# MATHEMATICS

**SHRI GOBIND SINGH JI GOVT.COLLEGE PAONTA SAHIB, H.P.**
**TEACHING PLAN**
**NAME OF TEACHER:VANDANA KANSAL**
**B.A./BSc 1ST YEAR**
**SUBJECT: Differential Calculus MATH 101(CORE COURSE)**

| UNIT | TOPIC/DETAILS | MONTH | METHOD OF TEACHING |
|---|---|---|---|
| 1 | Limit and Continuity (epsilon and delta definition). Types of discontinuities. Differentiability of functions, Successive differentiation, Leibnitz's theorem. | AUGUST SEPTEMBER(5 WEEKS) | LECTURE METHOD/PPT |
| 2 | Indeterminate forms, Rolle's theorem, Lagrange's & Cauchy Mean Value theorems, Taylor's theorem with Lagrange's and Cauchy's forms of remainder. Taylor's series. Maclaurin's series of sinx, cosx, $e^x$, log$(1-x)$, $(1-x)^m$. | SEPTEMBER-OCTOBER(4 WEEKS) | LECTURE METHOD |
| 3 | Concavity, Convexity & Points of Inflexion. Curvature, Radius of curvature, center of curvature. Asymptotes.Singularpoints. Double point, Polar coordinates, Relation between Cartesian and polar coordinates. | OCTOBER-NOVEMBER(5 WEEKS) | LECTURE METHOD |
| 4 | Functions of several variables (upto three variables): Limit and Continuity of these functions Partial differentiation, Euler's theorem on homogeneous functions, Maxima and Minima with Lagrange Multipliers Method (two variables), Jacobian(upto three variables). | NOVEMBER-FEBRUARY(5 WEEKS) | LECTURE METHOD |

Note: Assignments,class test and midterm will be taken during the session

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MS.VANDANA KANSAL

PRINCIPAL

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SHRI GOBIND SINGH JI GOVT.COLLEGE PAONTA SAHIB, H.P.

TEACHING PLAN

NAME OF TEACHER: TANU CHANDEL

B.A./BSc IST YEAR

SUBJECT:DIFFERENTIAL EQUATIONS MATH-102(CORE COURSE)

| UNIT | TOPIC/DETAILS | MONTH | METHOD OF TEACHING |
|---|---|---|---|
| 1 | Basic theory of linear differential equations, Wronskian, and its properties. First order exact differential equations. Integrating factors, rules to find an integrating factor. First order higher degree equations solvable for x,y,p.Clairut's form | AUGUST-SEPTEMBER(5 WEEKS) | LECTURE METHOD/PPT |
| 2 | Methods for solving higher-order differential equations. Solving a differential equation by reducing its order. Linear homogenous equations with constant coefficients,Linear non-homogenous equations. | SEPTEMBER-OCTOBER(4 WEEKS) | LECTURE METHOD |
| 3 | The method of variation of parameters with constant coefficients.The Cauchy-Euler equation and Legendre equation. Simultaneous differential equations,Total differential equations. | OCTOBER-NOVEMBER(5WEEKS) | LECTURE MFTHOD |
| 4 | Order and degree of partial differential equations,Concept of linear and non-linear partial differential equations. Formation of first order partial differential equations(PDE). Linear partial differential equation of first order, Lagrange's method. Classification of second order partial differential equations into elliptic,parabolic and hyperbolic through illustrations only. | NOVEMBER-FEBRUARY(5WEEKS) | LECTURE METHOD |

Note: Assignments,class test and midterm will be taken during the session

MS.TANU CHANDEL(A.P.MATHEMATICS)

MS.VANDANA KANSAL ( A.P. Mathematics)

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# SHRI GOBIND SINGH JI GOVT.COLLEGE PAONTA SAHIB, H.P.
## TEACHING PLAN
### NAME OF TEACHER: TANU CHANDEL
### B.A./BSc 2ND YEAR
### SUBJECT:Real Analysis MATH 201(CORE COURSE)

| UNIT | TOPIC/DETAILS | MONTH | METHOD OF TEACHING |
|------|---------------|-------|--------------------|
| 1 | Real line, bounded sets, suprema and infima, completeness property of R. Archimedean property of R. intervals .Concept of cluster points and statement of Bolzano-Weierstrass theorem | AUGUST-SEPTEMBER(5 WEEKS) | LECTURE METHOD/PPT |
| 2 | Real Sequence, Bounded sequence, Cauchy convergence criterion for sequences. Cauchy's theorem on limits, order preservation and squeeze theorem, monotone sequences and their convergence(monotone convergence theorem without proof) | SEPTEMBER-OCTOBER(4 WEEKS) | LECTURE METHOD |
| 3 | Infinite series. Cauchy convergence criterion for series, positive term series, geometric series,comparison test,convergence of p-series, Root test, Ratio test, alternating series,Leibnitz's test (Tests of Convergence without proof).Definition and examples of absolute and conditional convergence | OCTOBER-NOVEMBER(5WEEKS) | LECTURE METHOD |
| 4 | Sequences and series of functions, Pointwise and uniform convergence. Mn-test, M-test, Results about uniform convergence, Power series and radius of convergence | NOVEMBER-FEBRUARY(5WEEKS) | LECTURE METHOD |

Note: Assignments,class test and midterm will be taken during the session

MS.TANU CHANDEL(A.P.MATHEMATICS)          MS.VANDANA KANSAL(A.P. Mathematics)

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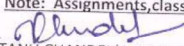# SHRI GOBIND SINGH JI GOVT.COLLEGE PAONTA SAHIB, H.P.
## TEACHING PLAN
### NAME OF TEACHER: TANU CHANDEL
### B.A./BSc 2ND YEAR
### SUBJECT: Algebra MATH 202(CORE COURSE)

| UNIT | TOPIC/DETAILS | MONTH | METHOD OF TEACHING |
|---|---|---|---|
| 1 | Definition and examples of groups, examples of abelian and non-abelian groups, the group Zn of integers under addition modulo n and the group U(n) of units under multiplication modulo n. Cyclic groups from number systems, complex roots of unity. | AUGUST-SEPTEMBER(5 WEEKS) | LECTURE METHOD/PPT |
| 2 | Subgroups, cyclic subgroups, the concept of a subgroup generated by a subset and the commutator subgroup of group, examples of subgroups including the center of a group. Cosets, Index of subgroup, Lagrange's theorem,order of an element. | SEPTEMBER-OCTOBER(4 WEEKS) | LECTURE METHOD |
| 3 | Normal subgroups : their definition, examples, and characterizations, Quotient groups. Definition of Kernel, Basic theorems of homomorphism. First theorem of Homomorphism. | OCTOBER-NOVEMBER(5WEEKS) | LECTURE METHOD |
| 4 | Definition and examples of rings, examples of commutative and non-commutative rings, rings from number systems, Zn the ring of integers modulo n. Rings of matrices. Sub rings and ideals, Definition of Integral domains and fields. | NOVEMBER-FEBRUARY(5WEEKS) | LECTURE METHOD |

Note: Assignments,class test and midterm will be taken during the session

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SHRI GOBIND SINGH JI GOVT.COLLEGE PAONTA SAHIB, H.P.

TEACHING PLAN

NAME OF TEACHER:VANDANA KANSAL

B.A./BSc 3RD YEAR

SUBJECT:Matrices MATH 301(DSE)

| UNIT | TOPIC/DETAILS | MONTH | METHOD OF TEACHING |
|------|--------------|-------|--------------------|
| 1 | Types of matrices. Rank of a matrix.In variance of rank under elementary transformations. Reduction to normal form, Solutions of linear homogeneous and non-homogeneous equations with number of equations and unknowns upto three. | AUGUST-SEPTEMBER(5 WEEKS) | LECTURE METHOD/PPT |
| 2 | Matrices in diagonal form. Reduction to diagonal form upto matrices of order 3. Computation of matrix inverses using elementary row operations. Rank of matrix. Solutions of a system of linear equations using matrices. Illustrative examples of above concepts from Geometry, Physics. Chemistry, Combinatorics and Statistics. | SEPTEMBER-OCTOBER(5WEEKS) | LECTURE METHOD |
| 3 | Definition of Vector space, R, R2, R3 as vector spaces over R, Concept of Linear dependence/Independence, Standard basis for R,R2,R3, Examples of different bases. Subspaces of R2, R3. | OCTOBER-NOVEMBER(5 WEEKS) | LECTURE METHOD |
| 4 | Translation, Dilation, Rotation, Reflection in a point, line and plane. Matrix form of basic geometric transformations. Interpretation of eigen values and eigen vectors for such transformations and eigen spaces as invariant subspaces | NOVEMBER-FEBRUARY(5 WEEKS) | LECTURE METHOD |
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| MS.VANDANA KANSAL | | | |
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**TEACHING PLAN**

**NAME OF TEACHER:VANDANA KANSAL**

**B.A./BSc 3RD YEAR**

**SUBJECT: Numerical Methods MATH 304(DSE)**

| UNIT | TOPIC/DETAILS | MONTH | METHOD OF TEACHING |
|---|---|---|---|
| 1 | Algorithms,Convergence,Bisection method, False position method, Fixed point iteration method, Newton's method,Secant method, LU decomposition | AUGUST-SEPTEMBER(5 WEEKS) | LECTURE METHOD/PPT |
| 2 | Gauss-Jacobi, Gauss-Siedel and SOR iterative methods, Lagrange and Newton interpolation : linear and higher order. | SEPTEMBER-OCTOBER(4 WEEKS) | LECTURE METHOD |
| 3 | Finite difference operators, Numerical differentiation: Newton's for ward difference and backward difference method, Sterling's Central difference,method | OCTOBER-NOVEMBER(5 WEEKS) | LECTURE METHOD |
| 4 | Integration:Trapezoidal rule, Simpson's rule,Euler's method.. | NOVEMBER-FEBRUARY(5 WEEKS) | LECTURE METHOD |

Note: Assignments,class test and midterm will be taken during the session

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TEACHING PLAN

NAME OF TEACHER: TANU CHANDEL

B.A./BSc 2ND YEAR

SUBJECT: IntegralCalculus MATH 309 (Skill Enhancement Course)

| UNIT | TOPIC/DETAILS | MONTH | METHOD OF TEACHING |
|---|---|---|---|
| 1 | Integration by Partial fractions, integration of rational and irrational functions. Properties of definite integrals. | AUGUST-SEPTEMBER(5 WEEKS) | LECTURE METHOD/PPT |
| 2 | Reduction Formule | SEPTEMBER-OCTOBER(4 WEEKS) | LECTURE METHOD |
| 3 | Areas and lengths of curves in the plane, volumes and surfaces of solids of revolution, Cartesian and parametric form | OCTOBER-NOVEMBER(5 WEEKS) | LECTURE METHOD |
| 4 | double and triple integrals | NOVEMBER-FEBRUARY(5 WEEKS) | LECTURE METHOD |

Note: Assignments,class test and midterm will be taken during the session

MS.TANU CHANDEL(A.P.MATHEMATICS)          MS.VANDANA KANSAL (A P. in Math's)

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## SHRI GOBIND SINGH JI GOVT.COLLEGE PAONTA SAHIB, H.P.
### TEACHING PLAN
### NAME OF TEACHER: TANU CHANDEL
### B.A./BSc 3RD YEAR
#### SUBJECT:VectorCalculus MATH 310 (SKILL ENHANCEMENT COURSE)

| UNIT | TOPIC/DETAILS | MONTH | METHOD OF TEACHING |
|---|---|---|---|
| 1 | Scalar and vector product of three vectors. Product of four vectors. Reciprocal vectors. Vector differentiation, Scalar valued point functions, vector valued point functions. Derivative along a curve, directional derivatives | AUGUST-SEPTEMBER(5 WEEKS) | LECTURE METHOD/PPT |
| 2 | Gradient of a scalar point function.Divergence and curl of a vector point function.Gradient, Divergence and curl of sums and products. Laplacian operator. | SEPTEMBER-OCTOBER(4 WEEKS) | LECTURE METHOD |
| 3 | Orthogonal curvilinear coordinates. Conditions for orthogonality. Fundamental triads of mutually orthogonal unit vectors. Gradient, Divergence, Curl and Laplacian operators in terms of orthogonal curvilinear coordinators. | OCTOBER-NOVEMBER(5WEEKS) | LECTURE METHOD |
| 4 | Vector integration : line incintegral, surface integral.Volume integral Theorems of Gauss, Green and Stokes (without proof)and the problems based on these theorems. | NOVEMBER-FEBRUARY(5WEEKS) | LECTURE METHOD |

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MS.TANU CHANDEL(A.P.MATHEMATICS)          MS.VANDANA KANSAL (A.P. Maths)

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TEACHING PLAN

NAME OF TEACHER:VANDANA KANSAL

B.A./BSc 3RD YEAR

SUBJECT: Probability and Statistics MATH 313(SKILL ENHANCEMENT COURSE)

| UNIT | TOPIC/DETAILS | MONTH | METHOD OF TEACHING |
|---|---|---|---|
| 1 | Sample space, probability axioms, real random variables (discrete and continuous),cumulative distribution function, probability mass/density functions | AUGUST-SEPTEMBER(5 WEEKS) | LECTURE METHOD/PPT |
| 2 | Mathematical expectation, moments, moment generating function, characteristic function,discrete distributions: uniform. | SEPTEMBER-OCTOBER(4 WEEKS) | LECTURE METHOD |
| 3 | Binomial, Poisson, continuous distributions: uniform, normal, exponential. | OCTOBER-NOVEMBER(5 WEEKS) | LECTURE METHOD |
| 4 | Joint cumulative distribution function and its properties, joint probability density functions, marginal and conditional distributions, expectation of function of two random variables, conditional expectations, independent random variables. | NOVEMBER-FEBRUARY(5 WEEKS) | LECTURE METHOD |

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## TEACHING PLAN
### NAME OF TEACHER:VANDANA KANSAL

B.A./BSc 3RD YEAR

SUBJECT:Theory of Equations MATH 316(SKILL ENHANCEMENT COURSE)

| UNIT | TOPIC/DETAILS | MONTH | METHOD OF TEACHING |
|---|---|---|---|
| 1 | General properties of polynomials, Graphical representation of a polynomials, maximum and minimum values of a polynomials, General properties of equations. | AUGUST-SEPTEMBER(5 WEEKS) | LECTURE METHOD/PPT |
| 2 | Descarte's rule of signs for positive and negative roots, Relation between the roots and the coefficients of equations | SEPTEMBER-OCTOBER(5WEEKS) | LECTURE METHOD |
| 3 | Symmetric functions, Applications symmetric function of the roots, Transformation of equations. Solutions of reciprocal and binomial equations. | OCTOBER-NOVEMBER(5 WEEKS) | LECTURE METHOD |
| 4 | Algebraic solutions of the cubic (Carden's method) and biquadratic (Descarte's&Ferrari'smethod). Properties of the derived functions. | NOVEMBER-FEBRUARY(5 WEEKS) | LECTURE METHOD |

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