SYLLABUS

Kurukshetra University, Kurukshetra

B.A. / B.Sc. 1st Year

FIRST SEMESTER

CALCULUS : (BM - 112)

Maximum Marks : { B.Sc. : 40 / B.A. : 26

Note. *The examiner is requested to set* ***nine questions*** *in all, selecting two questions from each section and* ***one compulsory question*** *consisting of five parts distributed over all the four sections. Candidates are required to attempt five questions, selecting at least one question from each section and the compulsory question.*

Section - I

$\varepsilon - \delta$ definition of the limit of a function. Basic properties of limits. Continuous functions and classification of discontinuities. Differentiability. Successive differentiation. Leibnitz theorem. Maclaurin and Taylor series expansions.

Section - II

Asymptotes in Cartesian coordinates, intersection of curve and its asymptotes, asymptotes in polar coordinates. Curvature, radius of curvature for Cartesian curves, parametric curves, polar curves. Newton's method. Radius of curvature for pedal curves. Tangential polar equations. Centre of curvature. Circle of curvature. Chord of curvature, evolutes. Tests for concavity and convexity. Points of inflexion. Multiple points. Cusps, nodes & conjugate points. Type of cusps.

Section - III

Tracing of curves in Cartesian, parametric and polar co-ordinates. Reduction formulae. Rectification, intrinsic equations of curve.

Section - IV

Quadrature (area) Sectorial area. Area bounded by closed curves. Volumes and Surfaces of solids of revolution. Theorems of Pappu's and Guilden.

SYLLABUS

Kurukshetra University, Kurukshetra

B.A. / B.Sc. 1st Year

FIRST SEMESTER

ALGEBRA : (BM - 111)

Maximum Marks : { B.Sc. : 40 / B.A. : 27

Note. *The examiner is requested to set* ***nine questions*** *in all, selecting two questions from each section and* ***one compulsory question*** *consisting of five parts distributed over all the four sections. Candidates are required to attempt five questions, selecting at least one question from each section and the compulsory question.*

Section - I

Symmetric, Skew-symmetric, Hermitian and Skew-Hermitian matrices. Elementary operations on matrices. Rank of a matrix. Inverse of a matrix. Linear dependence and independence of rows and columns of matrices. Row rank and column rank of a matrix. Eigen values, eigen vectors and the characteristic equation of a matrix. Minimal polynomial of a matrix. Cayley Hamilton theorem and its use in finding inverse of a matrix.

Section - II

Applications of matrices to a system of linear (both homogeneous and non-homogeneous) equations. Theorems on consistency of a system of linear equations. Unitary and Orthogonal Matrices, Bilinear and Quadratic forms.

Section - III

Relations between the roots and coefficients of general polynomial equation in one variable. Solutions of polynomial equations having conditions on roots. Common roots and multiple roots. Transformation of equations.

Section - IV

Nature of the roots of an equation. Descarte's rule of signs. Solutions of cubic equations (Cardan's method). Biquadratic equations and their solutions.

SYLLABUS

Kurukshetra University, Kurukshetra

B.A. / B.Sc. 1st Year

FIRST SEMESTER

SOLID GEOMETRY : (BM - 113)

Maximum Marks : { B.Sc. : 40 / B.A. : 27

Note. *The examiner is requested to set* ***nine questions*** *in all, selecting two questions from each section and* ***one compulsory question*** *consisting of five parts distributed over all the four sections. Candidates are required to attempt five questions, selecting at least one question from each section and the compulsory question.*

Section - I

General equation of second degree. Tracing of conics. Tangent at any point to the conic, chord of contact, pole of line to the conic, director circle of conic. System of conics. Confocal conics. Polar equation of a conic, tangent and normal to the conic.

Section - II

Sphere : Plane section of a sphere. Sphere through a given circle. Intersection of two spheres, radical plane of two spheres. Co-axal system of spheres.

Cones : Right circular cone, enveloping cone and reciprocal cone.

Cylinder : Right circular cylinder and enveloping cylinder.

Section - III

Central Conicoids : Equation of tangent plane. Director sphere. Normal to the conicoid Polar plane of a point. Enveloping cone of a conicoid. Enveloping cylinder of a conicoid.

Section - IV

Paraboloids : Circular section, Plane sections of conicoids.

Generating lines. Confocal conicoid. Reduction of second degree equations.

SYLLABUS

B.A. / B.Sc. 2nd Year

THIRD SEMESTER

STATICS : (BM - 233)

Maharishi Dayanand University, Rohtak

Time Allowed : 3 Hours

Note. *The question paper will consist of* ***five*** *sections. Each of the first four sections will contain two questions and the students shall be asked to attempt* ***one*** *question from each section.* ***Section – V*** *will contain* ***six*** *short answer type questions without any internal choice covering the entire syllabus and shall be* ***compulsory.***

Section - I

Composition and resolution of forces. Parallel forces. Moments and Couples

Section - II

Analytical conditions of equilibrium of coplanar forces. Friction. Centre of Gravity.

Section - III

Virtual work. Forces in three dimensions. Poinsots central axis.

Section - IV

Wrenches. Null lines and planes. Stable and unstable equilirbrium.

SYLLABUS

B.A. / B.Sc. 2nd Year

THIRD SEMESTER

PARTIAL DIFFERENTIAL EQUATIONS : (BM - 232)

Kurukshetra University, Kurukshetra

Time Allowed : 3 Hours

Note. *The examiner is requested to set* ***nine questions*** *in all, selecting two questions from each section and* ***one compulsory question*** *consisting of five or six parts distributed over all the four sections. Candidates are required to attempt* ***five questions in all****, selecting* ***at least one question*** *from each section and the compulsory question.*

Section - I

Partial differential equations : Formation, order and degree, Linear and non-linear partial differential equations of the first order : Complete solution, Singular solution, General solution, Solution of Lagrange's linear equations, Charpit's general method of solution. Compatible systems of first order equations, Jacobi's method.

Section - II

Linear partial differential equations of second and higher orders, Linear and non-linear homogeneous and non-homogeneous equations with constant coefficients, Partial differential equation with variable coefficients reducible to equations with constant coefficients, their complimentary functions and particular integrals, Equations reducible to linear equations with constant coefficients.

Section - III

Classification of linear partial differential equations of second order, Hyperbolic, parabolic and elliptic types, Reduction of second order linear partial differential equations to Canonical (Normal) forms and their solutions, Solution of linear hyperbolic equations, Monge's method for partial differential equations of second order.

Section - IV

Cauchy's problem for second order partial differential equations. Characteristic equations and characteristic curves of second order partial differential equation, 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 coordinate system.

SYLLABUS

B.A. / B.Sc. 2nd Year

THIRD SEMESTER

PARTIAL DIFFERENTIAL EQUATIONS : (BM - 232)

Kurukshetra University, Kurukshetra

Time Allowed : 3 Hours

Note. *The examiner is requested to set* ***nine questions*** *in all, selecting two questions from each section and* ***one compulsory question*** *consisting of five or six parts distributed over all the four sections. Candidates are required to attempt* ***five questions in all,*** *selecting* ***at least one question*** *from each section and the compulsory question.*

Section - I

Partial differential equations : Formation, order and degree, Linear and non-linear partial differential equations of the first order : Complete solution, Singular solution, General solution, Solution of Lagrange's linear equations, Charpit's general method of solution. Compatible systems of first order equations, Jacobi's method.

Section - II

Linear partial differential equations of second and higher orders, Linear and non-linear homogeneous and non-homogeneous equations with constant coefficients, Partial differential equation with variable coefficients reducible to equations with constant coefficients, their complimentary functions and particular integrals, Equations reducible to linear equations with constant coefficients.

Section - III

Classification of linear partial differential equations of second order, Hyperbolic, parabolic and elliptic types, Reduction of second order linear partial differential equations to Canonical (Normal) forms and their solutions, Solution of linear hyperbolic equations, Monge's method for partial differential equations of second order.

Section - IV

Cauchy's problem for second order partial differential equations. Characteristic equations and characteristic curves of second order partial differential equation, 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 coordinate system.

SYLLABUS

B.A. / B.Sc. 2nd Year

THIRD SEMESTER

ADVANCED CALCULUS : (BM - 231)

Kurukshetra University, Kurukshetra

Time Allowed : 3 Hours

Note. *The examiner is requested to set* ***nine questions*** *in all, selecting two questions from each section and* ***one compulsory question*** *consisting of five or six parts distributed over all the four sections. Candidates are required to attempt* ***five questions in all,*** *selecting* ***at least one question*** *from each section and the compulsory question.*

Section - I

Continuity, Sequential continuity, properties of continuous functions, Uniform continuity, Chain rule of differentiability. Mean value theorems; Rolle's theorem and Lagrange's mean value theorem and their geometrical interpretations. Taylor's theorem with various form of remainders, Darboux intermediate value theorem for derivatives, Indeterminate forms.

Section - II

Limit and continuity of real valued functions of two variables. Partial differentiation. Total differentials; Composite functions and implicit functions. Change of variables. Homogeneous functions and Euler's theorem on homogeneous functions. Taylor's theorem for functions o two variables.

Section - III

Differentiability of real valued functions of two variables. Schwarz and Young's theore Implicit function theorem. Maxima, Minima and saddle points of two variables. Lagran method of multipliers.

Section - IV

Curves : Tangents, Principal normals, Binormals, Serret-Frenet formulae. Locus o centre of curvature, Spherical curvature, Locus of centre of spherical curvature, Involu Evolutes, Bertrand curves. Surfaces : Tangent planes, one parameter family of sur Envelopes.

SYLLABUS

B. Sc. 3rd Year

FIFTH SEMESTER

REAL ANALYSIS : (BM - 351)

Kurukshetra University, Kurukshetra

Note. *The examiner is requested to set* ***nine questions*** *in all, selecting two questions from each section and* ***one compulsory question*** *consisting of five or six parts distributed over all the four sections. Candidates are required to attempt* ***five questions in all,*** *selecting* ***at least one question*** *from each section and the compulsory question.*

Section - I

Riemann integral, Integrability of continuous and monotonic functions, The fundamental theorem of integral calculus, Mean value theorems of integral calculus.

Section - II

Improper integral and their convergence, Comparison tests, Abel's and Dirichlet's tests, Frullani's integral, Integral as a function of a parameter. Continuity, Differentiability and integrability of an integral of a function of a parameter.

Section - III

Definition and examples of metric spaces, neighbourhoods, limit points, interior points, open and closed sets, closure and interior, boundary points, subspace of a metric space, equivalent metrics, Cauchy sequences, completeness, Cantor's intersection theorem, Baire's category theorem, Contraction principle.

Section - IV

Continuous functions, uniform continuity, compactness for metric spaces, sequential compactness, Bolzano-Weierstrass property, total boundedness, finite intersection property, continuity in relation with compactness, connectedness, components, continuity in relation with connectedness.

SYLLABUS

B.A./B. Sc. 3rd Year

FIFTH SEMESTER

NUMERICAL ANALYSIS : (BM - 353)

Kurukshetra University, Kurukshetra

Note. *The examiner is requested to set* ***nine questions*** *in all, selecting two questions from each section and* ***one compulsory question*** *consisting of five or six parts distributed over all the four sections. Candidates are required to attempt* ***five questions in all,*** *selecting* ***at least one question*** *from each section and the compulsory question.*

Part - A : Theory (30 Marks)

Section - I

Finite difference operators and their relations. Finding the missing terms and effect of error in a difference tabular values, Interpolation with equal intervals : Newton's forward and Newton's backward interpolation formulae. Interpolation with unequal intervals : Newton's divided difference. Lagrange's Interpolation formulae, Hermite formula.

Section - II

Central Differences : Gauss forward and Gauss's backward interpolation formulae. Sterling, Bessel formula.

Probability distribution of random variables, Binomial distribution, Poisson's distribution, Normal distribution : Mean, Variance and Fitting.

Section - III

Numerical Differentiation : Derivative of a function using interpolation formulae as studied in sections I & II.

Eigen Value problems : Power method, Jacobi's method, Given's method, House-Holder's method, QR-method, Lanczo's method.

Section - IV

Numerical Integration : Newton-Cote's Quadrature formula, Trapezoidal rule, Simpson's one-third and three-eighth rule, Chebychev formula, Gauss Quadrature formula.

Numerical solution of ordinary differential equations : Single step method-Picard's method. Taylor's series method. Euler's method. Runge-Kutta Methods. Multiple step methods; Predictor-corrector method. Modified Euler's method, Milne-Simpson's method.

Part - B : Practicals (20 Marks)

Implementation of numerical methods studied in the theory paper in 'C' programming language

SYLLABUS

B.A./B. Sc. 3rd Year

FIFTH SEMESTER

GROUPS AND RINGS : (BM - 352)

Kurukshetra University, Kurukshetra

Note. *The examiner is requested to set* ***nine questions*** *in all, selecting two questions from each section and* ***one compulsory question*** *consisting of five or six parts distributed over all the four sections. Candidates are required to attempt* ***five questions in all****, selecting* ***at least one question*** *from each section and the compulsory question.*

Section - I

Definition of a group with example and simple properties of groups, Subgroups and Subgroup criteria. Generation of groups, cyclic groups, Cosets, Left and right cosets, Index of a subgroup. Coset decomposition, Lagrange's theorem and its consequences, Normal subgroups. Quotient groups.

Section - II

Homomorphisms, isomorphisms, automorphisms and inner automorphisms of a group. Automorphisms of cyclic groups. Permutation groups. Even and odd permutations. Alternating groups. Cayley's theorem, Centre of a group and derived group of a group.

Section - III

Introduction to rings, subrings, integral domains and fields, Characteristics of a ring. Ring homomorphisms, ideals (principle, prime and Maximal) and Quotient rings. Field of quotients of an integral domain.

Section - IV

Euclidean rings, Polynomial rings, Polynomials over the rational field. The Eisenstein's criterion of irreducibility. Polynomial rings over commutative rings. Unique factorization domain. R unique factorization domain implies so is R $[X_1, X_2, \ldots\ldots X_n]$

SYLLABUS

B. Sc. 3rd Year

SIXTH SEMESTER

REAL AND COMPLEX ANALYSIS : (BM - 361)

Kurukshetra University, Kurukshetra

Time Allowed : 3 Hours

Maximum Marks : 45

Note. *The examiner is requested to set* ***nine questions*** *in all, selecting two questions from each section and* ***one compulsory question*** *consisting of five or six parts distributed over all the four sections. Candidates are required to attempt* ***five questions in all,*** *selecting* ***at least one question*** *from each section and the compulsory question.*

Section - I

Jacobians, Beta and Gamma functions, Double and Triple integrals, Dirichlet's integrals, Change of order of integration in double integrals.

Section - II

Fourier's series : Fourier expansion of piecewise monotonic functions, Properties of Fourier Coefficients, Dirichlet's conditions, Parseval's identity for Fourier series, Fourier series for even and odd functions, Half range series, Change of intervals.

Section - III

Extended Complex Plane, Stereographic projection of complex numbers, continuity and differentiability of complex functions, Analytic functions, Cauchy-Riemann equations. Harmonic functions.

Section - IV

Mappings by elementary functions : Translation, Rotation, Magnification and Inversion, conformal Mappings, Mobius transformations. Fixed points, Cross ratio, Inverse Points and critical mappings.

SYLLABUS

B. Sc. 3rd Year

SIXTH SEMESTER

LINEAR ALGEBRA : (BM - 362)

Kurukshetra University, Kurukshetra

Time Allowed : 3 Hours

Maximum Marks : 45

Note. *The examiner is requested to set* ***nine questions*** *in all, selecting two questions from each section and* ***one compulsory question*** *consisting of five or six parts distributed over all the four sections. Candidates are required to attempt* ***five questions in all****, selecting* ***at least one question*** *from each section and the compulsory question.*

Section - I

Vector spaces, subspaces, Sum and Direct sum of subspaces, Linear span, Linearly Independent and dependent subsets of a vector space. Finitely generated vector space, Existence theorem for basis of a finitely generated vector space, Finite dimensional vector spaces, Invariance of the number of elements of basis sets, Dimensions, Quotient space and its dimension.

Section - II

Homomorphism and isomorphism of vector spaces, Linear transformations and linear forms on vector spaces, Vector space of all the linear transformations. Dual Spaces, Bidual spaces, annihilator of subspaces of finite dimensional vector spaces. Null space, Range space of a linear transformation, Rank and Nullity Theorem.

Section - III

Algebra of Linear Transformation, Minimal Polynomial of a linear transformation, Singular and non-singular linear transformations, Matrix of a linear transformation, Change of basis. Eigen values and Eigen vectors of linear transformations.

Section - IV

Inner product spaces, Cauchy-Schwarz inequality, Orthogonal vectors, Orthogona complements, Orthogonal sets and Basis, Bessel's inequality for finite dimensional vector space Gram-Schmidt Orthogonalization process, Adjoint of a linear transformation and its properti Unitary linear transformations.

SYLLABUS

B. Sc. 3rd Year

SIXTH SEMESTER

DYNAMICS : (BM - 363)

Kurukshetra University, Kurukshetra

Time Allowed : 3 Hours

Maximum Marks : 45

Note. *The examiner is requested to set* ***nine questions*** *in all, selecting two questions from each section and* ***one compulsory question*** *consisting of five or six parts distributed over all the four sections. Candidates are required to attempt* ***five questions in all****, selecting* ***at least one question*** *from each section and the compulsory question.*

Section - I

Velocity and acceleration along radial, transverse, tangential and normal directions. Relative velocity and acceleration. Simple harmonic motion. Elastic strings.

Section - II

Mass, Momentum and Force. Newton's laws of motion. Work, Power and Energy. Definitions of Conservative forces and Impulsive forces.

Section - III

Motion on smooth and rough plane curves. Projectile motion of a particle in a plane. Vector angular velocity.

Section - IV

General motion of a rigid body : Central Orbits, Kepler's laws of motion. Motion of a particle in three dimensions. Acceleration in terms of different co-ordinate systems.

SYLLABUS

B.A. / B. Sc. 1st Year

SECOND SEMESTER

NUMBER THEORY AND TRIGONOMETRY

Paper : (BM - 121)

Kurukshetra University, Kurukshetra

Time Allowed : 3 Hours

Maximum Marks : B.A. – 30
B.Sc. – 45

Section - I

Divisibility, G.C.D. (Greatest Common Divisors), L.C.M. (Least Common Multiple), Primes, Fundamental Theorem of Arithmetic. Linear Congruences, Fermat's theorem. Wilson's theorem and its converse. Linear Diophantine equations in two variables.

Section - II

Complete Residue System and Reduced Residue System modulo m. Euler ϕ function. Euler's Generalization of Fermat's theorem. Chinese Remainder Theorem. Quadratic Residues. Legendre Symbols, Lemma of Gauss; Gauss Reciprocity law. Greatest integer function [x]. The number of divisors and the sum of divisors of a natural number n (The functions $d(n)$ and $\sigma(n)$). Moebius Function and Moebius Inversion Formula.

Section - III

De-Moivre's theorem and its applications. Expansion of trigonometrical functions. Direct circular and hyperbolic functions and their properties.

Section - IV

Inverse circular and hyperbolic functions and their properties. Logarithm of a complex quantity. Gregory's series. Summation of Trigonometric series.

Note. *The examiner is requested to set* ***nine questions*** *in all, selecting two questions from each section and one compulsory question consisting of five parts distributed over all the four sections. Candidates are required to attempt five questions, selecting at least one question from each section and compulsory question.*

SYLLABUS

K.U., Kurukshetra and C.D.L.U., Sirsa

B.A. / B. Sc. 1st Year

SECOND SEMESTER

VECTOR CALCULUS : (BM - 123)

Time Allowed : 3 Hours

Maximum Marks : B.Sc. – 40
B.A. – 27

Note. *The examiner is requested to set* ***nine questions*** *in all, selecting two questions from each section and* ***one compulsory question*** *consisting of five parts distributed over all the four sections. Candidates are required to attempt five questions, selecting at least one question from each section and the compulsory question.*

Section - I

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.

Section - II

Gradient of a scalar point function, geometrical interpretation of grad ϕ, character of gradient as a point function. Divergence and curl of vector point function, characters of div $\vec{f}$ and curl $\vec{f}$ as point function, examples. Gradient, divergence and curl of sums and product and their related vector identities. Laplacian operator.

Section - III

Orthogonal curvilinear co-ordinates. Conditions for orthogonality. Fundamental triad of mutually orthogonal unit vectors. Gradient, divergence, curl and laplacian operators in terms of orthogonal curvilinear co-ordinates, cylindrical co-ordinates, spherical co-ordinates.

Section - IV

Vector integration, line integral, surface integral, volume integral

Theorem of Gauss, Green, Stokes and problems based on these.

SYLLABUS

K.U., Kurukshetra and C.D.L.U., Sirsa

B.A. / B. Sc. 1st Year

SECOND SEMESTER

ORDINARY DIFFERENTIAL EQUATIONS : (BM - 122)

Time Allowed : 3 hours

Maximum Marks { B.Sc. : 40 / B.A. : 26

Note. *The examiner is requested to set* ***nine questions*** *in all, selecting two questions from each section and* ***one compulsory question*** *consisting of five parts distributed over all the four sections. Candidates are required to attempt five questions, selecting at least one question from each section and the compulsory question.*

Section - I

Geometrical meaning of a differential equation. Exact differential equations, integrating factors. First order higher degree equations solvable for x, y, p. Lagrange's equations, Clairaut's equations. Equations reducible to Clairaut's form. Singular solutions.

Section - II

Orthogonal trajectories in Cartesian coordinates and polar coordinates. Self orthogonal family of curves. Linear differential equations with constant coefficients. Homogeneous linear ordinary differential equations. Equations reducible to homogeneous.

Section - III

Linear differential equations of second order. Reduction to normal form. Transformation of the equation by changing the dependent variable / independent variable. Solution by operators of non-homogeneous linear differential equations. Reduction of order of a differential equation. Method of variations of parameters. Method of undetermined coefficients.

Section - IV

Ordinary simultaneous differential equations. Solution of simultaneous differential equations involving operators $x\,(d/dx)$ or $t\,(d/dt)$ etc. Simultaneous equation of the form $dx/P = dy/Q = dz/R$. Total differential equations. Condition for $Pdx + Qdy + Rdz = 0$ to be exact. General method of solving $Pdx + Qdy + Rdz = 0$ by taking one variable constant. Method of auxiliary equations.

SYLLABUS

K.U., Kurukshetra and C.D.L.U., Sirsa

B.A. / B. Sc. 1st Year

SECOND SEMESTER

VECTOR CALCULUS : (BM - 123)

Maximum Marks : B.Sc. – 40
B.A. – 27

Time Allowed : 3 Hours

Note. *The examiner is requested to set* ***nine questions*** *in all, selecting two questions from each section and* ***one compulsory question*** *consisting of five parts distributed over all the four sections. Candidates are required to attempt five questions, selecting at least one question from each section and the compulsory question.*

Section - I

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.

Section - II

Gradient of a scalar point function, geometrical interpretation of grad ϕ, character of gradient as a point function. Divergence and curl of vector point function, characters of div $\vec{f}$ and curl $\vec{f}$ as point function, examples. Gradient, divergence and curl of sums and product and their related vector identities. Laplacian operator.

Section - III

Orthogonal curvilinear co-ordinates. Conditions for orthogonality. Fundamental triad of mutually orthogonal unit vectors. Gradient, divergence, curl and laplacian operators in terms of orthogonal curvilinear co-ordinates, cylindrical co-ordinates, spherical co-ordinates.

Section - IV

Vector integration, line integral, surface integral, volume integral

Theorem of Gauss, Green, Stokes and problems based on these.

SYLLABUS

Kurukshetra University, Kurukshetra

B. Sc. 2nd Year

FOURTH SEMESTER

SPECIAL FUNCTIONS AND INTEGRAL TRANSFORMS : (BM - 242)

Maximum Marks : 45 *Time Allowed* : 3 Hours

Note. *The examiner is requested to set* ***nine questions*** *in all, selecting two questions from each section and* ***one compulsory question*** *consisting of five or six parts distributed over all the four sections. Candidates are required to attempt* ***five questions in all,*** *selecting* ***at least one question*** *from each section and the compulsory question.*

Section - I

Series solution of differential equations : Power series method, Definitions of Beta and Gamma functions, Bessel equation and its solution : Bessel functions and their properties - Convergence, Recurrence relations and generating functions, Orthogonality of Bessel functions.

Section - II

Legendre and Hermite differential equations and their solutions : Legendre and Hermite's functions and their properties, Recurrence relations and generating functions. Orthogonality of Legendre and Hermite's polynomials, Rodrigues' Formula for Legendre and Hermite Polynomials, Laplace Integral Representation of Legendre polynomial.

Section - III

Laplace Transforms : Existence theorem for Laplace transform, Linearity of the Laplace transforms, Shifting theorems, Laplace transforms of derivatives and integrals, Differentiation and integration of Laplace transforms, Convolution theorem, Inverse Laplace transforms, convolution theorem, Inverse Laplace transforms of derivatives and integrals, Solution of ordinary differential equations using Laplace transform.

Section - IV

Fourier transforms : Linearity property, Shifting, Modulation, Convolution theorem, Fourier transform of derivatives, Relations between Fourier transform and Laplace transform, Parseval's identity for Fourier transforms, Solution of differential equations using Fourier transforms.

SYLLABUS

Kurukshetra University, Kurukshetra

B. Sc. 2nd Year

FOURTH SEMESTER

SEQUENCES AND SERIES : (BM - 241)

Maximum Marks : 45

Time Allowed : 3 Hours

Note. *The examiner is requested to set* ***nine questions*** *in all, selecting two questions from each section and* ***one compulsory question*** *consisting of five or six parts distributed over all the four sections. Candidates are required to attempt* ***five questions in all****, selecting* ***at least one question*** *from each section and the compulsory question.*

Section - I

Boundedness of the set of real numbers, least upper bound, greatest lower bound of a set neighbourhoods, interior points, isolated points, limit points, open sets, closed set, interior of a set, closure of a set in real numbers and their properties. Bolzano-Weierstrass theorem. Open covers. Compact sets and Heine-Borel Theorem.

Section - II

Sequence : Real sequences and their convergence, Theorems on limits of sequence, Bounded and monotonic sequences, Cauchy's sequence, Cauchy general principle of convergence. Subsequences, Subsequential limits.

Infinite Series : Convergence and divergence of infinite series, Comparison tests of positive terms infinite series. Cauchy's general principle of convergence of series, Convergence and divergence of geometric series. Hyper Harmonic series or p-series.

Section - III

Infinite series : D'Alembert's Ratio test, Raabe's test, Logarithmic test, de Morgan and Bertrand's test, Cauchy's nth root test, Gauss Test, Cauchy's integral test. Cauchy's condensation test.

Section - IV

Alternating series : Leibnitz's test, absolute and conditional convergence Arbitrary series : Abel's lemma, Abel's test, Dirichlet's test, Insertion and removal of parenthesis re-arrangement of terms in a series, Dirichlet's theorem, Riemann's Re-arrangement theorem Pringsheim's theorem (statement only), Multiplication of series, Cauchy product of series (definitions and examples only), Convergence and absolute convergence of infinite products.

SYLLABUS

(For B. Com Part I)

C.D.L.U., Sirsa

FIRST SEMESTER

BUSINESS MATHEMATICS - I

(Paper BC-1.5)

Time Allowed : 3 Hours

External Marks : 80
Internal Marks : 20

Note : ***The syllabus is divided into three units i.e., Unit-I, Unit-II, Unit-III. Paper setter will set ten questions in all i.e., three questions carrying 15 marks each in each unit. Question No. 10 comprising of five short type questions carrying four (4) marks each is compulsory covering the entire syllabus. Answer to each question should not be more than one page. Candidate is required to attempt five questions in all selecting atleast one question but not more than two from each unit.***

Unit – I

Matrices : Definition of a matrix, Types of matrices; Algebra of matrices, Calculation of values of determinants upto third order; Adjoint of a matrix; Finding inverse of a matrix through adjoint. Applications of matrices to solution of simple business and economic problems.

Unit – II

Differential Calculus : Mathematical functions and their types - linear, quadratic polynomial; Concepts of limit and continuity of a function; Concept of differentiation; Rules of differentiation, simple standard forms. Applications of differentiation – elasticity of demand and supply; Maxima and Minima of functions (involving second or third order derivatives) relating to cost, revenue and profit.

Unit – III

Linear Programming : Formulation of LPP; Graphical method of solution; problems relating to two variables including the case of mixed constraints; cases having no solution, multiple solutions; unbounded solution and redundant constraints; simplex method-solution of problems up to three variables, including cases of mixed constraints, duality; Transportation Problems.

Basic Mathematics of Finance : Simple and compound interest, Rates of interest-nominal, effective and continuous – their interrelationship; Compounding and discounting of a sum using different types of rates.