Name – Sukhdev Singh

CLASS: B.Sc./B.A. -I Year II Sem

NAME OF PAPER – VECTOR CALCULUS AND GEOMETRY

PAPER CODE(for B.Sc.) -CML-207

PAPER CODE(for B.A.) - BAMH-105

| SR. NO. | MONTHS | PERIOD | TOPICS |
|---|---|---|---|
| 1. | 1st | 1st week<br>2nd week<br>3rd week<br>Last week | 1. Scalar and vector product of three vectors, derivative along a curve, directional derivatives.<br>2. Gradient of a scalar point function Geometrical interpretation of grad $\phi$ .<br>3.Divergence and curl of a vector point function. Gradient, divergence and curl of sums and product and their related vector identities.<br>4. Laplacian operators. |
| 2. | 2nd | 1st week<br>2nd week<br>3rd week<br>Last week | 1. Line integral, surface integral, volume integral<br>2. Gauss divergence theorem, Divergence theorem in Cartesian coordinates<br>3. Green theorem, Stoke's theorem (relation between line and surface integral) Stoke's theorem in Cartesian form.<br>4. Green's Theorem in plane as special case of Stoke's Theorem |
| 3. | 3rd | 1st week<br>2nd week<br>3rd week<br>Last week | 1.General equation of second degree,<br>2 Tracing of conics.System of conics<br>3 Tangent at any point to the conic,Director circle of conic,<br>4.tangent and normal to the conic. |
| 4. | 4th | 1st week<br>2nd week<br>3rd week<br>Last week | Sphere ; plane section of a sphere. Sphere through a given circle.<br>2. Intersection of two spheres. Co-axial system of spheres.<br>3. Cones: Right circular cone, enveloping cone and reciprocal cone.<br>4.Cylinder: Right circular cylinder and enveloping cylinder |

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Asstt Prof (Maths)

Session – 2023–24

Name – Sukhdev Singh

**CLASS: B.Sc./B.A. -I Year II Sem**

**NAME OF PAPER - Ordinary Diff. Equ. & Laplace Transform**

**PAPER CODE(for B.Sc) -CML-206**

**PAPER CODE(for B.A.) - BAMH-104**

| SR. NO. | MONTHS | PERIOD | TOPICS |
|---|---|---|---|
| 1. | 1st | 1st week<br>2nd week<br>3rd week<br>Last week | 1. Geometrical meaning of a differential equation. Exact differential equations, Integrating factors.<br>2. First order higher degree equations solvable for x,y,p Lagrange's equations,<br>3 Clairaut's equations. Equation reducible to Clairaut's form.<br>4. Singular solutions. |
| 2. | 2nd | 1st week<br>2nd week<br>3rd week<br>Last week | 1Orthogonal trajectories: in Cartesian coordinates and polar coordinates.<br>2 Self orthogonal family of curves. Linear differential equations with constant coefficients.<br>3 Homogeneous linear ordinary differential equations.<br>4 Equations reducible to homogeneous |
| 3. | 3rd | 1st week<br>2nd week<br>3rd week<br>Last week | 1. Linear differential equations of second order:<br>2. Reduction to normal form.<br>3. Transformation of the equation by changing the dependent variable/ the independent variable.<br>4. Method of variations of parameters |
| 4. | 4th | 1st week<br>2nd week<br>3rd week<br>Last week | 1. Laplace Transforms – Existence theorem for Laplace transforms, Linear property of the Laplace transforms, Shifting theorems,<br>2.Laplace transforms of derivatives and integrals,<br>3. Inverse Laplace transforms, convolution theorem,<br>4.solution of ordinary differential equations using Laplace transform. |

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Session – 2023-24

Name – Surbhi Singh

**CLASS: B.Sc./B.A. - II Year IV Sem**

**NAME OF PAPER – Partial Differential Equations & Special Functions**

**PAPER CODE(for B.Sc) -CML-406**

**PAPER CODE(for B.A.) - BAMH-204**

| SR. NO. | MONTHS | PERIOD | TOPICS |
|---|---|---|---|
| 1. | 1st | 1st week<br>2nd week<br>3rd week<br>Last week | 1.Partial differential equations: Formation, order and degree.<br>2.Linear and non-linear partial differential equations of the first order; Complete solution.<br>3.Singular solution, General solution, Solution of Lagrange s linear equations.<br>4.Charpit s general method of solution, Compatible systems of first order equations, Jacobi s method. |
| 2. | 2nd | 1st week<br>2nd week<br>3rd week<br>Last week | 1.Linear partial differential equations of second and higher orders, Linear and non-linear homogeneous and nonhomogeneousequations with constant coefficients,<br>2.Partial differential equation with variable coefficientsreducible to equations with constant coefficients, their complimentary functions and particular integrals,<br>3.Equations reducible to linear equations with constant coefficients.<br>4.Method of separation of variables: Solution of Laplace's equation, Wave equation (one and two dimensions), Diffusion (Heat) equation (one and two dimension) in Cartesian Co-ordinate system |
| 3. | 3rd | 1st week<br>2nd week<br>3rd week<br>Last week | 1.Classification of linear partial differential equations of second order, hyperbolic, parabolic and elliptic types,<br>2. Reduction of second order linear partial differential equations to Canonical (Normal) forms and their solutions.<br>3.Solution of linear hyperbolic equations, Monge's method for partial differential equations of second order,Cauchy's problem for second order partial differential equations.<br>4.Characteristic equations and characteristic curves of second order partial differential equation. |
| 4. | 4th | 1st week<br>2nd week<br>3rd week<br>Last week | 1.Series solution of differential equations – Power series method.<br>2.Bessel equation and its solution: Besselfunctions and their properties-Convergence, recurrence,Relations and generating functions, Orthogonality of Bessel functions.<br>3.Legendre differential equation and its solution: Legendre function and its properties-Recurrence Relations and generating functions.<br>4. Orthogonality of Legendre polynomial Rodrigues' Formula forLegendre Polynomial |

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Session - 2023-24
Name – Sukhdev Singh

**CLASS: B.Sc/B.A. - III Year VI Sem**
**NAME OF PAPER – REAL AND COMPLEX ANALYSIS**
**PAPER CODE(for B.Sc) -CML-607(i)**
**PAPER CODE(for B.A.) - BAMH-306(i)**

| SR. NO. | MONTHS | PERIOD | TOPICS |
|---|---|---|---|
| 1. | 1st | 1st week<br>2nd week<br>3rd week<br>Last week | 1Definition and examples of metric spaces, neighborhoods,<br>2. Limit points, interior points, open and closed sets, closure and interior, boundary points.<br>3.Subspace of a metric space, equivalent metrics,<br>4.Cauchy sequences, completeness, Cantor's intersection theorem. |
| 2. | 2nd | 1st week<br>2nd week<br>3rd week<br>Last week | 1 Baire's category theorem, Contraction Principle,<br>2.Continuous functions, uniform continuity, compactness for metric spaces,<br>3 Sequential CompactnessBolzano-WeierstrassProperty,<br>4 Totalboundedness, finite intersection property, continuity in relation with compactness, connectedness. |
| 3. | 3rd | 1st week<br>2nd week<br>3rd week<br>Last week | 1Improper integrals and their convergence, comparison tests,<br>2.Abel's and Dirichlet's tests<br>3 Frullani's integral,<br>4.Integral as a function of a parameter, Continuity, differentiability and integrability of an integral of a function of a parameter. |
| 4. | 4th | 1st week<br>2nd week<br>3rd week<br>Last week | 1. Topology of complex numbers: Trigonometric, exponential, logarithmic and hyperbolic trigonometric functions.<br>2. Extended complex plane, Stereographic projection of complex numbers Continuity and differentiability of complex functions.<br>3. Analytic functions, Cauchy-Riemann equations, harmonic conjugates, harmonic functions<br>4. Construction of analytic functions: direct method and Milne-Thomson method |

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