MC - MCA SYLLABUS FOR ENTRANCE EXAMINATION

MATHEMATICS :

Algebra: Fundamental operations in Algebra, Expansion, factorization, quadratic equations, indices, logarithms, arithmetic, geometric and harmonic progressions, binomial theorem, permutations and combinations.

Calculus: Functions of single variable, limit, continuity and differentiability, Mean value theorems, indeterminate forms and L'Hospital rule, Maxima and minima, Taylor's series, Fundamental and mean value-theorems of integral calculus, total derivatives, Lagrange method of multipliers.

Differential Equations: Differential equations of first order and their solutions, linear differential equations with constant coefficients, homogenous linear differential equations.

Algorithms: Analysis, Asymptotic notation, Notions of space and time complexity, Worst and average case analysis; Design: Greedy approach, Dynamic programming, Divide-and conquer; Connected components, Spanning trees, Shortest paths. Asymptotic analysis (best, worst, average cases) of time and space, upper and lower bounds.

Probability: Probability theory, Dependent and independent events, frequency distributions, and measures of dispersions, Skewness and Kurtosis, random variable and distribution functions, mathematical expectations, Binomial, Poisson, normal distributions.

Algebra and Complex Analysis: Algebra of matrices, rank and determinant of matrices, linear equations. Eigenvalues and eigenvectors, Cayley-Hamilton theorem. Matrix representation of linear transformations. Canonical forms, diagonal forms, triangular forms, Quadratic forms, reduction and classification of quadratic forms Analytic functions, Cauchy-Riemann equations. Contour integral, Cauchy's theorem, Cauchy's integral formula, Taylor series, Laurent series, calculus of residues. Conformal mappings, Mobius transformations — Fourier series—harmonics.

Calculus and its Applications : Linear ordinary differential equations (ODEs), variation of parameters, Sturm-Liouville problem. Partial differential equations (PDEs) - Classification of second order PDEs, General solution of higher order PDEs with constant coefficients, Method of separation of variables for Laplace, Heat and Wave equations. Transformation techniques—Laplace transformation—Fourier transforms—z—transformation to solve differential and difference equations.

Numerical Methods: Numerical solutions of algebraic and transcendental equations iteration methods and Newton — Raphson method, Solution of systems of linear algebraic equations using Gauss elimination and Gauss-Seidel methods-Numerical differentiation and integration, Numerical solutions of ODEs and PDEs.

Descriptive statistics, Exploratory Data Analysis: Sample space, discrete probability, independent events, Bayes theorem. Random variables and distribution functions (univariate and multivariate) - expectation and moments. Independent random variables, marginal and conditional distributions. Characteristic functions. Standard discrete and continuous univariate distributions. Correlation and simple and multiple linear regression. Test of hypotheses — Large and small sample tests confidence intervals. Chi-square test goodness of fit. Simple non parametric tests for one and two sample problems, rank correlation and test for independence. ANOVA.

Date Structures: Arrays, Stacks, Queues, linked Lists. Sorting techniques, Searching Techniques, Trees and Graph terminology and representation in memory, binary search tree, traversal techniques of graphs and Trees.

Computer Networks: Network models, Internet model, OSI model, Physical Layer - Analog and Digital Signals, Analog and Digital Transmission, Coding, Sampling. Data Link Layer - Error detection and correction, Data link control and Protocols, Stop and wait, Go – back - n, Selective repeat. Network Layer - Inter-networks, Addressing, unicast and multicast routing, Presentation Layer.

Programming in C: Data types, Declarations, Expressions, statements and symbolic constants, input-Output functions. Operators and expressions: Arithmetic, unary, logical, bit-wise, assignment and conditional operators. Control statements: While, do-while, for statements, nested loops, if else, switch, break, Continue, comma operators. Storage types: Automatic, external, register and static variables.

Functions: Defining and accessing, passing arguments, Recursion.

Database Management Systems: DBMS architecture, Data models, data independence, E-R model, normalization, Relational Model: concepts, constraints, languages. Data storage, indexing, query processing, design and programming SQL.

Operating Systems: Process management, Process States, Process Control Block, Process and Threads, CPU Scheduling, Scheduling algorithm, Process Synchronization and Deadlock, Memory management, Virtual memory concepts paging and segmentation File organization, Blocking and buffering, file descriptor, File and Directory structures, I/O Devices.

Computer Architecture: Boolean algebra and computer arithmetic, flip-flops, design of combinational and sequential circuits, instruction formats, addressing modes, interfacing peripheral devices, types of memory and their organization, interrupts and exceptions. Von Neumann Computer, System Bus. Instruction Cycle, Data Representation, Machine instruction and Assembly Language.

ENGLISH COMMUNICATION
20 Questions
1. Grammar
    i. Subject – Verb Agreement
    ii. Tense forms
    iii. Voices
    iv. Articles and Preposition
    v. Use of Conjunctions
2. Writing Technical Instructions
3. Writing Memos & Writing Minutes
4. Transcoding
5. Preparing Questionnaire
6. Proof Reading

Aspire Study MCA Entrance Classes