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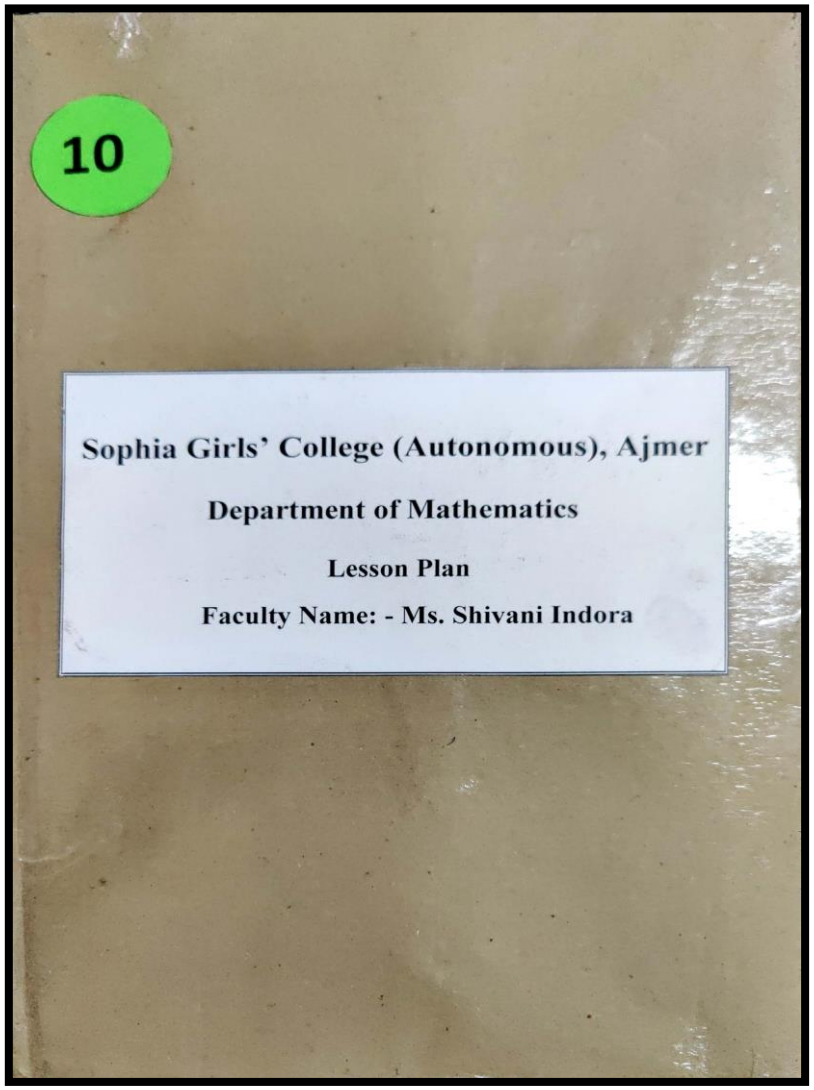

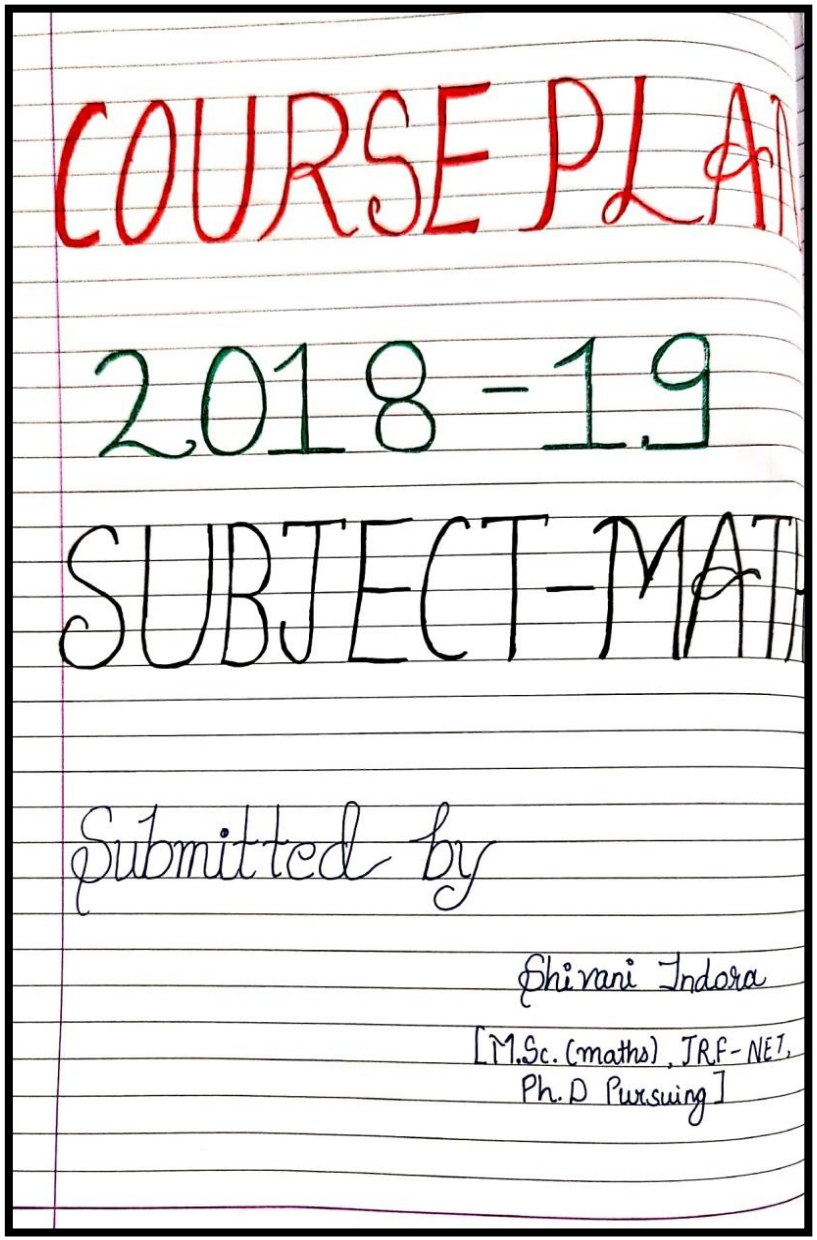
COURSE PLAN
2018-19
SUBJECT-MATH
Submitted by
Shivani Indora
[M.Sc. (maths), JRF-NET,
Ph.D Pursuing]

SOPHIA GIRL'S COLLEGE, AJMER (*AUTONOMOUS*)

B. Sc. I (SEMESTER I) **MATRICES (PAPER I) (MAT-101)**

Max. Marks: 100 (70 External; 30 Internal) Min. Marks: 40 (28 External; 12 Internal) Credit: 04

COURSE PLAN

SEM I Month	UNIT/TOPIC	Concepts/facts	Teaching Pedagogy	Learning Outcomes	Questions	Marks Weightage (%)
JULY	**UNIT I** Matrix, Types of matrix, Elementary operations on matrices, Symmetric and Skew Symmetric matrices, Hermitian and Skew Hermitian matrices, unitary matrix.	Matrix	Lecture method, PPT	Identify types of Matrix, its rank by using Normal form and Echelon form method and nature of vectors.	*Knowledge Based* -What do you mean by row and column matrix? Write the properties of orthogonal matrix ? *Understanding Based* -Show that the characteristic roots of a Skew Hermitian matrix are either zero or imignary. -Apply Cayley - Hamilton theorem to find eigen value of matrix A	Knowledge--60 Understanding-30 Higher Order-10
	Inverse of matrix, Linear Independence of row and column matrices.	Linear combination of vectors	Demonstration through examples, Quiz			
	Row rank, Column rank and Rank of matrix, Equivalence of column and row rank.	Rank of a matrix	Demonstration through examples, Problem solving classs			
AUGUST	**UNIT II** Applications of matrices to	Homogeneous and non-	Group Discussion,			

	solve a system of linear (both homogeneous and non- homogenous) equations, Theorems on consistency of a system of linear equation	Homogeneous system of equation	Demonstration through examples, Quiz	Solve System of Linear Equation by Matrix method, Problems related to Eigen value and Eigen vector.	$A = \begin{bmatrix} 1 & 3 \\ 3 & 1 \end{bmatrix}$ *Higher Order Thinking Skills Based* - Prove that all eigen value of idempotent matrix are zero or one. -Evaluate the roots of given equation by cardoan's method. $X^3 + 4x + 2 = 0$
	Eigen values, Eigen vectors and the Characteristic equation of a matrix, Cayley - Hamilton theorem and its use in finding Inverse of a matrix.	Cayley - Hamilton theorem	Demonstration through examples, Problem solving classs		
SEPTEMBER-OCTOBER	**UNIT III** Relation between roots and coefficients of general polynomial equation in one variable Transformation of equations.	General properties of polynomial equation	Lecture Method, Quiz	Evaluate roots of Cubic equation by Cardon method and Biquadratic equations by Ferrari's method.	
	Descartes' rule of signs, Solution of cubic equation by Cardoan method, Solution of Biquadratic equations by Ferrari's method. **REVISION CLASSES**	Solution of cubic and Biquadratic equation.	Demonstration through examples, Problem solving class		

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B. Sc. I (SEMESTER I) **ALGEBRA (PAPER II) (MAT-102)**

Max. Marks: 100 (70 External; 30 Internal) Min. Marks: 40 (28 External; 12 Internal) Credit: 04

COURSE PLAN

SEM I Month	UNIT/TOPIC	Concepts/facts	Teaching Pedagogy	Learning Outcomes	Questions	Marks Weightage (%)
JULY-AUGUST	**UNIT I** Definition of a group with examples, Order of finite group, General properties of groups, Integral power of an element of a group, Order of an element of a group.	Groups and its properties	Demonstration through examples, Quiz	Explain Groups, general properties of groups and Application of Lagrange's theorem.	*Knowledge Based* -What is a group? - State first theorem on Homomorphism. *Understanding Based* -show that all subgroup of an abelian group are normal. -Differentiate between commutative ring and ring with unity.	Knowledge--60 Understanding-30 Higher Order-10
	Subgroup, Generation of groups. Cyclic group, cosets decomposition, Lagrange's theorem and its consequences.	Subgroups	Lecture method, Problem solving class			
	UNIT II Normal subgroups and Quotient groups,Permutation, permutation group, cyclic permutation, Even and odd	Normal subgroup and its properties ,Permutation group	Lecture method	Analyze Normal subgroups, Quotient group,		

	permutation, The alternating group A_n.			Permutation group and Morphism of group.	*Higher Order Thinking Skills Based* - Prove that the intersection of two ideals is always an ideal - Evaluatre all cosets and generator for G≅{1, -1, i, -i ; x}	
	Morphism of groups, Homomorphism and isomorphism, The fundamental theorem of homomorphism.	Group Morphism	PPT, Lecture method, Problem solving class			
OCTOBER-NOVEMBER	**UNIT III** Ring, ring with unity, zero divisors, integral domain and field and their properties. Characteristic of a ring and integral domain, Subring, subfield, prime field, Ring morphism.	Ring and their Subrings	Demonstration through Examples	Solve problem related to Ring, Ideals, Quotient rings, Integral domains, and Fields.		
	Ideals (Principle, Prime and Maximal) and field of quotients of an Integral Domain. **REVISION CLASSES**	Ideals	PPT, Demonstration through examples.			

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B. Sc. II (SEMESTER III) **LINEAR ALGEBRA (PAPER I) (MAT-301)**

Max. Marks: 100 (70 External; 30 Internal) Min. Marks: 40 (28 External; 12 Internal) Credit: 04

COURSE PLAN

SEM III Month	UNIT/TOPIC	Concepts/facts	Teaching Pedagogy	Learning Outcomes	Questions	Marks Weightage (%)
JULY-AUGUST	**UNIT I** Vector space: Definition and examples of vector space, subspace, sum and direct sum of subspace, linear span, linear dependence, independence and their basic properties.	Vector space	PPT, Demonstration through theorems	Explain the concepts of vector spaces, subspaces, basis, dimension and their properties.	*Knowledge Based* -What is a vector space? - Write the properties of Eigen value ad Eigen vector. *Understanding Based* -Write an example of linear transformation also solve it. -Show that every finitely dimensional vector space have a basis. .	Knowledge--50 Understanding-35 Higher Order-15
	Basis, Finitely generated vector space, Existence theorem for basis of a finitely generated vector space, Invariance of the number of elements of basis set, dimensions, Quotient space and its dimension.	Basis and Dimension of a Vector space	Demonstration through examples and theorems , Problem solving class			

SEPTEMBER-OCTOBER	**UNIT III** Eigen values and Eigen vectors, similar matrices, equivalent matrices, minimal polynomial.	Properties of Eigen value of matrix A	Quiz, Demonstration through examples	Compute Eigen values and Eigen vectors, minimal polynomial, Jordan Canonical of Matrix.	*Higher Order Thinking Skills Based* -State and Prove Sylvester law of nullity. -Evaluate the inverse of matrix A by using Caley Hamilton theorem $A=\begin{bmatrix}1 & 1\\ 1 & 2\end{bmatrix}$	
	Diagonalization of matrices, Jordan blocks and Jordan forms.	Diagonalizable matrix	Demonstration through examples, Problem solving class			
	UNIT II Homomorphism and isomorphism of vector space, theorems on space morphism, Rank and Nullity, Sylvester law of nullity, Algebra of linear transformation.	Homomorphism of Vector space	PPT, Demonstration through examples and theorems	Construct Homomorphism of vector space, matrix related to linear transformation and verify Sylvester law of nullity.		
	Dual spaces, Bidual spaces, Adjoint of a linear transformation, Matrix representation of a linear transformation. **REVISION CLASSES**	Matrix of Linear transformation	Demonstration through examples, Problem solving class			

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B. Sc. II (SEMESTER III) **DIFFERENTIAL EQUATIONS (PAPER II) (MAT-302)**

Max. Marks: 100 (70 External; 30 Internal) Min. Marks: 40 (28 External; 12 Internal) Credit: 04

COURSE PLAN

SEM III Month	UNIT/TOPIC	Concepts/facts	Teaching Pedagogy	Learning Outcomes	Questions	Marks Weightage (%)
JULY	**UNIT I** Concept and formation of a differential equation, Order and degree of a differential equation, Differential equations of first order and first degree, Bernoulle's equation, Exact differential equation, integrating factors.	Differential equations of first order and first degree.	Demonstration through examples, Quiz	Formulate the ordinary the Ordinary differential equation and solve Differential equations of first order and first degree.	*Knowledge Based* -What do you mean by Partial Linear Differential equation? -Define Exact differential equation. *Understanding Based* -Solve : $dy = e^x cosxdx$ -Distinguish between Homogeneous differential equation Non -Homogeneous and differential equation.	Knowledge--50 Understanding-35 Higher Order-15
	First order higher degree equations solving for x, y, p. Lagrange's equation, Clairaut's equation, equation reducible to Clairaut's form, Singular solution.	Differential equations of first order and higher degree.	Demonstration through examples, Problem solving class			

AUGUST-SEPTEMBER	**UNIT III** Partial differential equation: Formation, order and degree, linear and non-linear partial differential equation of first order. Complete solution, singular solution, General solution, solution of Lagrange's linear equations, non-linear partial differential equation of first order: solution by four standard forms. Solution of non-linear differential equation by Charpit's method	Solution of linear and non-linear partial differential equation of first order.	Demonstration through examples, Quiz	Solve non-linear Partial differential equation by Charpit's method, Homogeneous and non-Homogeneous linear partial differential equation with constant coefficients.	*Higher Order Thinking Skills Based* - Solve : $px = qy$ -Formulate differential equation of the following family of curves: $y = ax^2 + by$	
	Homogeneous and non-Homogeneous linear partial differential equation with constant coefficients, Partial differential equation with variable coefficients redu cible to equations with constant coefficients,their complimentary function and particular integrals.	Partial differential equation with constant and variable coefficients	Group discussion, Demonstration through examples, Problem solving class			
OCTOBER-NOVEMBER	**UNIT II** Linear differential equations	Linear differential equations with constant	Demonstration through	Learn various techniques of		

	with constant coefficients: Homogeneous and non-homogeneous linear ordinary differential equation, Geometrical meaning of a differential equation and orthogonal trajectories.	coefficients.	examples, Quiz	getting solutions of linear differential equations with constant coefficients, linear differential equation of second order.		
	Linear differential equation of second order: Reduction to normal form, Method of variations of parameters, Ordinary Simultaneous differential equations. Simultaneous equation of the form d x / P = d y / Q = d z / R. **REVISION CLASSES**	Linear differential equation of second order.	Demonstration through examples, Problem solving class			

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B. Sc. III (SEMESTER V)

METRIC SPACES AND COMPLEX ANALYSIS (PAPER I) (MAT -501)

Max. Marks: 100 (70 External; 30 Internal) Min. Marks: 40 (28 External; 12 Internal) Credit: 04

COURSE PLAN

SEM V Month	UNIT/TOPIC	Concepts/facts	Teaching Pedagogy	Learning Outcomes	Questions	Marks Weightage (%)
JULY	**UNIT I** Definition and examples of a metric space, Diameter of a set, Bounded set, Open sphere, Closed sphere, Open set, Properties of open set .	Metric space and Open set	PPT, Demonstration through examples and theorems	Explain several standard concepts of Metric space and their properties, Open and Closed sets.	*Knowledge Based* -What do you mean by Pseudo metric space? - Write the properties of Closed sphere? *Understanding Based* -Differentiate between interior and exterior point of set. -Explain different types of transformation. *Higher Order*	Knowledge--40 Understanding-35 Higher Order-25
	Interior point and interior of a set, Closed set, Properties of closed set, Limit point of a set, Derived and closure of a set, Boundary point of a set.	Limit Point and Closed set	3-D Models, Quiz, Demonstration through theorems, Problem solving class			
AUGUAT-SEPTEMBER	**UNIT II** Continuity and Differentiability of complex valued function, Analytic function, Necessary	Differentiability of complex valued function	Demonstration through examples, Quiz			

	and Sufficient condition for analytic function, Cauchy – Riemann Equations (Cartesian and Polar form)			Analyze Analyticity of function and Construct analytic function by Milne Thomson method.	*Thinking Skills Based* -Prove that each closed sphere is a closed set . -Determine an open sphere for $S_2(1/4)$ with respect to usual mapping.
	Harmonic function, Conjugate Harmonic function, Construction of an analytic function by Milne Thomson method.	Analytic Functions	Group Discussion, Demonstration through examples, Problem solving class		
SEPTEMBER	**UNIT III** Conformal mapping, Isogonal mapping, Necessary and sufficient conditions for a conformal mapping. Some elementary transformations: Translation, Rotation, Magnification, Inversion.	Conformal mapping	3-D Models, Demonstration through examples	Apply the concepts of the conformal mapping , Bilinear transformation in real life problems.	
	Linear transformation, Bilinear transformation, Properties of Bilinear transformation, Cross ratio, Invariant point of Bilinear transformation. **REVISION CLASSES**	Bilinear transformation	PPT, Demonstration through examples, Problem solving class		

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SOPHIA GIRL'S COLLEGE, AJMER (*AUTONOMOUS*)
B. Sc. III (SEMESTER V)
LINEAR PROGRAMMING (PAPER II) (MAT -502)

Max. Marks: 100 (70 External; 30 Internal)

Min. Marks: 40 (28 External; 12 Internal)

Credit: 04

COURSE PLAN

SEM V Month	UNIT/TOPIC	Concepts/facts	Teaching Pedagogy	Learning Outcomes	Questions	Marks Weightage (%)
JULY	**UNIT I** Linear programming problem: Definition of Linear programming problem, Formulation and Solution of Linear programming problem, Feasible solution.	Graphical approach to solve LPP	PPT, Demonstration through examples	Explain several standard concepts of Metric space and their properties, Open and Closed sets.	*Knowledge Based* -Write the mathematical model for an LPP? -When degeneracy arises in LPP. *Understanding Based* -Differentiate between Simplex method and two phase method. -Find Dual of the LPP. Max $z = x + y$ $x+6y = 2$ $8x+9y = 6$ $x, y \geq 0$	Knowledge--40 Understanding-35 Higher Order-25
	Basic Feasible solution, Optimal solution, Convex set and their properties, Hyperplane, Basic solutions and properties.	Convex set and its properties	Group discussion, Demonstration through examples, Problem Solving class			
AUGUST	**UNIT II** Theory of Simplex method, Fundamental Theorem of	Simplex method to solve LPP	Demonstration through examples			

	Linear Programming (Statement only), The Simplex algorithm, Simplex method in tableau format.			Analyze Analyticity of function and Construct analytic function by Milne Thomson method.	*Higher Order Thinking Skills Based* -prove that every hyperplane is a convex set. -Maximize the LPP Min z = 2x +y 2x+y = 0 7x +3y = 4 $x, y \geq 0$
	introduction to artificial variables, case of unbounded solutions, Big- M method, Two phase method, Degeneracy in linear programming problem.	Degeneracy in linear programming problem	Demonstration through examples, Group discussion, Problem solving class		
OCTOBER-NOVEMBER	**UNIT III** Duality in Linear programming problem: Formulation of the dual problem, Primal-Dual relationships, Symmetric and Un-symmetric dual problem with restriction in sign, Theorems related to dual problem.	Primal-Dual relationships	Demonstration through examples, Quiz	Apply the concepts of the conformal mapping , Bilinear transformatio n in real life problems.	
	Revised Simplex method (standard form I and II).	Revised Simplex method	Demonstration through examples, Problem solving class		
	REVISION CLASSES				

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B. Sc. I (SEMESTER II)

Vector calculus and Geometry (PAPER I) (MAT-201)

Max. Marks: 100 (70 External; 30 Internal)

Min. Marks: 40 (28 External; 12 Internal)

Credit: 04

COURSE PLAN

SEM II Month	UNIT/TOPIC	Concepts/facts	Teaching Pedagogy	Learning Outcomes	Questions	Marks Weightage (%)
JANUARY-FEBRUARY	**UNIT I** Vector differentiation, Gradient, Divergence and Curl, Identities involving these operators and related problems.	Vector differentiation	Lecture method, PPT, Quiz	Evaluate vector Differentiation , gradient, divergence, curl, line integral and surface integral.	*Knowledge Based* - Define Curl of vector point function. - Find: $\int f(t)dt$ where $f(t) = ti + 2t^3j$ *Understanding Based* - find the value of grad f at the point (1,-2,-1) If $f(x,y,z) = 3x^2z - y$ -Show that the cones	Knowledge--60 Understanding-30 Higher Order-10
	Vector integration, Line and surface integral, Theorem of Gauss, Green's and Stoke's.	Vector integration	Demonstration through examples, problem solving class, Test			
	UNIT II General equation of second	Tracing of Ellipse, Parabola and Hyperbola.	Demonstration through examples, Quiz,			

	degree, Tracing of conics, centre of a conic, coordinates of the centre Equation of the conic referred to centre as origin, Asymptotes of a conic, Length and position of axes of a standard conic, Tracing of Ellipse, Parabola and Hyperbola.		PPT	Design different types of conic like Ellipse, Parabola and Hyperbola in Cartesian coordinate.	ax by cz 0 and x'/a y/b z/c 0 are reciprocal to each other. *Higher Order Thinking Skills Based* - Evaluate the equations of the axes of the conic: $8x^2 + 4xy + 5y^2 = 24(x + y)$ - prove that: If $\vec{r} = xi + yj + zk$ and $r = \lvert\vec{r}\rvert$ then $div\left[\frac{f(r)}{r}\vec{r}\right] = \frac{1}{r^2}\frac{d}{dr}[r^2 f(r)]$
	The Polar equation of Conic: polar equation of a straight line, circle and conic chord, Auxiliary circle, Tracing of conic l/r = 1+ecosθ.	Tracing of conic l/r = 1+ecosθ.	Demonstration through examples, Problem solving class, Test		
MARCH - APRIL	**UNIT III** Sphere, Plane section of a sphere, tangent line and	Properties of Sphere	Lecture Method, Quiz, PPT	Solve Problem related to 3-Dimensional figure like	

	tangent plane of sphere.			Sphere, Cone and Cylinder.		
	Cone, Enveloping cone, Tangent plane of cone, Reciprocal cone.	Properties of Cone	Demonstration through examples, Problem solving class, PPT			
	Cylinder, Right circular cylinder, enveloping cylinder. **Revision Class**	Properties of Cylinder	Demonstration through examples, Problem solving class			

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B. Sc. I (SEMESTER II)

Calculus (PAPER II) (MAT-202)

Max. Marks: 100 (70 External: 30 Internal)

Min. Marks: 40 (28 External; 12 Internal)

Credit: 04

COURSE PLAN

SEM II Month	UNIT/TOPIC	Concepts/facts	Teaching Pedagogy	Learning Outcomes	Questions	Marks Weightage (%)
DECEMBER -JANUARY	**UNIT II** Partial Differentiation, Change of variables, Euler's theorem on homogeneous functions, Differentiation of implicit functions, Jacobians	Partial Differentiation	Demonstration through examples, Quiz	Evaluate Maxima, Minima and saddle points of function of two variables.	*Knowledge Based* - Find value of $\Gamma\left(-\frac{5}{2}\right)$ - Define curvature. *Understanding Based* -List four properties of beta function. .Evaluate $\int_0^1 \int_0^3 (x^2)\,dx\,dy$	Knowledge--60 Understanding-30 Higher Order-10
	Envelopes, Evolutes, Maxima, Minima and saddle points of function of two variables.	Envelopes and Nature of point.	Lecture method, Problem solving class			
	UNIT III Beta and Gamma function, Double integral, change of order of integration.	Deal with the property of beta function, gamma function and double integral	Lecture method, Group Discussion	Solve Problem related to beta function, Gamma function, Double		

	integral and Liouville's extension of dirichlet's integral (statement only)		Problem solving class. Test	Triple integral.	*Thinking Skills Based* - Evaluate: $\int_0^a \int_0^{\sqrt{a^2-x^2}} xy\,dx\,dy$ - Prove Euler's theorem on homogeneous function.
MARCH - APRIL	**UNIT I** Derivative of length of an arc, Asymptotes in Cartesian coordinates, intersection of curve and its asymptote, Curvature, radius of curvature for (Cartesian, polar, parametric and pedal curves) Curvature, centre of curvature, chord of curvature.	Asymptote in Cartesian coordinate and curvature	Demonstration through Examples. Group discussion	Sketch curves in Cartesian and polar coordinate systems.	
	Tests for concavity and convexity, test for point of inflexion, singular points, curve tracing(in Cartesian and polar co-ordinates). **Revision Class**	Curve tracing in Cartesian and polar coordinate.	PPT, Demonstration through Examples		

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B. Sc. II (SEMESTER IV)

Real Analysis (PAPER I) (MAT-401)

Max. Marks: 100 (70 External; 30 Internal)

Min. Marks: 40 (28 External; 12 Internal)

Credit: 04

COURSE PLAN

SEM IV Month	UNIT/TOPIC	Concepts/facts	Teaching Pedagogy	Learning Outcomes	Questions	Marks Weightage (%)
DECEMBER – JANUARY	**UNIT I** Real number system as a complete ordered field: Field and its properties, ordered field, lower bound, upper bound, supremum and infimum of sets, the completeness property of Real number system, the Archimedean property.	properties of the Real number system	PPT, Demonstration through theorems and examples.	Explain properties of the Real number $\mathbb{R}$ and nature of Real Sequences.	*Knowledge Based* - Define Convergent Sequence. - Differentiate between Oscillating and Divergent series. *Understanding Based* -List four properties of fields	Knowledge--50 Understanding-35 Higher Order-15
	Definition of sequence theorems on limits of sequences, bounded and monotonic sequences, Cauchy's convergence	Convergence criteria of sequence.	Demonstration through examples and theorems , Problem solving class		-Show that the sequence	

	criterion.				$< x_n$, where $x_n = \frac{2n-7}{3n+2}$
	UNIT II Infinite series of non-negative terms, different tests of convergence of infinite series comparison test, ratio test, Logarithmic, Morgen and Bertrand test (without proof).	Nature of infinite series	Demonstration through examples. Group Discussion	Apply the ratio, Leibnitz', Cauchy n^{th} root test for Convergence of an Infinite series of Real number.	Monotonically increasing and Bounded *Higher Order Thinking Skills Based* -Prove that every bounded function need not to be R-integrable. -Evaluate $\lim_{n\to\infty}\left(1+\frac{1}{n}\right)^n$ And $\lim_{(x,y)\to(0,0)}\frac{xy}{x^2+y^2}$
	Alternating series, Leibnitz' theorem Absolute and conditional convergence, Pointwise convergence of sequence of functions, Uniform convergence	Nature of alternating series, Uniform convergence	Demonstration through examples, Problem solving class, Test		
MARCH - APRIL	**UNIT III** Limit, continuity, differentiability of two variable functions.	Limit, continuity, differentiability test.	PPT, Lecture method	Test Continuity and Differentiability of two variable function and the application of mean value Theorem.	
	Mean value theorems: Rolle's Theorem, Lagrange's mean value theorem, Cauchy's mean	Mean value theorems and , Riemann integral	Demonstration through		

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	Value theorem, Riemann integral, Fundamental theorem of integral calculus. Revision Class		examples, Problem solving class, Test		

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B. Sc. II (SEMESTER IV)

Mechanics (PAPER II) (MAT-402)

Max. Marks: 100 (70 External, 30 Internal)

Min. Marks: 40 (28 External; 12 Internal)

Credit: 04

COURSE PLAN

SEM IV Month	UNIT/TOPIC	Concepts/facts	Teaching Pedagogy	Learning Outcomes	Questions	Marks Weightage (%)
JANUARY-FEBRUARY	UNIT II Kinematics and Kinetics Rectilinear motion, Velocity and acceleration along radial, transverse, tangential and normal directions, Simple harmonic motion.	Kinematics and Rectilinear motion	Lecture method, PPT, Group Discussion	Deal with the Kinematics and Kinetics of the rectilinear motions of a particle, Problem related to horizontal and vertical elastic string.	*Knowledge Based* -What do you mean by Normal velocity and Normal acceleration? -State Hook's law. *Understanding Based* -Find velocity, acceleration and path If the position of a moving point at time t is given by $x = a\cos t$; $y = a\sin t$	Knowledge--50 Understanding-35 Higher Order-15
	Rectilinear motion in resisting medium, Hook's law and related problems.	resisting medium and string related problems.	Demonstration through examples, Problem solving class			

	UNIT III Constrained motion in vertical and horizontal circles, central orbit, inverse square law (Planetary motion), Impact (Direct and Oblique).	Constrained motion and Direct and Oblique impact	Demonstration through examples. Group discussion. Problem solving class	Learn that a particle moving under a central force describes a plane curve and know the Kepler's laws of the planetary motions.	- Show that if a sphere impinges directly on an equal sphere at rest and its coefficient of restitution be e then their velocities after impact are as (1- e): (1+ e). *Higher Order Thinking Skills Based* - Formulate the intrinsic, Cartesian and Parametric equation of common catenary. -Evaluate the force towards the pole when a particle describe the curve $r = a\sin\theta$
MARCH-APRIL	**UNIT I** General Conditions of equilibrium of coplanar forces: Reduction of coplanar forces into a force with couple, Equilibrium of a rigid body under three forces, Equilibrium of rigid body under more than three forces.	equilibrium of coplanar forces	Lecture method, Group Activity	Explain necessary conditions for the equilibrium of Coplanar Forces and Application of Friction.	

	Friction, Common Catenary. Revision Class	Friction and Catenary problem	Demonstration through examples, Problem solving class			

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B. Sc. III (SEMESTER VI)

Statistics (PAPER I) (MAT -601)

Max. Marks: 100 (70 External: 30 Internal) Min. Marks: 40 (28 External: 12 Internal) Credit: 04

COURSE PLAN

SEM VI Month	UNIT/TOPIC	Concepts/facts	Teaching Pedagogy	Learning Outcomes	Questions	Marks Weightage (%)
DECEMBER - JANUARY	**UNIT I** Random experiment, Sample space, Definition of Probability, Conditional probability, Addition theorem of probability, Multiplication theorem of compound probability, Baye's theorem.	Probability	Demonstration through examples and theorems, Quiz	Apply several concepts of Probability, Application of Baye's theorem, Regression and Correlation Coefficient for solving real life situation.	*Knowledge Based* -What do you mean by mutually exclusive event and independent event? -Differentiate between Binomial, and Poisson distribution . *Understanding Based* -List ten properties of Normal Distribution. -Show that $E(X+Y) = E(X)$	Knowledge--40 Understanding-35 Higher Order-25
	Random variate, Probability distribution, Mathematical expectation, Moment, Mathematical expectation of the Sum and product of two random variate, Covariance, Curve fitting, Regression and Correlation Coefficient.	Mathematical expectation, Regression and Correlation Coefficient.	Lecture method, Problem solving class			

	UNIT II Moment Generating Functions, Theorems on moment generating function, Cumulants, Properties of Cumulants, Characteristic function.	Moment Generating Functions and Cumulants.	Demonstration through examples. Quiz	Explain Discrete probability distributions like Binomial and Poisson distribution.	E(Y) *Higher Order Thinking Skills Based* -Prove Baye's Theorem. -Evaluate mean and median of Normal Distribution.
	Discrete probability distributions: Binomial, Poisson distribution and their Mean, Variance, Moment, Recurrence relation, Moment generating function.	Binomial and Poisson distribution	Group Discussion, Demonstration through examples, Problem solving class		
MARCH-APRIL	**UNIT III** Continuous probability distribution: Rectangular distribution, Normal distribution, derivation of normal distribution from binomial distribution, Mean, Variance, Moment, Recurrence relation, Moment generating function, Additive property of normal distribution, Problems related to area property of normal	Normal distribution	Demonstration through examples, PPT, Problem solving class, Test	Solve Problems related to Rectangular Distribution and area property of normal distribution.	

	distribution. **Revision Class**					

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Department of Mathematics
Sophia Girls' College
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B. Sc. III (SEMESTER VI)

NUMERICAL ANALYSIS (PAPER II) (MAT -602)

Max. Marks: 100 (70 External: 30 Internal) Min. Marks: 40 (28 External: 12 Internal) Credit: 04

COURSE PLAN

SEM VI Month	UNIT/TOPIC	Concepts/facts	Teaching Pedagogy	Learning Outcomes	Questions	Marks Weightage (%)
JANUARY - FEBRUARY	**UNIT I** Numerical operators, Properties of operators, Fundamental theorem of difference calculus, Factorial function.	Properties of Numerical operators	PPT, Demonstration through examples	Learn about various Numerical operators, interpolating and extrapolating methods.	*Knowledge Based* -What do you mean by Forward and Backward operators? -Define Interpolation and Extrapolation. *Understanding Based* - Evaluate $\nabla(x^2 + 2x)$ - Show that $\Delta - \nabla = \Delta\nabla$	Knowledge--40 Understanding-35 Higher Order-25
	Interpolation with equal intervals: Newton's forward and Newton's backward interpolation formula.	Interpolation with equal intervals	Group discussion, Demonstration through examples, Problem Solving class			

	UNIT II Divided differences and their properties, Newton's formula for unequal intervals, Lagrange's formula, Central difference, Gauss forward and backward formula, Stirling interpolation formula Bessel formula.	Interpolation with unequal intervals	Demonstration through examples. PPT	Solve question related to unequal intervals by using Newton's formula, Lagrange's formula.	*Higher Order Thinking Skills Based* - Prove that: $\delta^{n}y_{x} = \Delta^{n}y_{x-\frac{n}{2}}$ And $\delta^{2}(y_0) = y_1 - 2y_0 + y_{-1}$ -Prove that $\int_0^1 \frac{dx}{1+x} = log2$
	Numerical Differentation: Derivative from interpolation formulae, approximate expressions for the derivatives of a function.	Numerical Differentation	Demonstration through examples, Group discussion, Problem solving class, PPT		
MARCH-APRIL	UNIT III Numerical Integration: General quadrature formula for equidistant ordinates, Trapezoidal, Simpson's one-third, three-eighth rule, Weddle's rule, Gauss' Quadrature formula, Euler –	Numerical Integration	Lecture method, PPT	Evaluate Numerical Integration by General quadrature formula,Trapezoidal, Simpson's one- third,	

	McLaurin's summation formula			three-eighth rule.		
	Solution of algebraic and transcendental equation, Newton Rapson method and Regular Falsi method. **Revision Class**	Solution of algebraic and transcendental equation	Demonstration through examples, Problem solving class, PPT			

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