems on inner product spaces **Website and e-Learning Sources: https://nptel.ac.in**

		Pos					PSOs		
	1	2	3	4	5	6	-	2	3
CLO1	3	3	2	3	-	1	-	3	1
CLO2	3	3	3	3	-	1	-	3	1
CLO3	3	3	2	3	1	1	-	3	1
CLO4	3	3	3	3	-	1	-	3	1
CLO5	3	3	3	3	1	1	-	3	1

COURSE TITLE (**SEMESTER VI)**	**MECHANICS**
CREDITS	**4**
COURSE OBJECTIVES	• Equilibrium of a particle under the action of given forces • Simple Harmonic Motion Projectiles.
COURSE OUTCOMES	**CLO 1:** Define Resultant, Component of a Force, Coplanar forces, like and unlike parallel forces, Equilibrium of a Particle, Limiting equilibrium of a particle on an inclined plane. **CLO 2:** Define Moment of a force and Couple with examples. Define Parallel Forces and Forcesacting along a Triangle, Solve problems on frictional forces **CLO 3:** Define work, energy, power, rectilinear motions under varying forces. Define Simple Harmonic Motion and find its Geometrical representation. **CLO 4:** Define Projectile, impulse, impact and laws of impact. Prove that the path of a projectileis a parabola. Find the direct and oblique impact of smooth elastic spheres **CLO 5:** Define central orbits, explain conic as centered orbits and solve problems related to central orbits **Website and e-Learning Sources: https://nptel.ac.in**

		Pos					PSOs		
	1	2	3	4	5	6	1	2	3
CLO1	3	2	3	2	1	1	3	3	2
CLO2	3	2	3	2	1	1	3	3	2
CLO3	3	2	3	2	1	1	3	3	2
CLO4	3	2	3	2	1	1	3	3	2
CLO5	3	2	3	2	1	1	3	3	2

COURSE TITLE (**SEMESTER I)**	**MATHEMATICS FOR COMPETITIVE EXAMINATION-I SKILL ENCHANCEMENT COURSE SEC-01**
CREDITS	**2**
COURSE OBJECTIVES	• Remembering the meaning of HCF and LCM of numbers. • Understanding the concept of percentage on simple problems. Analyzing the concepts of ratio and proportion.
COURSE OUTCOMES	**CLO 1 :** Perform basic mathematics in Numbers. **CLO 2 :** Understand Decimal Fractions and Simplification. **CLO 3 :** Develop basic concept of Square Roots and Cube Roots and Average. **CLO 4 :** Explain Problems on Numbers - Problems on Ages. **CLO 5 :** Critique and evaluate quantitative arguments that utilize mathematics, statistical andquantitative informations. **Website and e-Learning Sources: https://nptel.ac.in**

		Pos					PSOs		
	1	2	3	4	5	6	1	2	3
CLO1	3	1	3	-	-	-	3	2	1
CLO2	2	1	3	1	-	-	3	2	1
CLO3	3	1	3	1	-	-	3	2	1
CLO4	3	1	3	-	-	-	3	2	1
CLO5	3	1	3	-	-	-	3	2	1

COURSE TITLE (**SEMESTER I)**	**MATHEMATICS FOR COMPETITIVE EXAMINATION-II SKILL ENCHANCEMENT COURSE SEC-02**
CREDITS	**2**
COURSE OBJECTIVES	• Understanding the concepts of chain rule. • Applying the concept of time and distance. Analyzing the problem on trains with solved examples.
COURSE OUTCOMES	**CLO 1 :** Explain in detail about Profit & Loss and Ratio & Proportion. **CLO 2 :** Explain Partnership and Chain Rule. **CLO 3 :** Explain Time & Work and Pipes & Cistern. **CLO 4 :** Explain Time & Distance and Problems on Trains. **CLO 5 :** Explain Boats & Streams and Alligation or Mixture. **Website and e-Learning Sources: https://nptel.ac.in**

		Pos					PSOs		
	1	2	3	4	5	6	1	2	3
CLO1	3	1	3	-	-	-	3	2	1
CLO2	2	1	3	1	-	-	3	2	1
CLO3	3	1	3	1	-	-	3	2	1
CLO4	3	1	3	-	-	-	3	2	1
CLO5	3	1	3	-	-	-	3	2	1

COURSE TITLE (**SEMESTER II)**	**COMPUTATIONAL MATHEMATICS** **SKILL ENCHANCEMENT COURSE SEC-03**
CREDITS	**2**
COURSE OBJECTIVES	• Understand and use the structure of C++ programme, to solve different Numerical Methods.
COURSE OUTCOMES	**CLO 1 :** Describe the roots of algebraic equations using different methods like, Newton-Raphson method, Secant Method etc. **CLO 2 :** Solve system of algebraic equations using direct and iterative methods. **CLO 3 :** To write C++ Program to compute roots of algebraic equations using Bisection method,Newton-Raphson method etc. **CLO 4 :** To write C++ Program to compute roots of algebraic equations using Secant method,Gauss Jordan method etc. **CLO 5 :** To write C++ Program to solve the system of algebraic equations using the Jacobianmethod, Gauss Seidal method. **Website and e-Learning Sources: https://nptel.ac.in**

PO/CO	PO1	PO2	PO3	PO4	PO5
CLO1	3	3	2	3	3
CLO2	2	3	3	3	3
CLO3	3	3	3	3	3
CLO4	2	3	3	2	3
CLO5	2	3	3	3	2

COURSE TITLE (**SEMESTER I)**	**STATISTICS WITH EXCEL PROGRAMMING** **SKILL ENCHANCEMENT COURSE SEC-04**
CREDITS	**1**
COURSE OBJECTIVES	To Acquire the knowledge of Statistics with Excel Programming
COURSE OUTCOMES	**CLO 1 :** Handle distribution of data and analyses the characteristics of data using Excel. **CLO 2 :** To find Normal distribution, common distribution shapes, Correlation Coefficient andplot graphs using Excel. **CLO 3 :** Create Time-Series Graphs, Dotplots, Stemplots, Bar Charts, Pie Charts using Excel. **CLO 4 :** Compute Mean and Median using Excel. **CLO 5 :** Compute Mode, Midrange, Weighted Mean using Excel. **Website and e-Learning Sources: https://nptel.ac.in**

<table>
<tr><td>COURSE TITLE
(SEMESTER II)</td><td>MATHEMATICS FOR COMPETITIVE EXAMINATION - III
SKILL ENCHANCEMENT COURSE SEC-05</td></tr>
<tr><td>CREDITS</td><td>2</td></tr>
<tr><td>COURSE OBJECTIVES</td><td>.
• Remembering the concept of Logarithms.
• Understanding the concept of Simple Interest – Compound Interest.
Analyzing the concepts of Stocks and Shares.</td></tr>
<tr><td>COURSE OUTCOMES</td><td>CLO 1 : Explain in detail about Simple Interest and Compound Interest.
CLO 2 : Explain Logarithms and Area.
CLO 3 : Explain Volume & Surface Areas and Races & Games of Skill.
CLO 4 : Explain Calendar and Clocks.
CLO 5 : Explain Stocks & Shares.

Website and e-Learning Sources: https://nptel.ac.in

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<tr><td></td><td></td><td>Pos</td><td></td><td></td><td></td><td></td><td>PSOs</td><td></td><td></td></tr>
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<tr><td>CLO1</td><td>3</td><td>1</td><td>3</td><td>-</td><td>-</td><td>-</td><td>3</td><td>2</td><td>1</td></tr>
<tr><td>CLO2</td><td>2</td><td>1</td><td>3</td><td>1</td><td>-</td><td>-</td><td>3</td><td>2</td><td>1</td></tr>
<tr><td>CLO3</td><td>3</td><td>1</td><td>3</td><td>1</td><td>-</td><td>-</td><td>3</td><td>2</td><td>1</td></tr>
<tr><td>CLO4</td><td>3</td><td>1</td><td>3</td><td>-</td><td>-</td><td>-</td><td>3</td><td>2</td><td>1</td></tr>
<tr><td>CLO5</td><td>3</td><td>1</td><td>3</td><td>-</td><td>-</td><td>-</td><td>3</td><td>2</td><td>1</td></tr>
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COURSE TITLE (**SEMESTER II)**	**MATHEMATICS FOR COMPETITIVE EXAMINATION - IV SKILL ENCHANCEMENT COURSE SEC-06**
CREDITS	**2**
COURSE OBJECTIVES	. • Remembering the Permutation and Combinations. • Understanding the concept of Banker‘s Discount. Analysing the concepts of Odd Man Out and Series.
COURSE OUTCOMES	**CLO 1 :** Explain in detail about Permutation and Combinations. **CLO 2 :** Explain Probability and True Discount. **CLO 3 :** Explain Banker‘s Discount and Heights & Distances. **CLO 4 :** Explain Odd Man Out and Series. **CLO 5 :** Explain Tabulation and Bar Graphs. **Website and e-Learning Sources: https://nptel.ac.in**

		Pos					PSOs		
	1	2	3	4	5	6	1	2	3
CLO1	3	1	3	-	-	-	3	2	1
CLO2	2	1	3	1	-	-	3	2	1
CLO3	3	1	3	1	-	-	3	2	1
CLO4	3	1	3	-	-	-	3	2	1
CLO5	3	1	3	-	-	-	3	2	1

COURSE TITLE (**SEMESTER II)**	**LaTeX-PRACTICAL** **SKILL ENCHANCEMENT COURSE SEC-07**
CREDITS	**2**
COURSE OBJECTIVES	• . To enable the Students to Prepare Research Articles in LaTeX format.
COURSE OUTCOMES	**CLO 1 :** Make different Alignments in a document and an Application for a job **CLO 2 :** Generate Bio-Data and Table Structures. **CLO 3 :** Create Mathematical Statements using LaTeX. **CLO 4 :** Prepare Articles and Inserting Pictures. **CLO 5 :** Prepare Question paper and PowerPoint presentation in LaTeX format. **Website and e-Learning Sources: https://nptel.ac.in**

COURSE TITLE (**SEMESTER II)**	**STATISTICS WITH R PROGRAMMING PROFESSIONAL COMPETENCY SKILL PCS01**
CREDITS	**2**
COURSE OBJECTIVES	• To acquire the practical knowledge of R programming for solving problems in mathematical statistics.
COURSE OUTCOMES	**CLO 1 :** Understand the usage of R Software and able to handle basic data types of R. **CLO 2 :** Create data, find the missing values, converting data types. **CLO 3 :** Apply the control structures, numerical and statistical functions. **CLO 4 :** To import files, able to connect with a data base and handle Pie and Bar Charts. **CLO 5 :** Compute mean, median, mode and skewness using R. **Website and e-Learning Sources: https://nptel.ac.in**

M.Sc., MATHEMATICS
SYLLABUS 2023-2024 ONWARDS

PERIYAR UNIVERSITY
PERIYAR PALKALAI NAGAR
SALEM -636011

Programme	**M.Sc., MATHEMATICS**
Programme Code	
Duration	**PG - 2 years**
Programme Outcomes (Pos)	**PO1: Problem Solving Skill** Apply knowledge of Management theories and Human Resource practices to solve business problems through research in Global context. **PO2: Decision Making Skill** Foster analytical and critical thinking abilities for data-based decision-making.
	PO3: Ethical Value Ability to incorporate quality, ethical and legal value-based perspectives to all organizational activities.
	PO4: Communication Skill Ability to develop communication, managerial and interpersonal skills.
	PO5: Individual and Team Leadership Skill Capability to lead themselves and the team to achieve organizational goals. **PO6: Employability Skill** Inculcate contemporary business practices to enhance employability skills in the competitive environment.
	PO7: Entrepreneurial Skill Equip with skills and competencies to become an entrepreneur.
	PO8: Contribution to Society Succeed in career endeavours and contribute significantly to society.
	PO 9 Multicultural competence Possess knowledge of the values and beliefs of multiple cultures and a global perspective.
	PO 10: Moral and ethical awareness/reasoning Ability to embrace moral/ethical values in conducting one‘s life.

Programme Specific Outcomes (PSOs)	**PSO1 – Placement** To prepare the students who will demonstrate respectful engagement with others‘ ideas, behaviors, beliefs and apply diverse frames of reference to decisions and actions.
	PSO 2 – Entrepreneur To create effective entrepreneurs by enhancing their critical thinking, problem solving, decision making and leadership skill that will facilitate startups and high potential organizations. **PSO3 – Research and Development** Design and implement HR systems and practices grounded in research that comply with employment laws, leading the organization towards growth and development. **PSO4 – Contribution to Business World** To produce employable, ethical and innovative professionals to sustain in the dynamic business world. **PSO 5 – Contribution to the Society** To contribute to the development of the society by collaborating with stakeholders for mutual benefit.

M.Sc., MATHEMATICS

PROGRAMME SPECIFIC OUTCOMES:

PSO1: Acquire good knowledge and understanding, to solve specific theoretical & applied problems in different area of mathematics & statistics.

PSO2: Understand, formulate, develop mathematical arguments, logically and use quantitative models to address issues arising in social sciences, business and other context /fields.

PSO3: To prepare the students who will demonstrate respectful engagement with other's ideas, behaviors, beliefs and apply diverse frames of references to decisions and actions.

To create effective entrepreneurs by enhancing their critical thinking, problem solving, decision making and leadership skill that will facilitate startups and high potential organizations. To encourage practices grounded in research that comply with employment laws, leading the organization towards growth and development.

Mapping of Course Learning Outcomes (CLOs) with Programme Outcomes (POs) and Programme Specific Outcomes (PSOs)can be carried out accordingly, assigning the appropriate level in the grids:

	Pos							PSOs		
	1	2	3	4	5	6	…	1	2	…
CLO1										
CLO2										
CLO3										
CLO4										
CLO5										

LEARNING AND TEACHING ACTIVITIES

Work Load:

The information below is provided as a guide to assist students in engaging appropriately with the course requirements.

Activity	Quantity	Workload periods
Lectures	60	60
Tutorials	15	15
Assignments	5	5
Cycle Test or similar	2	4
Model Test or similar	1	3
University Exam Preparation	1	3
	Total	90 Periods

1. Tutorial Activities

2. Laboratory Activities

3. Field Study Activities

4. Assessment Activities

Assessment Principles:

Assessment for this course is based on the following principles

1. Assessment must encourage and reinforce learning.
2. Assessment must measure achievement of the stated learning objectives.
3. Assessment must enable robust and fair judgments about student performance.
4. Assessment practice must be fair and equitable to students and give them the opportunity to demonstrate what they learned.
5. Assessment must maintain academic standards.

SYLLABUS FOR DIFFERENT COURSES OF M.Sc MATHEMATICS

Title of the Course	**ALGEBRAIC STRUCTURES**
Paper Number	**CORE I**
Cretids	**5**
Core (semester I)	**Year I**
Objectives of the Course	To introduce the concepts and to develop working knowledge on class equation,solvabilityofgroups,finiteabeliangroups,linear transformations, real quadratic forms
Website and e-Learning Source	http://mathforum.org, http://ocw.mit.edu/ocwweb/Mathematics, http://www.opensource.org, www.algebra.com
Course Learning Outcome	**CLO 1:** Recall basic counting principle, define class equations to solve problems, explain Sylow's theorems and apply the theorem to find number of Sylow subgroups **CLO 2:** Define Solvable groups, define direct products, examine the properties of finite abelian groups, define modules **CLO 3:** Define similar Transformations, define invariant subspace, explore the properties of triangular matrix, to find the index of nilpotence to decompose a space into invariant subspaces, to find invariants of linear transformation, to explore the properties of nilpotent transformation relating nilpotence with invariants. **CLO 4:** Define Jordan, canonical form, Jordan blocks, define rational canonical form, define companion matrix of polynomial, find the elementary devices of transformation, apply the concepts to find characteristic polynomial of linear transformation.

CLO 5: Define trace, define transpose of a matrix, explain the properties of trace and transpose, to find trace, to find transpose of matrix, to prove Jacobson lemma using the triangular form, define symmetric matrix, skew symmetric matrix, adjoint, to define Hermitian, unitary, normal transformations and to verify whether the transformation in Hermitian, unitary and normal.

	Pos						PSOs		
	1	2	3	4	5	6	1	2	3
CLO1	3	1	3	2	3	3	3	2	1
CLO2	2	1	3	1	3	3	3	2	1
CLO3	3	2	3	1	3	3	3	2	1
CLO4	1	2	3	2	3	3	3	2	1
CLO5	3	1	2	3	3	3	3	2	1

Title of the Course	**REAL ANALYSIS I**
Paper Number	**CORE II**
Cretids	**5**
Core (semester I)	**Year I**
Objectives of the Course	To work comfortably with functions of bounded variation, Riemann-Stieltjes Integration, convergence of infinite series, infinite product and uniform convergence and its interplay between various limiting operations.
Website and e-Learning Source	http://mathforum.org, http://ocw.mit.edu/ocwweb/Mathematics, http://www.opensource.org, www.algebra.com
Course Learning Outcome	**CLO1:** Analyze and evaluate functions of bounded variation and Rectifiable Curves. **CLO2:** Describe the concept of Riemann-Stieltjes integral and its properties. **CLO3**: Demonstrate the concept of step function, upper function, Lebesgue function and their integrals. **CLO4:** Construct various mathematical proofs using the properties of Lebesgue integrals and establish the Levi monotone convergence theorem. **CLO5:** Formulate the concept and properties of inner products, norms and measurable functions.

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	Pos						PSOs		
	1	2	3	4	5	6	1	2	3
CLO1	3	1	3	2	3	3	3	2	1
CLO2	2	1	3	1	3	3	3	2	1
CLO3	3	2	3	1	3	3	3	2	1
CLO4	1	2	3	2	3	3	3	2	1
CLO5	3	1	2	3	3	3	3	2	1

Title of the Course	**ORDINARY DIFFERENTIAL EQUATIONS**
Paper Number	**CORE III**
Cretids	**4**
Core (semester I)	**Year I**
Objectives of the Course	To develop strong background on finding solutions to linear differential equations with constant and variable coefficients and also with singular points, to study existence and uniqueness of the solutions of first order differential equations
Website and e-Learning Source	http://mathforum.org, http://ocw.mit.edu/ocwweb/Mathematics, http://www.opensource.org, www.algebra.com
Course Learning Outcome	**CLO1:** Establish the qualitative behavior of solutions of systems of differential equations . **CLO2:** Recognize the physical phenomena modeled by differential equations and dynamical systems. **CLO3:** Analyze solutions using appropriate methods and give examples. **CLO4:** Formulate Green's function for boundary value problems. **CLO5:** Understand and use various theoretical ideas and results that underlie the mathematics in this course.

	Pos						PSOs		
	1	2	3	4	5	6	1	2	3
CLO1	3	1	3	2	3	3	3	2	1
CLO2	2	1	3	1	3	3	3	2	1
CLO3	3	2	3	1	3	3	3	2	1
CLO4	1	2	3	2	3	3	3	2	1
CLO5	3	1	2	3	3	3	3	2	1

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Title of the Course	**ADVANCED ALGEBRA**
Paper Number	**CORE IV**
Cretids	**5**
Core (semester I)	**Year I**
Objectives of the Course	To study field extension, roots of polynomials, Galois Theory, finite fields, division rings, solvability by radicals and to develop computational skill in abstract algebra
Website and e-Learning Source	http://mathforum.org, http://ocw.mit.edu/ocwweb/Mathematics, http://www.opensource.org, www.algebra.com
Course Learning Outcome	**CLO1:** Prove theorems applying algebraic ways of thinking. **CLO2:** Connect groups with graphs and understanding about Hamiltonian graphs. **CLO3:** Compose clear and accurate proofs using the concepts of Galois Theory. **CLO4:** Bring out insight into Abstract Algebra with focus on axiomatic theories. **CLO5:** Demonstrate knowledge and understanding of fundamental concepts including extension fields, Algebraic extensions, Finite fields, Class equations and Sylow's theorem.

	Pos						PSOs		
	1	2	3	4	5	6	1	2	3
CLO1	3	1	3	2	3	3	3	2	1
CLO2	2	1	3	1	3	3	3	2	1
CLO3	3	2	3	1	3	3	3	2	1
CLO4	1	2	3	2	3	3	3	2	1
CLO5	3	1	2	3	3	3	3	2	1

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<table>
<tr><td>Title of the Course</td><td>REAL ANALYSIS II</td></tr>
<tr><td>Paper Number</td><td>CORE V</td></tr>
<tr><td>Cretids</td><td>5</td></tr>
<tr><td>Core
(semester I)</td><td>Year I</td></tr>
<tr><td>Objectives of the Course</td><td>To introduce measure on the real line, Lebesgue measurability and integrability, Fourier Series and Integrals, in-depth studyin multivariable calculus.</td></tr>
<tr><td>Website and e-Learning Source</td><td>http://mathforum.org, http://ocw.mit.edu/ocwweb/Mathematics, http://www.opensource.org, www.algebra.com</td></tr>
<tr><td>Course Learning Outcome</td><td>
CLO1: Understand and describe the basic concepts of Fourier series and Fourier integrals with respect to orthogonal system.
CLO2: Analyze the representation and convergence problems of Fourier series.

CLO3: Analyze and evaluate the difference between transforms of various functions.

CLO4: Formulate and evaluate complex contour integrals directly and by the fundamental theorem.
CLO5: Apply the Cauchy integral theorem in its various versions to compute contour integration.
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<tr><td></td><td colspan="6">Pos</td><td colspan="3">PSOs</td></tr>
<tr><td></td><td>1</td><td>2</td><td>3</td><td>4</td><td>5</td><td>6</td><td>1</td><td>2</td><td>3</td></tr>
<tr><td>CLO1</td><td>3</td><td>1</td><td>3</td><td>2</td><td>3</td><td>3</td><td>3</td><td>2</td><td>1</td></tr>
<tr><td>CLO2</td><td>2</td><td>1</td><td>3</td><td>1</td><td>3</td><td>3</td><td>3</td><td>2</td><td>1</td></tr>
<tr><td>CLO3</td><td>3</td><td>2</td><td>3</td><td>1</td><td>3</td><td>3</td><td>3</td><td>2</td><td>1</td></tr>
<tr><td>CLO4</td><td>1</td><td>2</td><td>3</td><td>2</td><td>3</td><td>3</td><td>3</td><td>2</td><td>1</td></tr>
<tr><td>CLO5</td><td>3</td><td>1</td><td>2</td><td>3</td><td>3</td><td>3</td><td>3</td><td>2</td><td>1</td></tr>
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Title of the Course	**PARTIAL DIFFERENTIAL EQUATIONS**
Paper Number	**CORE VI**
Cretids	**4**
Core (semester II)	**Year I**
Objectives of the Course	To classify the second order partial differential equations and to study Cauchy problem, method of separation of variables, boundary value problems.
Website and e-Learning Source	http://mathforum.org, http://ocw.mit.edu/ocwweb/Mathematics, http://www.opensource.org, www.algebra.com
Course Learning Outcome	**CLO1:** To understand and classify second order equations and find general solutions **CLO2:** To analyse and solve wave equations in different polar coordinates **CLO3:** To solve Vibrating string problem, Heat conduction problem, to identify and solve Laplace and beam equations **CLO4:** To apply maximum and minimum principle‘s and solve Dirichlet, Neumann problems for various boundary conditions **CLO5:** To apply Green‘s function and solve Dirichlet, Laplace problems, to apply Helmholtz operation and to solve Higher dimensional problem.

	Pos						PSOs		
	1	2	3	4	5	6	1	2	3
CLO1	3	1	3	2	3	3	3	2	1
CLO2	2	1	3	1	3	3	3	2	1
CLO3	3	2	3	1	3	3	3	2	1
CLO4	1	2	3	2	3	3	3	2	1
CLO5	3	1	2	3	3	3	3	2	1

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Title of the Course	**COMPLEX ANALYSIS**
Paper Number	**CORE VII**
Cretids	**5**
Core (semester III)	**Year II**
Objectives of the Course	To Study Cauchy integral formula, local properties of analytic functions, general form of Cauchy‘s theorem and evaluation of definite integral and harmonic functions.
Website and e-Learning Source	http://mathforum.org, http://ocw.mit.edu/ocwweb/Mathematics, http://www.opensource.org, www.algebra.com
Course Learning Outcome	**CLO1:** Analyze and evaluate local properties of analytical functions and definite integrals. **CLO2:** Describe the concept of definite integral and harmonic functions. **CLO3:** Demonstrate the concept of the general form of Cauchy‘s theorem **CLO4**: Develop Taylor and Laurent series . **CLO5** Explain the infinite products, canonical products and jensen‘s formula . .

	Pos						PSOs		
	1	2	3	4	5	6	1	2	3
CLO1	3	1	3	2	3	3	3	2	1
CLO2	2	1	3	1	3	3	3	2	1
CLO3	3	2	3	1	3	3	3	2	1
CLO4	1	2	3	2	3	3	3	2	1
CLO5	3	1	2	3	3	3	3	2	1

Title of the Course	**PROBABILITY THEORY**
Paper Number	**CORE VIII**
Cretids	**5**
Core (semester III)	**Year II**
Objectives of the Course	To introduce axiomatic approach to probability theory, to study some statistical characteristics, discrete and continuous distribution functions and their properties, characteristic function and basiclimit theorems of probability.
Website and e-Learning Source	http://mathforum.org, http://ocw.mit.edu/ocwweb/Mathematics, http://www.opensource.org, www.algebra.com
Course Learning Outcome	**CLO1:** To define Random Events, Random Variables, to describe Probability, to apply Bayes, to define Distribution Function, to find Joint Distribution function, to find Marginal Distribution and Conditional Distribution function, to solve functions on random variables. **CLO2:** To define Expectation, Moments and Chebyshev Inequality, to solve Regression of the first and second types. **CLO3:** To define Characteristic functions, to define distribution function, to find probability generating functions, to solve problems applying characteristic functions **CLO4:** To define One point, two-point, Binomial distributions, to solve problems of Hypergeometric and Poisson distributions, to define Uniform, normal, gamma, Beta distributions, to solve problems on Cauchy and Laplace distributions . **CLO5:** To discuss Stochastic convergence, Bernaulli law of large numbers, to elaborate Convergence of sequence of distribution functions, to prove Levy-Cramer Theorems and de Moivre-Laplace Theorems, to explain Poisson, Chebyshev, Khintchine Weak law of large numbers, to explain and solve problems on Kolmogorov Inequality and Kolmogorov Strong Law of large numbers.

	Pos						PSOs		
	1	2	3	4	5	6	1	2	3
CLO1	3	1	3	2	3	3	3	2	1
CLO2	2	1	3	1	3	3	3	2	1
CLO3	3	2	3	1	3	3	3	2	1
CLO4	1	2	3	2	3	3	3	2	1
CLO5	3	1	2	3	3	3	3	2	1

Title of the Course	**TOPOLOGY**
Paper Number	**CORE IX**
Cretids	**5**
Core (semester III)	**Year II**
Objectives of the Course	To study topological spaces, continuous functions, connectedness, compactness, countability and separation axioms.
Website and e-Learning Source	http://mathforum.org, http://ocw.mit.edu/ocwweb/Mathematics, http://www.opensource.org, www.algebra.com
Course Learning Outcome	**CLO1:** Define and illustrate the concept of topological spaces and the basic definitions of open sets, neighbourhood, interior, exterior, closure and their axioms for defining topological space. **CLO2**: Understand continuity, compactness, connectedness, homeomorphism and topological properties. **CLO3**: Analyze and apply the topological concepts in Functional Analysis. **CLO4:** Ability to determine that a given point in a topological space is either a limit point or

	not for a given subset of a topological space. **CLO5**: Develop qualitative tools to characterize connectedness, compactness, second countable, Hausdorff and develop tools toidentifywhentwoare equivalent(homeomorphic). .

	Pos						PSOs		
	1	2	3	4	5	6	1	2	3
CLO1	3	1	3	2	3	3	3	2	1
CLO2	2	1	3	1	3	3	3	2	1
CLO3	3	2	3	1	3	3	3	2	1
CLO4	1	2	3	2	3	3	3	2	1
CLO5	3	1	2	3	3	3	3	2	1

Title of the Course	**MACHINE LEARNING [Advancements in industry 4.0]**
Paper Number	**CORE X**
Cretids	**4**
Core (semester III)	**Year II**
Objectives of the Course	**-**
Website and e-Learning Source	http://mathforum.org, http://ocw.mit.edu/ocwweb/Mathematics, http://www.opensource.org, www.algebra.com
Course Learning Outcome	. -

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<tr><td></td><td></td></tr>
<tr><td>Title of the Course</td><td>Functional Analysis</td></tr>
<tr><td>Paper Number</td><td>CORE XI</td></tr>
<tr><td>Cretids</td><td>5</td></tr>
<tr><td>Core
(semester IV)</td><td>Year II</td></tr>
<tr><td>Objectives of the Course</td><td>To provide students with a strong foundation in functional analysis, focusing on spaces, operators and fundamental theorems. To develop student‘s skills and confidence in mathematical analysis and proof techniques.</td></tr>
<tr><td>Website and e-Learning Source</td><td>http://mathforum.org, http://ocw.mit.edu/ocwweb/Mathematics, http://www.opensource.org, www.algebra.com</td></tr>
<tr><td>Course Learning Outcome</td><td>.
CLO1: Understand the Banach spaces and Transformations on Banach Spaces.
CLO2: Prove Hahn Banach theorem and open mapping theorem.
CLO3: Describe operators and fundamental theorems.
CLO4: Validate orthogonal and orthonormal sets.
CLO5: Analyze and establish the regular and singular elements.
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<tr><td></td><td colspan="6">Pos</td><td colspan="3">PSOs</td></tr>
<tr><td></td><td>1</td><td>2</td><td>3</td><td>4</td><td>5</td><td>6</td><td>1</td><td>2</td><td>3</td></tr>
<tr><td>CLO1</td><td>3</td><td>1</td><td>3</td><td>2</td><td>3</td><td>3</td><td>3</td><td>2</td><td>1</td></tr>
<tr><td>CLO2</td><td>2</td><td>1</td><td>3</td><td>1</td><td>3</td><td>3</td><td>3</td><td>2</td><td>1</td></tr>
<tr><td>CLO3</td><td>3</td><td>2</td><td>3</td><td>1</td><td>3</td><td>3</td><td>3</td><td>2</td><td>1</td></tr>
<tr><td>CLO4</td><td>1</td><td>2</td><td>3</td><td>2</td><td>3</td><td>3</td><td>3</td><td>2</td><td>1</td></tr>
<tr><td>CLO5</td><td>3</td><td>1</td><td>2</td><td>3</td><td>3</td><td>3</td><td>3</td><td>2</td><td>1</td></tr>
</table>
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Title of the Course	**DIFFERENTIAL GEOMETRY**
Paper Number	**CORE XII**
Cretids	**5**
Core (semester IV)	**Year II**
Objectives of the Course	This course introduces space curves and their intrinsic properties ofasurface and geodesics. Further the non-intrinsic properties of surface and the differential geometry of surfaces are explored
Website and e-Learning Source	http://mathforum.org, http://ocw.mit.edu/ocwweb/Mathematics, http://www.opensource.org, www.algebra.com
Course Learning Outcome	**CLO1:** Explain space curves, Curves between surfaces, metrics on a surface, fundamental form of a surface and Geodesics. **CLO2**: Evaluate these concepts with related examples. **CLO3:** Compose problems on geodesics. **CLO4:** Recognize applicability of developable. **CLO5**: Construct and analyze the problems on curvature and minimal surfaces

.

	Pos						PSOs		
	1	2	3	4	5	6	1	2	3
CLO1	3	1	3	2	3	3	3	2	1
CLO2	2	1	3	1	3	3	3	2	1
CLO3	3	2	3	1	3	3	3	2	1
CLO4	1	2	3	2	3	3	3	2	1
CLO5	3	1	2	3	3	3	3	2	1

Title of the Course	**PROJECT WITH VIVA VOCE**
Paper Number	**CORE IVX**
Cretids	**7**
Core (semester IV)	**Year II**
Objectives of the Course	-
Website and e-Learning Source	http://mathforum.org, http://ocw.mit.edu/ocwweb/Mathematics, http://www.opensource.org, www.algebra.com
Course Learning Outcome	**-** .