**University Name : Guru Nanak Dev University, Amritsar**

**University website : www.gndu.ac.in**

**University address : Guru Nanak Dev University, Amritsar**

**Punjab, India**

**Exam Date of MCA  : In the month of May-June**

**Availability of Application form : In  May**

**Approximate Seats for the candidates    : 60**

**Exam Syllabus of MCA:**

**Paper – 1: 50 Objective Type Questions of 1 mark each (75 minutes)**
**General Mathematics (10marks): Mathematical Analysis- sets, rational numbers, real numbers, number line, intervals, division algorithm, basic properties of real numbers, complex numbers, relations and functions, basic elementary properties of functions.**
**Calculus: Limit, basic limit theorems, algebra of limits, sandwich theorem, L' Hospital's rule, continuity of a function at a point and in a closed interval, derivative and their properties, mathematical & geometric interpretation of differential, the differentials of some elementary functions, mean value theorems, some elementary integrals, integration by substitution and by parts, definite integrals.**
**Trigonometry: Measures of angles, trigonometric function of an acute angle, reduction formulae, addition & subtraction formulae, inverse trigonometric functions, trigonometric equations and their solutions.**
**Vectors: Scalar & vector quantities cross product and scalar product, vector triple product.**
**Statistics & Probability: Permutations & combinations, nature & purpose of statistics, tabular & graphical representation of samples, variance, correlation, mathematical expectation, curve fitting, random experiments, probability, random variables.**
**General Awareness (10marks): Current Affairs Imp. Events in Indian History Imp. Scientific discoveries.**
**Mental Ability (10marks): Logical & Analytical Ability**
**General English (10marks): English Vocabulary, English Comprehension**
**Computer Aptitude (10marks): Qs. related to basics of computer science & applications**

**Paper II: 15 Short Answer Type Ques of 3 marks each & 1 Ques of 5 marks (90min.)**
**Higher mathematics**

**Matrices & Determinants:** Basics concepts, addition, scalar multiplication, multiplication, transpose and adjoint of a matrix, rank of a matrix, system of linear equations, inverse of a matrix, eigen values & eigen vectors, cayley Hamilton theorem.

**Calculus:** Successive differentiation, partial differentiation, convexsity, concavity, asymptotes and curve tracing of curves of the form $F(x,y)=0$ and of curves given in terms of parametric equations, theorems on derivatives of inverse functions, hyperbolic and inverse hyperbolic functions and their derivatives, curvature of a curve (Cartesian and parametric forms), definite integrals (Cartesian, parametric), computation of lengths of arcs and areas under given curves, methods of approximation (Simpson's rule and trapezoidal rule).

**Co-ordinate Geometry:** Coordinate systems, lines in a plane, circle, points of intersection of a line and a curve, pole and polar, pair of tangents from a point, chord of contact, equation of chord in terms of midpoints and diameter of conic, conjugate diameters, geometric transformations, special properties of parabola, ellipse and hyperbola, transformation of axes, shifting of origin, rotation of axes, reduction of the second degree equation $S = ax^2+2hxy+by^2+2gx+2fy+c=0$ to standard form by transformation of coordinates.

**Linear Algebra:** Definitions of group, ring and field with illustrations, vector spaces, linear dependence and independence, basis, row and column spaces of matrices, connection with rank, the spaces of solutions of a system of linear homogeneous equations, linear transformations and their algebra, connections between matrices and linear transformations, determinant and trace of a linear transformation.

**Theory of Equations:** Polynomials and their characteristics, roots of an equation, relation between roots & coefficients, transformation of equations, solution of cubic & biquadratic equations.

**Differential Equations:** First order differential equations and their solutions, singular solutions, geometrical interpretations, linear differential equation with constant coefficient.

**Analysis:** Convergence and divergence of sequence and series of positive terms (standard tests only).

**Introduction to Computers:** Computer as a system : functional units and their interrelationship, types of computers, milestones in hardware and software, data storage devices and media, primary storage, types of memory, magnetic tape, magnetic disk and floppy diskette, input-output devices, problem analysis, flowcharts, algorithms, decision tables.

**DOS Fundamentals and PC Software:** Concepts of files and directories, basic DOS commands, creation of batch files, configuring DOS, formatting of hard disk, MS Windows, features of word processing package, creation, editing, formatting of document, global search and replacement of text, printing, spelling checking and mail merge, spread sheets: graphs, statistical, financial, and mathematical functions, databases : creating a database file, indexing and sorting database file, managing multiple database files (Word/EXCEL/FoxPro/dbase).

**Numerical Methods:** Finding root of an non-linear equation using bisection method, Newton-Raphson method, solutions of simultaneous linear equations, Gauss elimination method, Gauss-Siedel method, interpolation using Lagrange's method, integration using trapezoidal rule, Simpson's rule, (numericals/algorithms will be asked).

**Statistical Techniques:** Arithmetic mean, standard deviation, rank correlation and linear regression.

**Data Structures:** Sorting and searching, stacks, queues, linked list, trees and graphs.

**Data Base Management System:** Fundamentals concepts of database, DBMS, data base models (relational, hierarchical, network)

**Programming Language:** Basic programming concepts of FORTRAN & C.

**Eligibility Criteria for MCA:**

**Bachelor's degree in any discipline with 50% marks as an aggregate.**