COLLEGE: MBP GOVT. P.G. COLLEGE, ASHIANA, LUCKNOW

ACADEMIC CALENDAR : SESSION- (2024-2025)

NAME OF TEACHER: DR. POONAM BAJPAI
DEPARTMENT: DEPARTMENT OF **MATHEMATICS**
CLASS: **BSC (NEP)-I** YEAR (**I SEMESTER**) (APPLICABLE FROM JULY 2024)

S.NO.	CLASS (YEAR, SEMESTER)	PAPER	UNIT	TOPIC NAME	MONTHLY / WEEKLY PLAN	TEACHING PEDAGOGY	LEARNING OUTCOMES	ANY OTHER DETAIL
01	02	03	04	05	06	07	08	09
1	BSC (NEP) – I YEAR, I SEMESTER CREDITS-4 T:04	P-1 (MAJOR) DIFFERENTIAL CALCULUS	**Course Outcomes:** 1. Know the concepts of calculus, namely, limits, continuity, differentiability of functions of one and two variables and their applications in the form of mean value theorem and Taylor's theorem. 2. Sketch curves in a plane using its mathematical properties in the different coordinate systems of reference. 3. Apply derivatives in Optimization, Social sciences, Physics and Life sciences etc. 4. Get knowledge of curvature, asymptotes, envelopes and evolutes.					
			UNIT-I	Limit, continuity and differentiability of function of single variable, Cauchy's definition, Heine's definition, Uniform continuity, Borel's theorem, boundedness theorem, Bolzano's theorem, Intermediate value theorem, extreme value theorem, Darboux's intermediate value theorem for derivatives, Chain rule, indeterminate forms.	MIN. 09 LECTURES	OFFLINE TEACHING METHOD (NOTES IN FORM OF PDF,AUDIO/ VIDEO,CLASS ROOM TEACHING METHOD)	STUDENTS WILL GET THE UNDERSTANDING OF THE TOPIC DISCUSSED.	EVALUATION THROUGH MONTHLY MOCK TESTS AND ASSIGNMENTS AND DISCUSSIONS THROUGH WHICH WE ASSESS AND EVALUATE THE PERFORMANCE
			UNIT-II	Rolle's theorem, Lagrange and Cauchy Mean value theorems, mean value theorems of higher order, Taylor's theorem with various forms of remainders,	MIN 09 LECTURES	OFFLINE TEACHING METHOD (NOTES IN FORM OF PDF,AUDIO/ VIDEO,CLASS ROOM TEACHING METHOD)	STUDENTS WILL GET THE UNDERSTANDING OF THE TOPIC DISCUSSED.	EVALUATION THROUGH MONTHLY MOCK TESTS AND ASSIGNMENTS AND DISCUSSIONS THROUGH WHICH

				Successive differentiation, Leibnitz theorem, Maclaurin's and Taylor's series, Limit and Continuity of functions of two variables, Differentiation of function of two variables, Necessary and sufficient condition for differentiability of functions two variables.				WE ASSESS AND EVALUATE THE PERFORMANCE
			UNIT-III	Partial differentiation, Euler's theorem on homogeneous function, Schwarz's and Young theorem, Taylor's theorem for functions of two variables with examples, Maxima and minima for functions of two variables, Lagrange multiplier method, Jacobians, Inverse function theorem and implicit function theorem.	MIN 09 LECTURES	OFFLINE TEACHING METHOD (NOTES IN FORM OF PDF,AUDIO/ VIDEO,CLASS ROOM TEACHING METHOD)	STUDENTS WILL GET THE UNDERSTANDING OF THE TOPIC DISCUSSED.	EVALUATION THROUGH MONTHLY MOCK TESTS AND ASSIGNMENTS AND DISCUSSIONS THROUGH WHICH WE ASSESS AND EVALUATE THE PERFORMANCE
			UNIT-IV	Tangents and normals, Asymptotes, Curvature, Envelops and evolutes, Tests for concavity and convexity, Points of inflexion, Multiple points, Parametric representation of curves and tracing of parametric curves, Tracing of curves in Cartesian and Polar forms.	MIN 09 LECTURES	OFFLINE TEACHING METHOD (NOTES IN FORM OF PDF,AUDIO/ VIDEO,CLASS ROOM TEACHING METHOD)	STUDENTS WILL GET THE UNDERSTANDING OF THE TOPIC DISCUSSED.	EVALUATION THROUGH MONTHLY MOCK TESTS AND ASSIGNMENTS AND DISCUSSIONS THROUGH WHICH WE ASSESS AND EVALUATE THE PERFORMANCE
			References: **Text Books:** 1. T.M. Apostol, Calculus Vol. I, John Wiley & Sons Inc. 2. S. Balachandra Rao, C. K. Shantha, Differential Calculus, New Age Publication. **Suggested Reading:** 3. H. Anton, I. Birens and S. Davis, Calculus, John Wiley and Sons, Inc.,2002. 4. G.B. Thomas and R.L. Finney, Calculus, Pearson Education, 2007.					**FINAL EVALUATION THROUGH INTERNAL ASSESMENT UPLODED ON LU EXAM PORTAL**

			Web References: 1.Digital platforms web links: NPTEL/SWAYAM/ MOOCS/Openstax.org https://openlearninglibrary.mit/edu/courses http://heecontent.upsdc.gov.in/SearchContent.aspx https://www.lkouniv.ac.in/en/article/e-content-faculty-of-science					
2	**BSC (NEP) – I YEAR, I SEMESTER CREDITS-4 T:04**	**P-2 (MAJOR) MATRICES & ALGEBRA**	**Course Outcomes:** 1. Find the rank and eigen values of matrices. 2. Study the system of linear homogeneous and non-homogeneous equations. 3. Recognize the mathematical objects that are groups, and classify them as abelian, cyclic and permutation groups, etc. 4. Link the fundamental concepts of Groups and symmetrical figures. 5. Analyze the subgroups of cyclic groups. 6. Explain the significance of the notion of cosets, normal subgroups, and factor group. 7. Understand the concepts of rings, subrings and fields.					
			UNIT-1	Elementary operations on matrices, Rank of a matrix, Echelon and normal form of a matrix, Inverse of a matrix by elementary operations, System of linear homogeneous and non-homogeneous equations, Theorems on consistency of a system of linear equations. Eigen values, Eigen vectors and characteristic equation of a matrix, Cayley-Hamilton theorem and its use in finding inverse of a matrix.	MIN 09 LECTURES	OFFLINE TEACHING METHOD (NOTES IN FORM OF PDF,AUDIO/ VIDEO,CLASS ROOM TEACHING METHOD)	STUDENTS WILL GET THE UNDERSTANDING OF THE TOPIC DISCUSSED.	EVALUATION THROUGH MONTHLY MOCK TESTS AND ASSIGNMENTS AND DISCUSSIONS THROUGH WHICH WE ASSESS AND EVALUATE THE PERFORMANCE
			UNIT-II	Equivalence relations and partitions, Congruence modulo n, Definition of a group with examples and simple properties, Subgroups, Generators of a group, Cyclic groups, Coset decomposition, Lagrange's theorem and its consequences, Fermat and Euler theorems.	MIN 09 LECTURES	OFFLINE TEACHING METHOD (NOTES IN FORM OF PDF,AUDIO/ VIDEO,CLASS ROOM TEACHING METHOD)	STUDENTS WILL GET THE UNDERSTANDING OF THE TOPIC DISCUSSED.	EVALUATION THROUGH MONTHLY MOCK TESTS AND ASSIGNMENTS AND DISCUSSIONS THROUGH WHICH WE ASSESS AND EVALUATE THE PERFORMANCE

				Normal subgroups, Quotient groups.				
			UNIT-III	Homomorphism and isomorphism, Fundamental theorem of homomorphism, Theorems on isomorphism, Permutation groups, Even and odd permutations, The alternating group, Cayley's theorem, Direct products.	MIN 09 LECTURES	OFFLINE TEACHING METHOD (NOTES IN FORM OF PDF,AUDIO/ VIDEO,CLASS ROOM TEACHING METHOD)	STUDENTS WILL GET THE UNDERSTANDING OF THE TOPIC DISCUSSED.	EVALUATION THROUGH MONTHLY MOCK TESTS AND ASSIGNMENTS AND DISCUSSIONS THROUGH WHICH WE ASSESS AND EVALUATE THE PERFORMANCE
			UNIT-IV	Rings, types of rings (commutative rings, rings with unity, division rings, Integral domains and fields) with examples, basic properties, sub-rings, Characteristic of a ring, Ideals and quotient rings, Ring homomorphism, Isomorphism theorems, Field of quotient of an integral domain, polynomial rings.	MIN 09 LECTURES	OFFLINE TEACHING METHOD (NOTES IN FORM OF PDF,AUDIO/ VIDEO,CLASS ROOM TEACHING METHOD)	STUDENTS WILL GET THE UNDERSTANDING OF THE TOPIC DISCUSSED.	EVALUATION THROUGH MONTHLY MOCK TESTS AND ASSIGNMENTS AND DISCUSSIONS THROUGH WHICH WE ASSESS AND EVALUATE THE PERFORMANCE
			References: **Text Books:** 1. Linear Algebra by K. Hoffman and R. Kunze. 2. V. Sahai and V. Bist, Algebra, Narosa **Suggested Readings:** 3. J.B. Fraleigh, A First Course in Abstract Algebra, Pearson 4. I.N. Herstein, Topics in Algebra, John Wiley & Sons **Web References:** Digital platforms web links: NPTEL/SWAYAM/ MOOCS/Openstax.org https://openlearninglibrary.mit/edu/courses http://heecontent.upsdc.gov.in/SearchContent.aspx https://www.lkouniv.ac.in/en/article/e-content-faculty-of-science						**FINAL EVALUATION THROUGH INTERNAL ASSESMENT UPLODED ON LU EXAM PORTAL**

3	**BSC (NEP) – I YEAR, I SEMESTER CREDITS-4 T:04**	**P-1 (MINOR) APPLICABLE MATHEMATICS– I**	**Course Outcomes:** 1. To compute the rank of a matrix and its applications in finding solutionsof system of equations, computing Eigen values and Eigen vectors and their applications. 2. To Know the concepts of calculus, namely, limits, continuity,differentiability of functions and their applications in the form of mean value theorem and Taylor's theorem. 3. To understand the concept of double and triple integration and their applications in finding length surfaces and volumes etc. 4. To understand the concepts of vector calculus.					
			UNIT-I	Types of matrices, elementary operations on matrices, rank of a matrix, echelon and normal forms of a matrix, inverse of a matrix by elementary operations, systems of linear homogeneous and non - homogeneous equations, consistency of linear system of equations, eigenvalues, eigenvectors and characteristic equation of a square matrix, Cayley - Hamilton theorem and its application in finding the inverse of a matrix.	MIN 09 LECTURES	OFFLINE TEACHING METHOD (NOTES IN FORM OF PDF,AUDIO/ VIDEO,CLASS ROOM TEACHING METHOD)	STUDENTS WILL GET THE UNDERSTANDING OF THE TOPIC DISCUSSED.	EVALUATION THROUGH MONTHLY MOCK TESTS AND ASSIGNMENTS AND DISCUSSIONS THROUGH WHICH WE ASSESS AND EVALUATE THE PERFORMANCE
			UNIT-II	Limit, continuity and differentiability of functions of single variable, successive differentiation, Leibnitz's theorem, Rolle's theorem, Lagrange's and Cauchy's mean value theorems, Taylor's and Maclaurins's series with various forms of remainders.	MIN 09 LECTURES	OFFLINE TEACHING METHOD (NOTES IN FORM OF PDF,AUDIO/ VIDEO,CLASS ROOM TEACHING METHOD)	STUDENTS WILL GET THE UNDERSTANDING OF THE TOPIC DISCUSSED.	EVALUATION THROUGH MONTHLY MOCK TESTS AND ASSIGNMENTS AND DISCUSSIONS THROUGH WHICH WE ASSESS AND

								EVALUATE THE PERFORMANCE
			UNIT-III	Limit, continuity and differentiability of functions of two variables, partial derivatives, Euler's theorem for homogeneous functions, total derivative, Taylor's and Maclaurins's theorem for functions of two variables, extrema of functions of two variables, Lagrange's method of unknown multipliers, Jacobian.	MIN 09 LECTURES	OFFLINE TEACHING METHOD (NOTES IN FORM OF PDF,AUDIO/ VIDEO,CLASS ROOM TEACHING METHOD)	STUDENTS WILL GET THE UNDERSTANDING OF THE TOPIC DISCUSSED.	EVALUATION THROUGH MONTHLY MOCK TESTS AND ASSIGNMENTS AND DISCUSSIONS THROUGH WHICH WE ASSESS AND EVALUATE THE PERFORMANCE
			UNIT-IV	Double and triple integration, change of order of integration, application of integration to length, surface and volumes (only Cartesian coordinates), beta, gamma and Dirichlet’s integral – basic properties with applications, vector differentiation, gradient, divergence and curl with their physical interpretations, tangent and normal on a surface, directional derivative, line, surface and volume integrals, applications of	MIN 09 LECTURES	OFFLINE TEACHING METHOD (NOTES IN FORM OF PDF,AUDIO/ VIDEO,CLASS ROOM TEACHING METHOD)	STUDENTS WILL GET THE UNDERSTANDING OF THE TOPIC DISCUSSED.	EVALUATION THROUGH MONTHLY MOCK TESTS AND ASSIGNMENTS AND DISCUSSIONS THROUGH WHICH WE ASSESS AND EVALUATE THE PERFORMANCE

				Green's, Stoke's and Gauss' divergence theorems (without proofs).				
			References: **Textbooks** 1. Linear Algebra by K. Hoffman and R. Kunze. 2. Calculus, Volumes I & II by T. M. Apostol. 3. Mathematical Analysis by S.C. Malik and S. Arora, New Age International Limited, New Delhi. **Suggested Books** 1. R. R. Goldberg : Methods of Real Analysis, Oxford & IBH Pub. Co. Pvt. Ltd. 2. R. G. Bartle, The Elements of Real Analysis, Wiley International Edition.				**FINAL EVALUATION THROUGH INTERNAL ASSESMENT UPLODED ON LU EXAM PORTAL**

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ACADEMIC CALENDAR : SESSION- (2024-2025)

NAME OF TEACHER: DR. POONAM BAJPAI

DEPARTMENT: DEPARTMENT OF **MATHEMATICS**

CLASS: BSC (NEP)-I YEAR (**II SEMESTER**) (APPLICABLE FROM JANUARY 2025)

S.NO.	CLASS (YEAR, SEMESTER)	PAPER	UNIT	TOPIC NAME	MONTHLY/WEEKLY PLAN	TEACHING PEDAGOGY	LEARNING OUTCOMES	ANY OTHER DETAIL
01	02	03	04	05	06	07	08	09
1	**BSC (NEP) – I YEAR, I I SEMESTER CREDITS-4 T:04**	**P-3 (MAJOR) INTEGRAL CALCULUS**	**Course Outcomes:** 1. Some of the families and properties of Riemann integrable functions, and the applications of the fundamental theorems of integration. 2. Beta and Gamma functions and their properties. 3. The valid situations for the inter-changeability of differentiability and integrability with infinite sum, and approximation of transcendental functions in terms of power series. 4. Compute area of surfaces of revolution and the volume of solids by integrating over cross-sectional areas.					
			UNIT-I	Definite integrals as limit of the sum, Riemann integral, Integrability of continuous and monotonic functions, Fundamental theorem of integral calculus, Mean value theorems of integral calculus, Differentiation under the sign of Integration.	MIN 09 LECTURES	OFFLINE TEACHING METHOD (NOTES IN FORM OF PDF,AUDIO/ VIDEO,CLASS ROOM TEACHING METHOD)	STUDENTS WILL GET THE UNDERSTANDING OF THE TOPIC DISCUSSED.	EVALUATION THROUGH MONTHLY MOCK TESTS AND ASSIGNMENTS AND DISCUSSIONS THROUGH WHICH WE ASSESS AND EVALUATE THE PERFORMANCE
			UNIT-II	Improper integrals, their classification and convergence, Comparison test, µtest, Abel's test, Dirichlet's test, quotient test, Beta and Gamma functions.	MIN 09 LECTURES	OFFLINE TEACHING METHOD (NOTES IN FORM OF PDF,AUDIO/ VIDEO,CLASS ROOM TEACHING METHOD)	STUDENTS WILL GET THE UNDERSTANDING OF THE TOPIC DISCUSSED.	EVALUATION THROUGH MONTHLY MOCK TESTS AND ASSIGNMENTS AND

								DISCUSSIONS THROUGH WHICH WE ASSESS AND EVALUATE THE PERFORMANCE
			UNIT-III	Rectification, Volumes and Surfaces of Solid of revolution, Pappus theorem, Multiple integrals, change of order of double integration, Dirichlet's theorem, Liouville's theorem for multiple integrals.	MIN 09 LECTURES	OFFLINE TEACHING METHOD (NOTES IN FORM OF PDF,AUDIO/ VIDEO,CLASS ROOM TEACHING METHOD)	STUDENTS WILL GET THE UNDERSTANDING OF THE TOPIC DISCUSSED.	EVALUATION THROUGH MONTHLY MOCK TESTS AND ASSIGNMENTS AND DISCUSSIONS THROUGH WHICH WE ASSESS AND EVALUATE THE PERFORMANCE
			UNIT-IV	Vector Differentiation, Gradient, Divergence and Curl, Normal on a surface, Directional Derivative, Vector Integration, Theorems of Gauss, Green, Stokes and related problems.	MIN 09 LECTURES	OFFLINE TEACHING METHOD (NOTES IN FORM OF PDF,AUDIO/ VIDEO,CLASS ROOM TEACHING METHOD)	STUDENTS WILL GET THE UNDERSTANDING OF THE TOPIC DISCUSSED.	EVALUATION THROUGH MONTHLY MOCK TESTS AND ASSIGNMENTS AND DISCUSSIONS THROUGH WHICH WE ASSESS AND EVALUATE THE PERFORMANCE
			References: **Text Books:** 1. T.M. Apostol, Calculus Vol. II, John Wiley Publication. 2. Shanti Narayan, P.K. Mittal, Integral Calculus, S. Chand. **Suggested Readings:** 3. Erwin Kreyszig, Advanced Engineering Mathematics, John Wiley & Sons. **Web References:** Digital platforms web links: NPTEL/SWAYAM/ MOOCS/Openstax.org https://openlearninglibrary.mit/edu/courses http://heecontent.upsdc.gov.in/SearchContent.aspx https://www.lkouniv.ac.in/en/article/e-content-faculty-of-science						**FINAL EVALUATION THROUGH INTERNAL ASSESMENT UPLODED ON LU EXAM PORTAL**

2	**BSC (NEP) – I YEAR,** **I I SEMESTER** **CREDITS-4** **T:04**	**P-4** **(MAJOR)** **GEOMETRY**	**Course Outcomes:** 1. To learn and visualize the fundamental ideas of coordinate geometry. 2. To describe some surfaces by using analytical geometry. 3. To gain knowledge about regular geometrical figures and their properties.					
			UNIT-I	General equation of second degree, System of conics, Tracing of conics, Confocal conics, Polar equation of conics and its properties.	MIN 09 LECTURES	OFFLINE TEACHING METHOD (NOTES IN FORM OF PDF,AUDIO/ VIDEO,CLASS ROOM TEACHING METHOD)	STUDENTS WILLGET THE UNDERSTANDING OF THE TOPIC DISCUSSED.	EVALUATION THROUGH MONTHLY MOCK TESTS AND ASSIGNMENTS AND DISCUSSIONS THROUGH WHICH WE ASSESS AND EVALUATE THE PERFORMANCE
			UNIT-II	Three-Dimensional Coordinates, Projection and Direction Cosine, Plane (Cartesian and vector form), Straight line in three dimension (Cartesian and vector form).	MIN 09 LECTURES	OFFLINE TEACHING METHOD (NOTES IN FORM OF PDF,AUDIO/ VIDEO,CLASS ROOM TEACHING METHOD)	STUDENTS WILL GET THE UNDERSTANDING OF THE TOPIC DISCUSSED.	EVALUATION THROUGH MONTHLY MOCK TESTS AND ASSIGNMENTS AND DISCUSSIONS THROUGH WHICH WE ASSESS AND EVALUATE THE PERFORMANCE
			UNIT-III	Sphere, Cone and Cylinder.	MIN 09 LECTURES	OFFLINE TEACHING METHOD (NOTES IN FORM OF PDF,AUDIO/ VIDEO,CLASS ROOM TEACHING METHOD)	STUDENTS WILL GET THE UNDERSTANDING OF THE TOPIC DISCUSSED.	EVALUATION THROUGH MONTHLY MOCK TESTS AND ASSIGNMENTS AND DISCUSSIONS THROUGH WHICH WE ASSESS AND EVALUATE THE PERFORMANCE
			UNIT-IV	Central conicoids, Paraboloids, Plane section of conicoids, Generating lines, Confocal	MIN 09 LECTURES	OFFLINE TEACHING METHOD (NOTES IN FORM OF PDF,AUDIO/	STUDENTS WILL GET THE UNDERSTANDING OF THE TOPIC DISCUSSED.	EVALUATION THROUGH MONTHLY MOCK TESTS AND ASSIGNMENTS AND

				conicoids, Reduction of second degree equation.		VIDEO,CLASS ROOM TEACHING METHOD)		DISCUSSIONS THROUGH WHICH WE ASSESS AND EVALUATE THE PERFORMANCE
			References: **Text Books:** 1. P. R. Vittal, Analytical Geometry 2. S. L. Loney, The Elements of Coordinate Geometry, Macmillan **Suggested Readings:** 3. Robert J.T. Bell, Elementary Treatise on Coordinate Geometry of three dimensions, Macmillan India Ltd **Web References:** Digital platforms web links: NPTEL/SWAYAM/ MOOCS/Openstax.org https://openlearninglibrary.mit/edu/courses http://heecontent.upsdc.gov.in/SearchContent.aspx https://www.lkouniv.ac.in/en/article/e-content-faculty-of-science					**FINAL EVALUATION THROUGH INTERNAL ASSESMENT UPLODED ON LU EXAM PORTAL**
3	**BSC (NEP) – I YEAR,** **I I SEMESTER** **CREDITS-4** **T:04**	**P-2** **(MINOR)** **APPLICABLE MATHEMATICS– II**	**Course Outcomes:** 1. To understand the concepts of groups, subgroups, cyclic groups, quotient groups and homomorphism of groups. 2. To Know the concepts of rings, subrings, ideals, quotient rings and homomorphism of rings. 3. To know the concept of vector spaces, its basis and dimension, quotient space and linear transformations. 4. To learn sequences and various tests to check convergence of an infinite series.					
			UNIT-I	Equivalence relations and partitions, congruence modulo n, groups, subgroups, cyclic groups, coset decomposition, Lagrange's theorem, Fermat's & Euler's theorems, normal subgroups, quotient groups, homomorphism and homomorphism theorems.	MIN 09 LECTURES	OFFLINE TEACHING METHOD (NOTES IN FORM OF PDF,AUDIO/ VIDEO,CLASS ROOM TEACHING METHOD)	STUDENTS WILL GET THE UNDERSTANDING OF THE TOPIC DISCUSSED.	EVALUATION THROUGH MONTHLY MOCK TESTS AND ASSIGNMENTS AND DISCUSSIONS THROUGH WHICH WE ASSESS AND EVALUATE THE PERFORMANCE
			UNIT-II	Rings, types of rings - commutative rings, rings with unity, division rings, integral	MIN 09 LECTURES	OFFLINE TEACHING METHOD (NOTES IN FORM OF PDF,AUDIO/	STUDENTS WILL GET THE UNDERSTANDING OF THE TOPIC DISCUSSED.	EVALUATION THROUGH MONTHLY MOCK TESTS AND

				domains and fields, subrings, ideals and quotient rings, ring homomorphism and homomorphism theorems, characteristic of a ring, Polynomial rings.		VIDEO,CLASS ROOM TEACHING METHOD)		ASSIGNMENTS AND DISCUSSIONS THROUGH WHICH WE ASSESS AND EVALUATE THE PERFORMANCE
			UNIT-IV	Vector spaces, subspaces, linear independence and dependence, basis and dimension, quotient space, linear transformations and their representation as matrices, rank - nullity theorem.	MIN 09 LECTURES	OFFLINE TEACHING METHOD (NOTES IN FORM OF PDF,AUDIO/ VIDEO,CLASS ROOM TEACHING METHOD)	STUDENTS WILL GET THE UNDERSTANDING OF THE TOPIC DISCUSSED.	EVALUATION THROUGH MONTHLY MOCK TESTS AND ASSIGNMENTS AND DISCUSSIONS THROUGH WHICH WE ASSESS AND EVALUATE THE PERFORMANCE
			UNIT-IV	Sequences, limit of a sequence, convergence, divergence and oscillation of a sequence, infinite series and its convergence, geometric and harmonic series, tests for convergence and divergence - comparison test, Cauchy integral test, D'alembert's ratio test, Cauchy's nth root test, Raabe's logarithmic test, DeMorgan and Bertrand's test, alternating series, absolute and conditional convergence, Leibnitz's theorem (without proof).	MIN 09 LECTURES	OFFLINE TEACHING METHOD (NOTES IN FORM OF PDF,AUDIO/ VIDEO,CLASS ROOM TEACHING METHOD)	STUDENTS WILL GET THE UNDERSTANDING OF THE TOPIC DISCUSSED.	EVALUATION THROUGH MONTHLY MOCK TESTS AND ASSIGNMENTS AND DISCUSSIONS THROUGH WHICH WE ASSESS AND EVALUATE THE PERFORMANCE
			References: **Textbooks** 1. V. Sahai & V. Bist : Algebra, Narosa. 2. J.A. Gallian : Contemporary Abstract Algebra, Narosa.					**FINAL EVALUATION THROUGH INTERNAL ASSESMENT**

			3. R.G. Bartle : Introduction to Real Analysis, Wiley. **Suggested books** 1. J.B. Fraleigh : A First course in Abstract Algebra, Pearson. 2. D.S. Dummit & R.M. Foote : Abstract Algebra, Wiley International edition.	**UPLODED ON LU EXAM PORTAL**

COLLEGE: MBP GOVT. P.G. COLLEGE, ASHIANA, LUCKNOW

ACADEMIC CALENDAR : SESSION- (2024-2025)

NAME OF TEACHER: DR. POONAM BAJPAI
DEPARTMENT: DEPARTMENT OF **MATHEMATICS**
CLASS: **BSC (NEP)-II** YEAR (**III SEMESTER**) (APPLICABLE FROM JULY 2024)

S.NO.	CLASS (YEAR, SEMESTER)	PAPER	UNIT	TOPIC NAME	MONTHLY / WEEKLY PLAN	TEACHING PEDAGOGY	LEARNING OUTCOMES	ANY OTHER DETAIL
01	02	03	04	05	06	07	08	09
1	BSC (NEP) – II YEAR, III SEMESTER CREDITS-4 T:04	P-5 (MAJOR) ORDINARY DIFFERENTIAL EQUATIONS	**Course Outcomes:** 1. Formulate Differential Equations for various Mathematical models. 2. Solve first order non-linear differential equation and linear differential equations of higher order using various techniques. 3. Apply these techniques to solve and analyze various mathematical models.					
			UNIT-I	Differential Equations of first order and first degree, variable separable equations and equations reducible to this form, linear equations and Bernoulli equations, Exact differential equations and integrating factors, special integrating factors and transformations. Differential Equations of first order and higher degree, Clairaut equation, singular solutions. Orthogonal trajectories.	MIN. 09 LECTURES	OFFLINE TEACHING METHOD (NOTES IN FORM OF PDF,AUDIO/ VIDEO,CLASS ROOM TEACHING METHOD)	STUDENTS WILL GET THE UNDERSTANDING OF THE TOPIC DISCUSSED.	EVALUATION THROUGH MONTHLY MOCK TESTS AND ASSIGNMENTS AND DISCUSSIONS THROUGH WHICH WE ASSESS AND EVALUATE THE PERFORMANCE
			UNIT-II	Linear Differential Equations with constant coefficients, homogeneous linear equation with constant coefficients, Wronskian,	MIN 09 LECTURES	OFFLINE TEACHING METHOD (NOTES IN FORM OF PDF,AUDIO/	STUDENTS WILL GET THE UNDERSTANDING OF THE TOPIC DISCUSSED.	EVALUATION THROUGH MONTHLY MOCK TESTS AND ASSIGNMENTS AND

				its properties and applications. Second order linear differential equations with variable coefficients: Use of a known solution to find another, normal form, method of undetermined coefficient, variation of parameters,		VIDEO,CLASS ROOM TEACHING METHOD)		DISCUSSIONS THROUGH WHICH WE ASSESS AND EVALUATE THE PERFORMANCE
			UNIT-III	Systems of first order equations, linear systems, homogeneous linear systems with constant coefficients, Volterra's prey predator equations, Existence and uniqueness of solutions, method of successive approximations, Picard's theorem, Application to systems of first order equations.	MIN 09 LECTURES	OFFLINE TEACHING METHOD (NOTES IN FORM OF PDF,AUDIO/ VIDEO,CLASS ROOM TEACHING METHOD)	STUDENTS WILL GET THE UNDERSTANDING OF THE TOPIC DISCUSSED.	EVALUATION THROUGH MONTHLY MOCK TESTS AND ASSIGNMENTS AND DISCUSSIONS THROUGH WHICH WE ASSESS AND EVALUATE THE PERFORMANCE
			UNIT-IV	Series solutions of differential equations, Power series method. Bessel, Legendre and Hypergeometric functions and their properties, recurrence and generating relations.	MIN 09 LECTURES	OFFLINE TEACHING METHOD (NOTES IN FORM OF PDF,AUDIO/ VIDEO,CLASS ROOM TEACHING METHOD)	STUDENTS WILL GET THE UNDERSTANDING OF THE TOPIC DISCUSSED.	EVALUATION THROUGH MONTHLY MOCK TESTS AND ASSIGNMENTS AND DISCUSSIONS THROUGH WHICH WE ASSESS AND EVALUATE THE PERFORMANCE
			References: **Text Books:** 1. B. Rai, D.P. Choudhary & H.J. Freedman, A Course in Differential Equations. 2. S. L Ross, Differential Equations, 3rd Edition, Wiley **Suggested Reading:** 3. G.F. Simmons, Differential Equations with Applications and Historical Notes, Tata McGraw Hill **Web References:** Digital platforms web links: NPTEL/SWAYAM/ MOOCS/Openstax.org					**FINAL EVALUATION THROUGH INTERNAL ASSESMENT UPLODED ON LU EXAM PORTAL**

			https://openlearninglibrary.mit/edu/courses http://heecontent.upsdc.gov.in/SearchContent.aspx https://www.lkouniv.ac.in/en/article/e-content-faculty-of-science					
2	**BSC (NEP) – II YEAR, I I I SEMESTER CREDITS-4 T:04**	**P-6 (MAJOR) MECHANICS**	**Course Outcomes:** 1. The significance of mathematics involved in physical quantities and their uses. 2. To understanding the various concepts of basic mechanics like simple harmonic motion, motion under other laws and forces. 3. To study and to learn the cause-effect related to these. 4. The applications in observing and relating real situations/structures.					
			UNIT-1	Frame of reference, work energy principle, Forces in three dimensions, Poinsot's central axis, Wrenches, Null lines and planes.	MIN 09 LECTURES	OFFLINE TEACHING METHOD (NOTES IN FORM OF PDF,AUDIO/ VIDEO,CLASS ROOM TEACHING METHOD)	STUDENTS WILL GET THE UNDERSTANDING OF THE TOPIC DISCUSSED.	EVALUATION THROUGH MONTHLY MOCK TESTS AND ASSIGNMENTS AND DISCUSSIONS THROUGH WHICH WE ASSESS AND EVALUATE THE PERFORMANCE
			UNIT-II	Virtual work, Stable and Unstable equilibrium, Catenary, Catenary of uniform strength.	MIN 09 LECTURES	OFFLINE TEACHING METHOD (NOTES IN FORM OF PDF,AUDIO/ VIDEO,CLASS ROOM TEACHING METHOD)	STUDENTS WILL GET THE UNDERSTANDING OF THE TOPIC DISCUSSED.	EVALUATION THROUGH MONTHLY MOCK TESTS AND ASSIGNMENTS AND DISCUSSIONS THROUGH WHICH WE ASSESS AND EVALUATE THE PERFORMANCE
			UNIT-III	Velocities and accelerations along radial and transverse directions, and along tangential and normal directions, Simple Harmonic motion, Motion under other law of forces. Elastic strings, Motion in resisting medium, Constrained motion, Motion on smooth and rough plane curves.	MIN 09 LECTURES	OFFLINE TEACHING METHOD (NOTES IN FORM OF PDF,AUDIO/ VIDEO,CLASS ROOM TEACHING METHOD)	STUDENTS WILL GET THE UNDERSTANDING OF THE TOPIC DISCUSSED.	EVALUATION THROUGH MONTHLY MOCK TESTS AND ASSIGNMENTS AND DISCUSSIONS THROUGH WHICH WE ASSESS AND EVALUATE THE PERFORMANCE

			UNIT-IV	Motion of particles of varying mass, Rocket motion, Central orbit, Kepler's laws of motion, Motion of particle in three dimensions, Rotating frame of reference, Rotating Earth, Acceleration in terms of different coordinates systems.	MIN 09 LECTURES	OFFLINE TEACHING METHOD (NOTES IN FORM OF PDF,AUDIO/ VIDEO,CLASS ROOM TEACHING METHOD)	STUDENTS WILL GET THE UNDERSTANDING OF THE TOPIC DISCUSSED.	EVALUATION THROUGH MONTHLY MOCK TESTS AND ASSIGNMENTS AND DISCUSSIONS THROUGH WHICH WE ASSESS AND EVALUATE THE PERFORMANCE
			References: **Text Books:** 1. R.C. Hibbeler, Engineering Mechanics-Statistics 2. Nelson, Engineering Mechanics- Dynamics, Tata McGraw Hill **Suggested Readings:** 3. J.L. Synge & B.A. Griffith, Principles of Mechanics, Tata McGraw Hill **Web References:** Digital platforms web links: NPTEL/SWAYAM/ MOOCS/Openstax.org https://openlearninglibrary.mit/edu/courses http://heecontent.upsdc.gov.in/SearchContent.aspx https://www.lkouniv.ac.in/en/article/e-content-faculty-of-science						**FINAL EVALUATION THROUGH INTERNAL ASSESMENT UPLODED ON LU EXAM PORTAL**
3	**BSC (NEP) – II YEAR, III SEMESTER** **CREDITS-4** **T:04**	**P-3** **(MINOR)** Applicable Mathematics– III	**Course Outcomes:** 1. To know the basic concepts of complex analysis including Cauchy's integral formula, derivative of analytic functions, Taylor's and Laurent's series. 2. To understand various methods for numerical solutions of equations. 3. To know how to do numerical differentiation and integration. 4. To solve systems of linear equations by standard methods.						
			UNIT-1	Functions of complex variables - analytic functions, Cauchy - Riemann equations, harmonic functions, Cauchy's integral theorem, Cauchy's integral formula, derivatives	MIN 09 LECTURES	OFFLINE TEACHING METHOD (NOTES IN FORM OF PDF,AUDIO/ VIDEO,CLASS ROOM TEACHING METHOD)	STUDENTS WILL GET THE UNDERSTANDING OF THE TOPIC DISCUSSED.	EVALUATION THROUGH MONTHLY MOCK TESTS AND ASSIGNMENTS AND DISCUSSIONS THROUGH WHICH WE ASSESS AND EVALUATE THE PERFORMANCE

				of analytic functions, formulae for first, second and nth derivatives, Taylor's and Laurent's series, singularities, zeroes and poles of order n.				
			UNIT-II	Numerical solutions of equations - bisection method, secant method, regula -falsi method, Newton - Raphson method and interpolation with equispaced points.	MIN 09 LECTURES	OFFLINE TEACHING METHOD (NOTES IN FORM OF PDF,AUDIO/ VIDEO,CLASS ROOM TEACHING METHOD)	STUDENTS WILL GET THE UNDERSTANDING OF THE TOPIC DISCUSSED.	EVALUATION THROUGH MONTHLY MOCK TESTS AND ASSIGNMENTS AND DISCUSSIONS THROUGH WHICH WE ASSESS AND EVALUATE THE PERFORMANCE
			UNIT-III	Finite differences, Newton's forward and backward interpolation formula, Lagrange interpolation formula, divided differences and Newton's formula, numerical differentiations and integration - trapezoidal and Simpson's rules, Newton-Cotes integration formula, Ramberg integration, Gaussian quadrature.	MIN 09 LECTURES	OFFLINE TEACHING METHOD (NOTES IN FORM OF PDF,AUDIO/ VIDEO,CLASS ROOM TEACHING METHOD)	STUDENTS WILL GET THE UNDERSTANDING OF THE TOPIC DISCUSSED.	EVALUATION THROUGH MONTHLY MOCK TESTS AND ASSIGNMENTS AND DISCUSSIONS THROUGH WHICH WE ASSESS AND EVALUATE THE PERFORMANCE
			UNIT-IV	Systems of linear equations - Gauss elimination method, Gauss-Jordan method, LU decomposition, Jacobi method, Gauss - Seidel method, the algebraic eigenvalue problem - Jacobi's method and power method.	MIN 09 LECTURES	OFFLINE TEACHING METHOD (NOTES IN FORM OF PDF,AUDIO/ VIDEO,CLASS ROOM TEACHING METHOD)	STUDENTS WILL GET THE UNDERSTANDING OF THE TOPIC DISCUSSED.	EVALUATION THROUGH MONTHLY MOCK TESTS AND ASSIGNMENTS AND DISCUSSIONS THROUGH WHICH WE ASSESS AND EVALUATE THE PERFORMANCE

			References: **Text Books:** 1. J.W. Brown and R.V. Churchill : Complex Variables and Applications, Mc Graw Hill. 2. M.K. Jain, S.R.K. Iyengar and R.K. Jain : Numerical methods for scientific and engineering computations, New Age International, New Delhi. **Suggested Readings:** 1. S.S. Sastry : Introductory Methods of Numerical Analysis, Prentice Hall of India. 2. Complex Variables, Schaum's Outline Series **Web References:** Digital platforms web links: NPTEL/SWAYAM/ MOOCS/Openstax.org https://openlearninglibrary.mit/edu/courses http://heecontent.upsdc.gov.in/SearchContent.aspx https://www.lkouniv.ac.in/en/article/e-content-faculty-of-science	**FINAL EVALUATION THROUGH INTERNAL ASSESMENT UPLODED ON LU EXAM PORTAL**

COLLEGE: MBP GOVT. P.G. COLLEGE, ASHIANA, LUCKNOW

ACADEMIC CALENDAR : SESSION- (2024-2025)

NAME OF TEACHER: DR. POONAM BAJPAI

DEPARTMENT: DEPARTMENT OF **MATHEMATICS**

CLASS: **BSC (NEP)-II** YEAR (**IV SEMESTER**) (APPLICABLE FROM JANUARY 2025)

S.NO.	CLASS (YEAR, SEMESTER)	PAPER	UNIT	TOPIC NAME	MONTHLY/WEEKLY PLAN	TEACHING PEDAGOGY	LEARNING OUTCOMES	ANY OTHER DETAIL
01	02	03	04	05	06	07	08	09
1	**BSC (NEP) – II YEAR, I V SEMESTER CREDITS-4 T:04**	**P-7 (MAJOR) MATHEMATICAL METHODS**	**Course Outcomes:** 1. To develop mathematical skills in calculus and analysis. 2. To get knowledge of Laplace Transforms and Fourier series. 3. To get acquainted with the essentials of calculus of variations.					
			UNIT-I	Definition of a sequence, theorems on limits of sequences, bounded and monotonic sequences, Cauchy's convergence criterion, Cauchy sequence, limit superior and limit inferior of a sequence, subsequence, Series of non-negative terms, convergence and divergence, Comparison tests, Cauchy's integral test, Ratio tests, Root test, Raabe's logarithmic test, de Morgan and Bertrand's tests, alternating series, Leibnitz's theorem, absolute and conditional convergence. Sequences and series	MIN 09 LECTURES	OFFLINE TEACHING METHOD (NOTES IN FORM OF PDF,AUDIO/ VIDEO,CLASS ROOM TEACHING METHOD)	STUDENTS WILL GET THE UNDERSTANDING OF THE TOPIC DISCUSSED.	EVALUATION EVALUATION THROUGH MONTHLY MOCK TESTS AND ASSIGNMENTS AND DISCUSSIONS THROUGH WHICH WE ASSESS AND EVALUATE THE PERFORMANCE

				of functions: point wise and uniform convergence of sequences of functions, consequences of uniform convergence, integration and differentiation of series of functions.				
			UNIT-II	Existence theorems for Laplace transforms, Linearity of Laplace transform and their properties, Laplace transform of the derivatives and integrals of a function, Convolution theorem, inverse Laplace transforms, Solution of the differential equations using Laplace transforms.	MIN 09 LECTURES	OFFLINE TEACHING METHOD (NOTES IN FORM OF PDF,AUDIO/ VIDEO,CLASS ROOM TEACHING METHOD)	STUDENTS WILL GET THE UNDERSTANDING OF THE TOPIC DISCUSSED.	EVALUATION THROUGH MONTHLY MOCK TESTS AND ASSIGNMENTS AND DISCUSSIONS THROUGH WHICH WE ASSESS AND EVALUATE THE PERFORMANCE
			UNIT-III	Fourier series, Fourier expansion of piecewise monotonic functions, Half and full range expansions, Fourier transforms (finite and infinite), Fourier integral.	MIN 09 LECTURES	OFFLINE TEACHING METHOD (NOTES IN FORM OF PDF,AUDIO/ VIDEO,CLASS ROOM TEACHING METHOD)	STUDENTS WILL GET THE UNDERSTANDING OF THE TOPIC DISCUSSED.	EVALUATION THROUGH MONTHLY MOCK TESTS AND ASSIGNMENTS AND DISCUSSIONS THROUGH WHICH WE ASSESS AND EVALUATE THE PERFORMANCE
			UNIT-IV	Calculus of variations-Variational problems with fixed boundaries-Euler's equation for functionals containing first order derivative and one independent variable, Extremals, Functionals dependent on higher order derivatives, Functionals dependent on more than one independent variable,	MIN 09 LECTURES	OFFLINE TEACHING METHOD (NOTES IN FORM OF PDF,AUDIO/ VIDEO,CLASS ROOM TEACHING METHOD)	STUDENTS WILL GET THE UNDERSTANDING OF THE TOPIC DISCUSSED.	EVALUATION THROUGH MONTHLY MOCK TESTS AND ASSIGNMENTS AND DISCUSSIONS THROUGH WHICH WE ASSESS AND EVALUATE THE PERFORMANCE

				Variational problems in parametric form.				
			References: **Text Books:** 1. T.M. Apostol. Mathematical Analysis, Pearson 2. RG Bartle, Introduction to Real Analysis, Wiley India **Suggested Readings:** 3. G.F. Simmons, Differential Equations with Applications and Historical Notes, Tata-McGraw Hill 4. A.S. Gupta, Calculus of Variations with Applications Prentice Hall India. **Web References:** Digital platforms web links: NPTEL/SWAYAM/ MOOCS/Openstax.org https://openlearninglibrary.mit/edu/courses http://heecontent.upsdc.gov.in/SearchContent.aspx https://www.lkouniv.ac.in/en/article/e-content-faculty-of-science				**FINAL EVALUATION THROUGH INTERNAL ASSESMENT UPLODED ON LU EXAM PORTAL**
2	**BSC (NEP) – II YEAR,** **I V SEMESTER** **CREDITS-4** **T:04**	**P-8** **(MAJOR)** **LINEAR & ABSTRACT ALGEBRA**	**Course Outcomes:** 1. The fundamental concept of Rings, Fields, subrings, integral domains and the corresponding morphisms. 2. The concept of linear independence of vectors over a field, the idea of basis and the dimension of a vector space. 3. Basic concepts of linear transformations, the Rank-Nullity Theorem, matrix of a linear transformation and the change of basis. 4. Automorphisms for constructing new groups from the given group. 5. Group actions, Sylow theorems and their applications to check nonsimplicity. 6. Compute inner products and determine orthogonality on vector spaces.					
			UNIT-I	Automorphism, inner automorphism, automorphism groups and their computations, Conjugacy relations, Normaliser, Counting principle and the class equation of a finite group, Center of group of prime power order, simple groups, Group action, Burnside lemma, Sylow theorems and its applications.	MIN 09 LECTURES	OFFLINE TEACHING METHOD (NOTES IN FORM OF PDF,AUDIO/ VIDEO,CLASS ROOM TEACHING METHOD)	STUDENTS WILLGET THE UNDERSTANDING OF THE TOPIC DISCUSSED.	EVALUATION THROUGH MONTHLY MOCK TESTS AND ASSIGNMENTS AND DISCUSSIONS THROUGH WHICH WE ASSESS AND EVALUATE THE PERFORMANCE

			UNIT-II	Prime and maximal ideals, Euclidean Rings, Principal ideal rings, Polynomial Rings, Polynomial over the Rational Field, The Eisenstein Criterion, Polynomial Rings over Commutative Rings, unique factorization domain.	MIN 09 LECTURES	OFFLINE TEACHING METHOD (NOTES IN FORM OF PDF,AUDIO/ VIDEO,CLASS ROOM TEACHING METHOD)	STUDENTS WILL GET THE UNDERSTANDING OF THE TOPIC DISCUSSED.	EVALUATION THROUGH MONTHLY MOCK TESTS AND ASSIGNMENTS AND DISCUSSIONS THROUGH WHICH WE ASSESS AND EVALUATE THE PERFORMANCE
			UNIT-III	Vector spaces, Subspaces, Linear independence and dependence of vectors, Basis and dimension, Quotient space, Linear transformations, Direct sums, The Algebra of linear transformations, rank nullity theorem, their representation as matrices, Linear functionals, Dual space, Characteristic values, Cayley Hamilton Theorem.	MIN 09 LECTURES	OFFLINE TEACHING METHOD (NOTES IN FORM OF PDF,AUDIO/ VIDEO,CLASS ROOM TEACHING METHOD)	STUDENTS WILL GET THE UNDERSTANDING OF THE TOPIC DISCUSSED.	EVALUATION THROUGH MONTHLY MOCK TESTS AND ASSIGNMENTS AND DISCUSSIONS THROUGH WHICH WE ASSESS AND EVALUATE THE PERFORMANCE
			UNIT-IV	Inner product spaces, Cauchy-Schwarz inequality, Orthogonal vectors, Orthonormal sets and bases, Bessel's inequality for finite dimensional spaces, Gram-Schmidt orthogonalization process, Bilinear and Quadratic forms.	MIN 09 LECTURES	OFFLINE TEACHING METHOD (NOTES IN FORM OF PDF,AUDIO/ VIDEO,CLASS ROOM TEACHING METHOD)	STUDENTS WILL GET THE UNDERSTANDING OF THE TOPIC DISCUSSED.	EVALUATION THROUGH MONTHLY MOCK TESTS AND ASSIGNMENTS AND DISCUSSIONS THROUGH WHICH WE ASSESS AND EVALUATE THE PERFORMANCE
			References: **Text Books:** 1. Topics in Algebra by I. N. Herstein. 2. Algebra by V. Sahai and V. Bist 3. Linear Algebra by V. Sahai and V. Bist **Suggested Readings:**					**FINAL EVALUATION THROUGH INTERNAL ASSESMENT UPLODED ON LU EXAM PORTAL**

			4. Linear Algebra by K. Hoffman and R. Kunze. **Web References:** Digital platforms web links : NPTEL/SWAYAM/ MOOCS/Openstax.org https://openlearninglibrary.mit/edu/courses http://heecontent.upsdc.gov.in/SearchContent.aspx https://www.lkouniv.ac.in/en/article/e-content-faculty-of-science				
3	**BSC (NEP) – II YEAR,** **IV SEMESTER** **CREDITS-4** **T:04**	**P-4** **(MINOR)** Applicable Mathematics–IV	**Course Outcomes:** 1. To understand application and techniques of solving various types of ordinary differential equations. 2. To understand the Laplace transforms and its applications in solving differential equations. 3. To understand Fourier series and Fourier transforms. 4. To understand standard techniques for finding numerical solution of ordinary differential equations.				
			UNIT-I	Ordinary differential equations - Bernoulli's equation, exact differential equations and integrating factors, special integrating factors and transformations, differential equations of order one and degree more than one, Clairaut's equation, singular solutions and orthogonal trajectories, Linear differential equations with constant coefficients, homogeneous Linear differential equations, series solutions of Legendre's, Bessel's and hypergeometric equations and their basic properties.	MIN 09 LECTURES	OFFLINE TEACHING METHOD (NOTES IN FORM OF PDF,AUDIO/ VIDEO,CLASS ROOM TEACHING METHOD)	STUDENTS WILLGET THE UNDERSTANDING OF THE TOPIC DISCUSSED.	EVALUATION THROUGH MONTHLY MOCK TESTS AND ASSIGNMENTS AND DISCUSSIONS THROUGH WHICH WE ASSESS AND EVALUATE THE PERFORMANCE

			UNIT-II	Laplace transforms - existence theorem, Laplace transforms of derivatives and integrals, inverse Laplace transform, convolution theorem, applications to simple linear differential equations.	MIN 09 LECTURES	OFFLINE TEACHING METHOD (NOTES IN FORM OF PDF,AUDIO/ VIDEO,CLASS ROOM TEACHING METHOD)	STUDENTS WILL GET THE UNDERSTANDING OF THE TOPIC DISCUSSED.	EVALUATION THROUGH MONTHLY MOCK TESTS AND ASSIGNMENTS AND DISCUSSIONS THROUGH WHICH WE ASSESS AND EVALUATE THE PERFORMANCE
			UNIT-III	Periodic functions, Fourier series, Fourier expansion of piecewise monotonic functions, half and full range expansions, Fourier transforms (finite and infinite), Fourier integral.	MIN 09 LECTURES	OFFLINE TEACHING METHOD (NOTES IN FORM OF PDF,AUDIO/ VIDEO,CLASS ROOM TEACHING METHOD)	STUDENTS WILL GET THE UNDERSTANDING OF THE TOPIC DISCUSSED.	EVALUATION THROUGH MONTHLY MOCK TESTS AND ASSIGNMENTS AND DISCUSSIONS THROUGH WHICH WE ASSESS AND EVALUATE THE PERFORMANCE
			UNIT-IV	Numerical solution of ordinary differential equations - Taylor series method, Euler's method, Runge - Kutta method, Milne's method, Adam's method.	MIN 09 LECTURES	OFFLINE TEACHING METHOD (NOTES IN FORM OF PDF,AUDIO/ VIDEO,CLASS ROOM TEACHING METHOD)	STUDENTS WILL GET THE UNDERSTANDING OF THE TOPIC DISCUSSED.	EVALUATION THROUGH MONTHLY MOCK TESTS AND ASSIGNMENTS AND DISCUSSIONS THROUGH WHICH WE ASSESS AND EVALUATE THE PERFORMANCE
			References: **Text Books:** 1. G. F. Simmons : Differential Equations with Applications and Historical Notes, Tata McGraw Hill. 2. M.K. Jain, S.R.K. Iyengar and R.K. Jain : Numerical methods for scientific and engineering computations, New Age International, New Delhi. 3. T. M. Apostol : Mathematical Analysis.					**FINAL EVALUATION THROUGH INTERNAL ASSESMENT UPLODED ON LU EXAM PORTAL**

			Web References: Digital platforms web links: NPTEL/SWAYAM/ MOOCS/Openstax.org https://openlearninglibrary.mit/edu/courses http://heecontent.upsdc.gov.in/SearchContent.aspx https://www.lkouniv.ac.in/en/article/e-content-faculty-of-science	

COLLEGE: MBP GOVT. P.G. COLLEGE, ASHIANA, LUCKNOW

ACADEMIC CALENDAR : SESSION- (2024-2025)

NAME OF TEACHER: DR. POONAM BAJPAI

DEPARTMENT: DEPARTMENT OF **MATHEMATICS**

CLASS: **BSC(NEP)-III** YEAR (**V SEMESTER**) (APPLICABLE FROM JULY 2024) EACH PAPER CARRIES 100 MARKS (4 CREDITS)

S.NO.	CLASS (YEAR, SEMESTER)	PAPER	UNIT	TOPIC NAME	MONTHLY/ WEEKLY PLAN	TEACHING PEDAGOGY	LEARNING OUTCOMES	ANY OTHER DETAIL
01	02	03	04	05	06	07	08	09
I	**BSC (NEP) -III YEAR, V SEM** **CREDITS-4** **T:04**	**P –09** **NUMERICAL ANALYSIS**	**Course Outcomes:** 1. Some numerical methods to find the zeroes of nonlinear functions of a single variable and solution of a system of linear equations, up to a certain given level of precision. 2. Interpolation techniques to compute the values for a tabulated function at points not in the table. 3.Applications of numerical differentiation and integration to convert differential equations into difference equations for numerical solutions.					
			UNIT-I	Solution of equations: bisection, Secant, Regular Falsi, Newton Raphson's method, Newton's method for multiple roots, Interpolation, Lagrange and Hermite interpolation, Difference schemes, Divided differences, Interpolation formula using differences.	MIN. 06 LECTURES	OFFLINE TEACHING METHOD (NOTES IN FORM OF PDF,AUDIO/ VIDEO,CLASS ROOM TEACHING METHOD)	STUDENTS WILL GET THE UNDERSTANDING OF THE TOPIC DISCUSSED.	EVALUATION THROUGH MONTHLY MOCK TESTS AND ASSIGNMENTS AND DISCUSSIONS THROUGH WHICH WE ASSESS AND EVALUATE THE PERFORMANCE

			UNIT-II	Numerical differentiation, Numerical Quadrature: Newton Cotes Formulas, Gaussian Quadrature Formulas, System of Linear equations: Direct method for solving systems of linear equations (Gauss elimination, LU Decomposition, Cholesky Decomposition), Iterative methods (Jacobi, Gauss Seidel, Relaxation methods). The Algebraic Eigen Value problem: Jacobi's method, Givens method, Power method.	MIN 06 LECTURES	OFFLINE TEACHING METHOD (NOTES IN FORM OF PDF,AUDIO/ VIDEO,CLASS ROOM TEACHING METHOD)	STUDENTS WILL GET THE UNDERSTANDING OF THE TOPIC DISCUSSED.	EVALUATION THROUGH MONTHLY MOCK TESTS AND ASSIGNMENTS AND DISCUSSIONS THROUGH WHICH WE ASSESS AND EVALUATE THE PERFORMANCE
			UNIT-III	Numerical solution of Ordinary differential equations: Euler method, single step methods, Runge-Kutta method, Multi-step methods: Milne-Simpson method, Types of approximation: Last Square polynomial approximation, Uniform approximation, Chebyshev polynomial approximation.	MIN 06 LECTURES	OFFLINE TEACHING METHOD (NOTES IN FORM OF PDF,AUDIO/ VIDEO,CLASS ROOM TEACHING METHOD)	STUDENTS WILL GET THE UNDERSTANDING OF THE TOPIC DISCUSSED.	EVALUATION THROUGH MONTHLY MOCK TESTS AND ASSIGNMENTS AND DISCUSSIONS THROUGH WHICH WE ASSESS AND EVALUATE THE PERFORMANCE
			UNIT-IV	Difference Equations and their solutions, Shooting method and Difference equation method for solving Linear second order differential equation with boundary conditions of first, second and third type.	MIN 06 LECTURES	OFFLINE TEACHING METHOD (NOTES IN FORM OF PDF,AUDIO/ VIDEO,CLASS ROOM TEACHING METHOD)	STUDENTS WILL GET THE UNDERSTANDING OF THE TOPIC DISCUSSED.	EVALUATION THROUGH MONTHLY MOCK TESTS AND ASSIGNMENTS AND DISCUSSIONS THROUGH WHICH WE ASSESS AND EVALUATE THE PERFORMANCE
			Reference Books:					**FINAL EVALUATION**

<table>
<tr><td></td><td></td><td></td><td colspan="5">1. Numerical Methods for Engineering and scientific computation by M. K. Jain, S.R.K. Iyengar & R.K. Jain.
2. Introductory methods of Numerical Analysis by S. S. Sastry
Suggested Readings:
3. Kandasamy P. & et Al., Numerical Methods, S. Chand & Co.

Web References:
Digital platforms web links: NPTEL/SWAYAM/ MOOCS/Openstax.org
https://openlearninglibrary.mit/edu/courses
http://heecontent.upsdc.gov.in/SearchContent.aspx
https://www.lkouniv.ac.in/en/article/e-content-faculty-of-science</td><td>THROUGH INTERNAL ASSESMENT UPLODED ON LU EXAM PORTAL</td></tr>
<tr><td>II</td><td>BSC (NEP) -III YEAR, V SEM

CREDITS-4

T:04</td><td>P-10

ANALYSIS</td><td colspan="5">Course Outcomes:
1. Understand the basic concepts of metric spaces.
2. Know the concepts such as open balls, closed balls, compactness, connectedness etc.
3.Understand the significance of differentiability of complex valued functions leading to the understanding of Cauchy-Riemann equations.
4. Evaluate the contour integrals and understand the role of Cauchy-Goursat theorem and the Cauchy integral formula.
5. Expand some simple functions as their Taylor and Laurent series, classify the nature of singularities, find residues and apply Cauchy Residue theorem to evaluate integrals.</td></tr>
<tr><td></td><td></td><td></td><td>UNIT-I</td><td>Definition and examples of metric spaces, Neighborhoods, Interior points, Limit Points, Open and closed sets, Convergent and Cauchy sequences, Completeness, Cantor’s intersection theorem. Uniform convergence of sequences and series of functions, Uniform convergence and continuity, Uniform convergence and integration, Uniform convergence and differentiation, Power series.</td><td>MIN. 06 LECTURES</td><td>OFFLINE TEACHING METHOD

(NOTES IN FORM OF PDF,AUDIO/ VIDEO,CLASS ROOM TEACHING METHOD)</td><td>STUDENTS WILL GET THE UNDERSTANDING OF THE TOPIC DISCUSSED.</td><td>EVALUATION THROUGH MONTHLY MOCK TESTS AND ASSIGNMENTS AND DISCUSSIONS THROUGH WHICH WE ASSESS AND EVALUATE THE PERFORMANCE</td></tr>
<tr><td></td><td></td><td></td><td>UNIT-II</td><td>Stereographic projection, Continuity and Differentiability of</td><td>MIN 06 LECTURES</td><td>OFFLINE TEACHING METHOD</td><td>STUDENTS WILL GET THE UNDERSTANDING</td><td>EVALUATION THROUGH MONTHLY MOCK</td></tr>
</table>

				complex functions, Analytic functions, Cauchy Riemann equations, Harmonic functions.		(NOTES IN FORM OF PDF,AUDIO/ VIDEO,CLASS ROOM TEACHING METHOD)	OF THE TOPIC DISCUSSED.	TESTS AND ASSIGNMENTS AND DISCUSSIONS THROUGH WHICH WE ASSESS AND EVALUATE THE PERFORMANCE
			UNIT-III	Complex integration, Cauchy-Goursat theorem, Cauchy's Integral formula, Formulae for first, second and nth derivatives, Cauchy's Inequality, Liouville's Theorem, Elementary functions, Mapping by elementary functions, conformal mapping.	MIN 06 LECTURES	OFFLINE TEACHING METHOD (NOTES IN FORM OF PDF,AUDIO/ VIDEO,CLASS ROOM TEACHING METHOD)	STUDENTS WILL GET THE UNDERSTANDING OF THE TOPIC DISCUSSED.	EVALUATION THROUGH MONTHLY MOCK TESTS AND ASSIGNMENTS AND DISCUSSIONS THROUGH WHICH WE ASSESS AND EVALUATE THE PERFORMANCE
			UNIT-IV	Taylor and Laurent Series, Absolute and uniform convergence of Power series, Residues and Poles, Residue theorem, Zeros and poles of order m, Evaluation of improper real integrals, Definite integrals involving sines and cosines.	MIN 06 LECTURES	OFFLINE TEACHING METHOD (NOTES IN FORM OF PDF,AUDIO/ VIDEO,CLASS ROOM TEACHING METHOD)	STUDENTS WILL GET THE UNDERSTANDING OF THE TOPIC DISCUSSED.	EVALUATION THROUGH MONTHLY MOCK TESTS AND ASSIGNMENTS AND DISCUSSIONS THROUGH WHICH WE ASSESS AND EVALUATE THE PERFORMANCE
			REFERENCE BOOK: **Text books:** 1. MATHEMATICAL ANALYSIS BY SHANTI NARAIN. 2. COMPLEX VARIABLE AND APPLICATIONS BY BROWN & CHURCHILL. **Suggested Readings:** 3. Magnus Robert, Fundamental Mathematical Analysis, Springer Undergraduate Mathematics Series **Web References:** Digital platforms web links: NPTEL/SWAYAM/ MOOCS/Openstax.org https://openlearninglibrary.mit/edu/courses http://heecontent.upsdc.gov.in/SearchContent.aspx						**FINAL EVALUATION THROUGH INTERNAL ASSESMENT UPLODED ON LU EXAM PORTAL**

			https://www.lkouniv.ac.in/en/article/e-content-faculty-of-science				
III	BSC (NEP) -III YEAR, V SEM CREDITS-4 T:04	P-11A INTEGRAL & PARTIAL DIFFERENTIAL EQUATIONS	**Course Outcomes:** 1. Describe different types of Linear integral equations and partial differential equations for the impart knowledge of formulation of practical problems of applied mathematics. 2. Understand the theoretical basic behavior of different types of arising problems such as Fredholm, Volterra, Singular, Hilbert and Cauchy integral equations. 3. Explain the foundations of various problems related to Wave, Laplace and Diffusion equations by the method of separation of variables. 4. Deal with problems in applied mathematics, theoretical mechanics and mathematical physics and engineering.				
			UNIT-1	Origin of first order partial differential equations. Partial differential equations of the first order and degree one, Lagrange's solution, Partial differential equation of first order and degree greater than one. Cauchy's method of characteristic, Charpit's method of solution, Surfaces orthogonal to the given system of surfaces.	MIN 06 LECTURES	OFFLINE TEACHING METHOD (NOTES IN FORM OF PDF,AUDIO/ VIDEO,CLASS ROOM TEACHING METHOD)	STUDENTS WILL GET THE UNDERSTANDING OF THE TOPIC DISCUSSED.	EVALUATION THROUGH MONTHLY MOCK TESTS AND ASSIGNMENTS AND DISCUSSIONS THROUGH WHICH WE ASSESS AND EVALUATE THE PERFORMANCE
			UNIT-II	Origin of second order PDE, Solution of partial differential equations of the second and higher order with constant coefficients, Classification of linear partial differential equations of second order, Solution of second order partial differential equations with variable coefficients, Monge's method of solution, Cauchy's problem for Homogenous wave	MIN 06 LECTURES	OFFLINE TEACHING METHOD (NOTES IN FORM OF PDF,AUDIO/ VIDEO,CLASS ROOM TEACHING METHOD)	STUDENTS WILL GET THE UNDERSTANDING OF THE TOPIC DISCUSSED.	EVALUATION THROUGH MONTHLY MOCK TESTS AND ASSIGNMENTS AND DISCUSSIONS THROUGH WHICH WE ASSESS AND EVALUATE THE PERFORMANCE

				equation, Properties of Harmonic function, Methods of separation of variable for solving Laplace, wave and diffusion equations.				
			UNIT-III	Linear Integral Equations-Definition and Classification of conditions, Special kinds of Kernels, Eigen values and Eigen functions, Convolution integral, Inner product, Integral equations with separable Kernels. Reduction to a system of algebraic equations.	MIN 06 LECTURES	OFFLINE TEACHING METHOD (NOTES IN FORM OF PDF,AUDIO/ VIDEO,CLASS ROOM TEACHING METHOD)	STUDENTS WILL GET THE UNDERSTANDING OF THE TOPIC DISCUSSED.	EVALUATION THROUGH MONTHLY MOCK TESTS AND ASSIGNMENTS AND DISCUSSIONS THROUGH WHICH WE ASSESS AND EVALUATE THE PERFORMANCE
			UNIT-IV	Fredholm alternative, Fredholm Theorem, Fredholm alternative theorem, Approximate method, Method of successive approximations, Iterative scheme. Solution of Fredholm and Volterra integral equation, Results about resolvent Kernel	MIN 06 LECTURES	OFFLINE TEACHING METHOD (NOTES IN FORM OF PDF,AUDIO/ VIDEO,CLASS ROOM TEACHING METHOD)	STUDENTS WILL GET THE UNDERSTANDING OF THE TOPIC DISCUSSED.	EVALUATION THROUGH MONTHLY MOCK TESTS AND ASSIGNMENTS AND DISCUSSIONS THROUGH WHICH WE ASSESS AND EVALUATE THE PERFORMANCE
			Reference book: Text Books: 1. I.N. Sneddon: Elements of Partial Differential Equations, Mc -Graw Hill, 1988. 2. Ram P. Kanwal, Linear Integral Equations (2nd ed.), Birkhäuser, Boston. Suggested Readings: 3. T. Amarnath: An Elementary Course in Partial Differential Equations, Narosa Publishing House, New Delhi, 2005. 4. Tyn Myint U: Partial Differential Equations of Mathematical Physics, Elsevier Publications. **Web References:**					**FINAL EVALUATION THROUGH INTERNAL ASSESMENT UPLODED ON LU EXAM PORTAL**

			Digital platforms web links: NPTEL/SWAYAM/ MOOCS/Openstax.org https://openlearninglibrary.mit/edu/courses http://heecontent.upsdc.gov.in/SearchContent.aspx https://www.lkouniv.ac.in/en/article/e-content-faculty-of-science					
III	**BSC (NEP) -III YEAR, V SEM** **CREDITS-4** **T:04**	**P-11 B** **DISCRETE MATHEMATICS**	**Course Outcomes:** 1. Lattices and their types. 2. Boolean algebra, switching circuits and their applications. 3. Graphs, their types and its applications in study of shortest path algorithms. 4. Display familiarity with the mathematical models which are the integral part of the hardware and software of computer science. 5. Elaborate and expand their understanding of the tools helpful in the implementation of circuit design, AI algorithms and compiler construction.					
			UNIT-1	Propositional Logic- Proposition logic, basic logic, logical connectives, truth tables, tautologies, contradiction, normal forms (conjunctive and disjunctive), modus ponens and modus tollens, validity, predicate logic, universal and existential quantification, proof by implication, converse, inverse contrapositive, contradiction, direct proof by using truth table.	MIN 06 LECTURES	OFFLINE TEACHING METHOD (NOTES IN FORM OF PDF,AUDIO/ VIDEO,CLASS ROOM TEACHING METHOD)	STUDENTS WILL GET THE UNDERSTANDING OF THE TOPIC DISCUSSED.	EVALUATION THROUGH MONTHLY MOCK TESTS AND ASSIGNMENTS AND DISCUSSIONS THROUGH WHICH WE ASSESS AND EVALUATE THE PERFORMANCE
			UNIT-II	Boolean Algebra- Basic definitions, Sum of products and products of sums, duality principle, Boolean functions, Logic gates and Karnaugh maps. Lattice, Duality, types of lattices, sublattices, bounded lattices, distributive lattices,	MIN 06 LECTURES	OFFLINE TEACHING METHOD (NOTES IN FORM OF PDF,AUDIO/ VIDEO,CLASS ROOM TEACHING METHOD)	STUDENTS WILL GET THE UNDERSTANDING OF THE TOPIC DISCUSSED.	EVALUATION THROUGH MONTHLY MOCK TESTS AND ASSIGNMENTS AND DISCUSSIONS THROUGH WHICH WE ASSESS AND EVALUATE THE PERFORMANCE

				complemented lattices, modular lattices, join irreducible elements.				
			UNIT-III	Combinatorics- Inclusion-exclusion, recurrence relations (nth order recurrence relation with constant coefficients, Homogeneous recurrence relations, Inhomogeneous recurrence relations), generating function (closed form expression, properties of G.F., solution of recurrence relations using G.F. solution of combinatorial problem using G.F.)	MIN 06 LECTURES	OFFLINE TEACHING METHOD (NOTES IN FORM OF PDF,AUDIO/ VIDEO,CLASS ROOM TEACHING METHOD)	STUDENTS WILL GET THE UNDERSTANDING OF THE TOPIC DISCUSSED.	EVALUATION THROUGH MONTHLY MOCK TESTS AND ASSIGNMENTS AND DISCUSSIONS THROUGH WHICH WE ASSESS AND EVALUATE THE PERFORMANCE
			UNIT-IV	Finite Automata- Basic concepts of automation theory, Deterministic Finite Automation (DFA), transition function, transition table, Non Deterministic Finite Automata (NDFA), Mealy and Moore machine, Minimization of finite automation.	MIN 06 LECTURES	OFFLINE TEACHING METHOD (NOTES IN FORM OF PDF,AUDIO/ VIDEO,CLASS ROOM TEACHING METHOD)	STUDENTS WILL GET THE UNDERSTANDING OF THE TOPIC DISCUSSED.	EVALUATION THROUGH MONTHLY MOCK TESTS AND ASSIGNMENTS AND DISCUSSIONS THROUGH WHICH WE ASSESS AND EVALUATE THE PERFORMANCE

			Reference book: **Text books:** 1. Discrete Mathematics by C. L.Liu. 2. Discrete Mathematics with computer application by Trembley and Manohar. 3. Mendelson, Elliott: Introduction to Mathematical Logic, Chapman & Hall, 1997 4. John E. Hoprcroft, Rajeev Motwani, Jeffrey D. Ullman: Introduction to Automata Theory, Languages and Computation, Pearson Education, 2000 **Suggested Readings:** 5. Arnold B. H.: Logic and Boolean Algebra, Prentice Hall, 1962 6. K. H. Rosen: Discrete Mathematics and its applications, MGH 1999 **Web References:** Digital platforms web links: NPTEL/SWAYAM/ MOOCS/Openstax.org https://openlearninglibrary.mit/edu/courses http://heecontent.upsdc.gov.in/SearchContent.aspx https://www.lkouniv.ac.in/en/article/e-content-faculty-of-science				**FINAL EVALUATION THROUGH INTERNAL ASSESMENT UPLODED ON LU EXAM PORTAL**
III	**BSC (NEP) -III YEAR, V SEM** **CREDITS-4** **T:04**	**P-11 C** **NUMBER THEORY**	**Course Outcomes:** 1. To have knowledge of primes, congruences, quadratic residues and primitive roots. 2. Solving Diophantine equations. 3. Derive generating functions and recurrence relations.				
			UNIT-1	Divisibility; Euclidean algorithm; primes; congruences; Fermat's theorem, Euler's theorem and Wilson's theorem; Fermat's quotients and theirelementary consequences; solutions of congruences; Chinese remainder theorem; Euler's phi-function. Congruences	MIN 06 LECTURES	OFFLINE TEACHING METHOD (NOTES IN FORM OF PDF,AUDIO/ VIDEO,CLASS ROOM TEACHING METHOD)	STUDENTS WILL GET THE UNDERSTANDING OF THE TOPIC DISCUSSED.	EVALUATION THROUGH MONTHLY MOCK TESTS AND ASSIGNMENTS AND DISCUSSIONS THROUGH WHICH WE ASSESS AND EVALUATE THE PERFORMANCE

			UNIT-II	Congruence modulo powers of prime; primitive roots and their existence; quadratic residues; Legendre symbol, Gauss' lemma about Legendre symbol; quadratic reciprocity law; proofs of various formulations; Jacobi symbol.	MIN 06 LECTURES	OFFLINE TEACHING METHOD (NOTES IN FORM OF PDF,AUDIO/ VIDEO,CLASS ROOM TEACHING METHOD)	STUDENTS WILL GET THE UNDERSTANDING OF THE TOPIC DISCUSSED.	EVALUATION THROUGH MONTHLY MOCK TESTS AND ASSIGNMENTS AND DISCUSSIONS THROUGH WHICH WE ASSESS AND EVALUATE THE PERFORMANCE
			UNIT-III	Diophantine Equations, Solutions of ax + by = c, $xn+ yn= zn$; properties of Pythagorean triples; sums of two, four and five squares; assorted examples of diophantine equations.	MIN 06 LECTURES	OFFLINE TEACHING METHOD (NOTES IN FORM OF PDF,AUDIO/ VIDEO,CLASS ROOM TEACHING METHOD)	STUDENTS WILL GET THE UNDERSTANDING OF THE TOPIC DISCUSSED.	EVALUATION THROUGH MONTHLY MOCK TESTS AND ASSIGNMENTS AND DISCUSSIONS THROUGH WHICH WE ASSESS AND EVALUATE THE PERFORMANCE
			UNIT-IV	Generating Functions and Recurrence Relations, Generating Function Models, calculating coefficient of generating functions, Partitions, Exponential Generating Functions, A Summation Method. Recurrence Relations: Recurrence Relation Models, Divide and conquer Relations, Solution of Linear, Recurrence Relations, Solution of Inhomogeneous Recurrence Relations, Solutions with Generating Functions.	MIN 06 LECTURES	OFFLINE TEACHING METHOD (NOTES IN FORM OF PDF,AUDIO/ VIDEO,CLASS ROOM TEACHING METHOD)	STUDENTS WILL GET THE UNDERSTANDING OF THE TOPIC DISCUSSED.	EVALUATION THROUGH MONTHLY MOCK TESTS AND ASSIGNMENTS AND DISCUSSIONS THROUGH WHICH WE ASSESS AND EVALUATE THE PERFORMANCE

			Reference book: **Text books:** 1. Niven, I., Zuckerman, H. S. and Montgomery, H. L. (2003) An Int. to the Theory of Numbers (6th edition) John Wiley and sons, Inc., New York. 2. Burton, D. M. (2002) Elementary Number Theory (4th edition) Universal Book Stall, New Delhi. 3. Balakrishnan, V. K. (1996) Introductory Discrete Mathematics, Dover Publications. **Suggested Readings :** 4. Balakrishnan, V. K. (1994) Schaum's Outline of Theory and Problems of Combinatorics Including Concepts of Graph Theory, Schaum's Outline **Web References:** Digital platforms web links: NPTEL/SWAYAM/ MOOCS/Openstax.org https://openlearninglibrary.mit/edu/courses http://heecontent.upsdc.gov.in/SearchContent.aspx https://www.lkouniv.ac.in/en/article/e-content-faculty-of-science	**FINAL EVALUATION THROUGH INTERNAL ASSESMENT UPLODED ON LU EXAM PORTAL**

❖ **NOTE:** THERE WILL BE AN **INTERNSHIP / TERM ASSIGNMENT** **IN V SEMESTER (NEP).**

✓ **Credit :04**

COLLEGE: MBP GOVT. P.G. COLLEGE, ASHIANA, LUCKNOW

ACADEMIC CALENDAR : SESSION- (2024-2025)

NAME OF TEACHER: DR. POONAM BAJPAI
DEPARTMENT: DEPARTMENT OF **MATHEMATICS**
CLASS: **BSC(NEP)-III** YEAR (**VI SEMESTER**) (APPLICABLE FROM JANUARY 2025) EACH PAPER CARRIES 100 MARKS (4 CREDITS)

S.NO.	CLASS (YEAR, SEMESTER)	PAPER	UNIT	TOPIC NAME	MONTHLY/ WEEKLY PLAN	TEACHING PEDAGOGY	LEARNING OUTCOMES	ANY OTHER DETAIL
01	02	03	04	05	06	07	08	09
I	**BSC (NEP) -III YEAR, VI SEM** **CREDITS-4** **T:04**	**P –12** ADVANCED ALGEBRA	**Course Outcomes:** 1. Give the structure of an abelian group of a given order. 2. Construct the splitting field extension of a given polynomial. 3. Understand the interplay of group theory and field theory. 4. Determine the minimal polynomial of an algebraic element.					
			UNIT-1	Series of groups, Schreier theorem, Jordan Holder theorem, solvable groups, Nilpotent groups, Insolvability of Sn for n>5,	MIN 06 LECTURES	OFFLINE TEACHING METHOD (NOTES IN FORM OF PDF,AUDIO/ VIDEO,CLASS ROOM TEACHING METHOD)	STUDENTS WILL GET THE UNDERSTANDING OF THE TOPIC DISCUSSED.	EVALUATION THROUGH MONTHLY MOCK TESTS AND ASSIGNMENTS AND DISCUSSIONS THROUGH WHICH WE ASSESS AND EVALUATE THE PERFORMANCE
			UNIT-1I	Finite Abelian groups, primary decomposition theorem, basis theorem, fundamental theorem of finite Abelian group, elementary divisors and invariant factors,	MIN 06 LECTURES	OFFLINE TEACHING METHOD (NOTES IN FORM OF PDF,AUDIO/ VIDEO,CLASS ROOM TEACHING METHOD)	STUDENTS WILL GET THE UNDERSTANDING OF THE TOPIC DISCUSSED.	EVALUATION THROUGH MONTHLY MOCK TESTS AND ASSIGNMENTS AND DISCUSSIONS THROUGH WHICH WE ASSESS AND EVALUATE THE PERFORMANCE

			UNIT-1II	Field extensions: finite extension, finitely generated extension, algebraic extension, simple extension, transcendental extension, finite field.	MIN 06 LECTURES	OFFLINE TEACHING METHOD (NOTES IN FORM OF PDF,AUDIO/ VIDEO,CLASS ROOM TEACHING METHOD)	STUDENTS WILL GET THE UNDERSTANDING OF THE TOPIC DISCUSSED.	EVALUATION THROUGH MONTHLY MOCK TESTS AND ASSIGNMENTS AND DISCUSSIONS THROUGH WHICH WE ASSESS AND EVALUATE THE PERFORMANCE
			UNIT-1V	Splitting field, algebraically closed field, normal extension, separable extension, primitive element theorem. Galois theory- Galois group, Galois extension, Fundamental theorem of Galois theory, Artin's theorem, Fundamental theorem of algebra (Algebraic Proof)	MIN 06 LECTURES	OFFLINE TEACHING METHOD (NOTES IN FORM OF PDF,AUDIO/ VIDEO,CLASS ROOM TEACHING METHOD)	STUDENTS WILL GET THE UNDERSTANDING OF THE TOPIC DISCUSSED.	EVALUATION THROUGH MONTHLY MOCK TESTS AND ASSIGNMENTS AND DISCUSSIONS THROUGH WHICH WE ASSESS AND EVALUATE THE PERFORMANCE
			References: **Text Books:** 1. V. Sahai & V. Bist: Algebra, Fourth Edition, Narosa. 2. J. A. Gallian, Contemporary Abstract Algebra, 4th edition, Narosa 3. DJS Robinson, An Introduction to Abstract Algebra, Hindustan Book Agency. **Suggested Readings:** 4. J. B. Fraleigh: A first course in Abstract algebra, Narosa 5. S. Lang: Algebra, Addison Wesley. **Web References:** Digital platforms web links: NPTEL/SWAYAM/ MOOCS/Openstax.org https://openlearninglibrary.mit/edu/courses http://heecontent.upsdc.gov.in/SearchContent. https://www.lkouniv.ac.in/en/article/e-content-faculty-of-science					
II	**BSC (NEP) -III YEAR, VI SEM** **CREDITS-4**	**P-13** **DIFFERENTIAL GEOMETRY & TENSOR ANALYSIS**	**Course Outcomes:** 1. Explain the concept of differentiable geometry. 2. Understand the concepts of tensors in differentiable geometry. 3. Apply various concept of differential calculus in tensors.					

	T:04		**UNIT-1**	Local theory of curves-Space curves, Examples, Plane Curves, tangent and normal and binormal, Osculating Plane, normal plane and rectifying plane, Helices, Serret-Frenet apparatus, contact between curve and surfaces, tangent surfaces, involutes and evolutes of curves, Bertrand curves, Intrinsic equations, fundamental existence theorem for space curves.	MIN 06 LECTURES	OFFLINE TEACHING METHOD (NOTES IN FORM OF PDF,AUDIO/ VIDEO,CLASS ROOM TEACHING METHOD)	STUDENTS WILL GET THE UNDERSTANDING OF THE TOPIC DISCUSSED.	EVALUATION THROUGH MONTHLY MOCK TESTS AND ASSIGNMENTS AND DISCUSSIONS THROUGH WHICH WE ASSESS AND EVALUATE THE PERFORMANCE
			UNIT-II	Metric-first fundamental form and arc length, Direction coefficients, families of curves, intrinsic properties, geodesics, canonical geodesic equations, normal properties of geodesics, geodesics curvature, Gauss-Bonnet theorem, Gaussian curvature, normal curvature, Meusneir's theorem, mean curvature, Gaussian curvature, umbilic points, lines of curvature, Rodrigue's formula, Euler's theorem.	MIN 06 LECTURES	OFFLINE TEACHING METHOD (NOTES IN FORM OF PDF,AUDIO/ VIDEO,CLASS ROOM TEACHING METHOD)	STUDENTS WILL GET THE UNDERSTANDING OF THE TOPIC DISCUSSED.	EVALUATION THROUGH MONTHLY MOC TESTS AND ASSIGNMENTS THROUGH WHICH WE ASSESS AND EVALUATE THE PERFORMANCE AND DISCUSSIONS
			UNIT-III	Tensor algebra: Vector spaces, the dual spaces, tensor product of vector spaces, transformation formulae, contraction, special tensor, inner product, associated tensor. Tensor Analysis: Contravariant and covariant vectors and tensors, Mixed tensors, Symmetric and	MIN 06 LECTURES	OFFLINE TEACHING METHOD (NOTES IN FORM OF PDF,AUDIO/ VIDEO,CLASS ROOM TEACHING METHOD)	STUDENTS WILL GET THE UNDERSTANDING OF THE TOPIC DISCUSSED.	EVALUATION THROUGH MONTHLY MOCK TESTS AND ASSIGNMENTS AND DISCUSSIONS THROUGH WHICH WE ASSESS AND EVALUATE THE PERFORMANCE

				skew-symmetric tensors, Algebra of tensors, Contraction and inner product, Quotient theorem, Reciprocal tensors, Christoffel's symbols, Covariant differentiation.				
			UNIT-IV	Gradient of scalars, Divergence of a contra-variant vector, covariant vector and conservative vectors, Laplacian of an invariant, curl of a covariant vector, irrotational vector, Riemannian space, Riemannian curvatures and their properties, Ricci tensor, and scalar curvature, Einstein space and Einstein tensor, Geodesics. .	MIN 09 LECTURES	OFFLINE TEACHING METHOD (NOTES IN FORM OF PDF,AUDIO/ VIDEO,CLASS ROOM TEACHING METHOD)	STUDENTS WILL GET THE UNDERSTANDING OF THE TOPIC DISCUSSED.	EVALUATION THROUGH MONTHLY MOCK TESTS AND ASSIGNMENTS AND DISCUSSIONS THROUGH WHICH WE ASSESS AND EVALUATE THE PERFORMANCE
			REFERENCE BOOK: **Text books:** 1. T.J. Willmore, An introduction to Differential Geometry,Dover Publication 2012. 2. S.Lang., Fundamentals of Differential Geometry; Springer, 1999. 3. B. O'Neil, Elementary Differential Geometry, 2nd Edition, Academic press, 2006. 4. R.S. Mishra, A Course in Tensors with Application to Riemannian Geometry, Pothishala 1988. **Suggested Readings:** 5. David C. Kay, Tensor Analysis, Schaum's Outline series McGraw Hill 1988. **Web References:** Digital platforms web links: NPTEL/SWAYAM/ MOOCS/Openstax.org https://openlearninglibrary.mit/edu/courses http://heecontent.upsdc.gov.in/SearchContent.aspx https://www.lkouniv.ac.in/en/article/e-content-faculty-of-science				**FINAL EVALUATION THROUGH INTERNAL ASSESMENT UPLODED ON LU EXAM PORTAL**

III	**BSC (NEP) -III YEAR, VI SEM** **CREDITS-4** **T:04**	**P-14 A** **ADVANCED DIFFERENTIAL EQUATIONS**	**Course Outcomes:** 1. Solve the system of 1st order differential equations, 2nd order differential equations, nth order differential equations, oscillatory equation, stability and unstability of linear and non-linear system of equations. 2. Conceptualize Green's functions and nature of critical points. 3. Prove advanced understanding of topics in applied mathematics, computational physics etc.					
			UNIT-1	Linear System- Introduction, properties of linear homogeneous systems, Abel-Liouville formula, Periodic linear System, Floquet's theorem, Solution of nth order linear homogeneous equation with variable coefficients.	MIN 06 LECTURES	OFFLINE TEACHING METHOD (NOTES IN FORM OF PDF,AUDIO/ VIDEO,CLASS ROOM TEACHING METHOD)	STUDENTS WILL GET THE UNDERSTANDING OF THE TOPIC DISCUSSED.	EVALUATION THROUGH MONTHLY MOCK TESTS AND ASSIGNMENTS AND DISCUSSIONS THROUGH WHICH WE ASSESS AND EVALUATE THE PERFORMANCE
			UNIT-II	Inhomogeneous linear system, nth order linear non-homogeneous equation with variable coefficients, Hurwitz's theorem, Non-linear system, Volterra's prey & predator equation, Non linear equations: Autonomous system.	MIN 06 LECTURES	OFFLINE TEACHING METHOD (NOTES IN FORM OF PDF,AUDIO/ VIDEO,CLASS ROOM TEACHING METHOD)	STUDENTS WILL GET THE UNDERSTANDING OF THE TOPIC DISCUSSED.	EVALUATION THROUGH MONTHLY MOCK TESTS AND ASSIGNMENTS AND DISCUSSIONS THROUGH WHICH WE ASSESS AND EVALUATE THE PERFORMANCE
			UNIT-III	The phase plane & its phenomena, types of critical points & Stability, Critical points & stability for linear system, stability by Liapunov's direct method. Green function, Construction of Green functions, Green function of homogeneous and non-homogeneous end	MIN 06 LECTURES	OFFLINE TEACHING METHOD (NOTES IN FORM OF PDF,AUDIO/ VIDEO,CLASS ROOM TEACHING METHOD)	STUDENTS WILL GET THE UNDERSTANDING OF THE TOPIC DISCUSSED.	EVALUATION THROUGH MONTHLY MOCK TESTS AND ASSIGNMENTS AND DISCUSSIONS THROUGH WHICH WE ASSESS AND EVALUATE THE PERFORMANCE

				conditions, Strum Liouville systems.				
			UNIT-IV	Second order differential equation: Introduction, Preliminary results, Boundedness of solutions, Oscillatory equation, number of zeroes, Pruffer's transformation, Strum theorem, Strum's comparison theorem.	MIN 06 LECTURES	OFFLINE TEACHING METHOD (NOTES IN FORM OF PDF,AUDIO/ VIDEO,CLASS ROOM TEACHING METHOD)	STUDENTS WILL GET THE UNDERSTANDING OF THE TOPIC DISCUSSED.	EVALUATION THROUGH MONTHLY MOCK TESTS AND ASSIGNMENTS AND DISCUSSIONS THROUGH WHICH WE ASSESS AND EVALUATE THE PERFORMANCE
			REFERENCE BOOK: **Text books:** 1. G. F. Simmons: Differential Equation, Tata McGraw-Hill 2. B. Rai, D. P. Chaudhary, H.I. Freedman: A course in Ordinary Differential Equations, Narosa Publishing House. 3. S. L. Ross: Differential Equations, Wiley Indian, 2004 **Suggested Readings:** **4.**E. A. Coddington: An Introduction to Ordinary Differential Equations Web References: **Web References**: Digital platforms web links: NPTEL/SWAYAM/ MOOCS/Openstax.org https://openlearninglibrary.mit/edu/courses http://heecontent.upsdc.gov.in/SearchContent.aspx https://www.lkouniv.ac.in/en/article/e-content-faculty-of-science				**FINAL EVALUATION THROUGH INTERNAL ASSESMENT UPLODED ON LU EXAM PORTAL**

III	**BSC (NEP) -III YEAR, VI SEM** **CREDITS-4** **T:04**	**P-14 B** **OPERATIONS RESEARCH**	**Course Outcomes:** 1. Be able to understand the application of OR and frame a LP Problem with solution 2. Be able to build and solve Transportation and Assignment problems using appropriate method. 3. Be able to design and solve simple models of CPM and queuing to improve decision making and develop critical thinking and objective analysis of decision problems. 4. to take best course of action out of several alternative courses for the purpose of achieving objectives by applying game theory and sequencing models.					
			UNIT-1	Linear programming problems, Slack and surplus variables, Statement of general Linear programming Problems, Standard and matrix forms of linear programming problem, Basic feasible solution.	MIN 06 LECTURES	OFFLINE TEACHING METHOD (NOTES IN FORM OF PDF,AUDIO/ VIDEO,CLASS ROOM TEACHING METHOD)	STUDENTS WILL GET THE UNDERSTANDING OF THE TOPIC DISCUSSED.	EVALUATION THROUGH MONTHLY MOCK TESTS AND ASSIGNMENTS AND DISCUSSIONS THROUGH WHICH WE ASSESS AND EVALUATE THE PERFORMANCE
			UNIT-II	Convex sets, Fundamental theorem of linear programming, Simplex method. Artificial variables, Big-M method, Two-phase method, Revised simplex method.	MIN 06 LECTURES	OFFLINE TEACHING METHOD (NOTES IN FORM OF PDF,AUDIO/ VIDEO,CLASS ROOM TEACHING METHOD)	STUDENTS WILL GET THE UNDERSTANDING OF THE TOPIC DISCUSSED.	EVALUATION THROUGH MONTHLY MOCK TESTS AND ASSIGNMENTS AND DISCUSSIONS THROUGH WHICH WE ASSESS AND EVALUATE THE PERFORMANCE
			UNIT-III	Resolution of degeneracy, Duality in linear programming problems, Dual simplex method, Primal-dual relation analysis, integer programming.	MIN 06 LECTURES	OFFLINE TEACHING METHOD (NOTES IN FORM OF PDF,AUDIO/ VIDEO,CLASS ROOM TEACHING METHOD)	STUDENTS WILL GET THE UNDERSTANDING OF THE TOPIC DISCUSSED.	EVALUATION THROUGH MONTHLY MOCK TESTS AND ASSIGNMENTS AND DISCUSSIONS THROUGH WHICH WE ASSESS AND EVALUATE THE PERFORMANCE

			UNIT-IV	Transportation problems, assignment problems, Queuing Theory, Markov Chains, PERT and CPM, Optimization and constrained Optimization using Langrange's Multiplier.	MIN 06 LECTURES	OFFLINE TEACHING METHOD (NOTES IN FORM OF PDF,AUDIO/ VIDEO,CLASS ROOM TEACHING METHOD)	STUDENTS WILL GET THE UNDERSTANDING OF THE TOPIC DISCUSSED.	EVALUATION THROUGH MONTHLY MOCK TESTS AND ASSIGNMENTS AND DISCUSSIONS THROUGH WHICH WE ASSESS AND EVALUATE THE PERFORMANCE
			REFERENCE BOOK: **Text books:** 1. Hamdy A. Taha, Operations Research: An Introduction, 10th Edition, Pearson 2. Kanti Swaroop, P. K. Gupta, Manmohan, Operations Research, Sultan Chand 29 **Suggested Readings:** 3. G. Hadley, Linear Programming **Web References**: Digital platforms web links: NPTEL/SWAYAM/ MOOCS/Openstax.org https://openlearninglibrary.mit/edu/courses http://heecontent.upsdc.gov.in/SearchContent.aspx https://www.lkouniv.ac.in/en/article/e-content-faculty-of-science						**FINAL EVALUATION THROUGH INTERNAL ASSESMENT UPLODED ON LU EXAM PORTAL**

❖ **NOTE:** THERE WILL BE A **MINOR PROJECT** IN VI SEMESTER (NEP).