

**Madhya Pradesh Bhoj (Open) University**  
**M.Sc. IT (Final Year)**  
**Syllabus for the session 2006-07 & onwards**

**MIT-09 Discrete Mathematics**

**Unit – I**

**Arithmetic Progression**, Sequence, Series, Arithmetic Progression, The General Term or Nth Term of an AP., The Sum of n terms of an AP., Arithmetic Mean, AM. of two Given Numbers, Insertion of N AM. Between Two Given Numbers Properties of A P. **Geometric Progression**, Definition, The Nth Term of G.P., The Sum of N Terms of a G.P., The Sum of an Infinite G.P., Recurring Decimal an Infinite G.P., Geometric Means, Geometric Mean of Two Given Numbers A And B Insertion of N Geometric Means Between Two Quantities Properties of G.P., To Find the Sum of N Terms of the Series.

**Harmonic Progression**, Definition, Harmonic Mean (H.M) of Two Given Numbers Relation between AM., G.M. and H.M.

**Unit – II**

**Miscellaneous Series**, , Arithmetic - Geometric Series, The Sum of n Terms of the Arithmetic - Geometric Series Sigma CE) Notation, Sum of first N Natural Numbers, The Sum of the Squares of First n Natural Numbers The Sum of the Cubes of th First n Natural Numbers Method of Difference.

**Set Theory**, , The Concept of a Set, Notations, Representation of a Set, Types of Sets, Theorem on Subsets, Number of Subsets of a Set, Venn Diagram, Set Operations, Laws of Union of sets, Laws of Intersection of Sets, Law of Complement of a Set, Theorem (on Symmetric Difference) De-Morgan's Laws, Applications of Venn Diagrams.

**Unit – III**

**Ordered Pairs, Relations & Functions** Ordered Pairs, Equality of Ordered Pairs, Cartesian Product of Sets, Theorems on Cartesian Products' Relation, Domain and Range of a Relation, Inverse Relation, The Inverse of an Inverse Relation, *Binary* (or Dyadic) relations , Type of Relations, Equivalence Relations, Equivalence Class, Properties of Equivalence Classes Composition of Two Relations, Partition of a Set, Partial Order, Theorem, Functions (Mapping), Types of Mapping, Other Specific Mappings, Types of Binary Operations, Algebraic Structure, Graph of a Function, Real Valued Map., Product of 'Functions, Method of Construction of Operation Table Countable and-Uncountable Sets.

**Group Theory**, Introduction-Algebraic Structures, Groups: Definition, Abelian Group, Order of a Group, Semi-group, Some General Properties of Groups, Some Important Theorems on Groups, Theorem on Subgroups, Homomorphism (Definition), Isomorphism (Definition), Theorems on Homomorphism, Definition (Kernel of f), Theorems on Homomorphism, Definition (Cyclic Groups), Fundamental Theorem of Homomorphism,

**Unit – IV**

**Rings and Fields**, Quotient Spaces, Rings in General, Some Special Classes of Rings, Field and its Axioms, Sub-ring and Sub-fields, **Vector Space**, Definition, Linear Combination,

Linear Independence and linear Dependence, Basis of Vector Space, Vector Space of linear Transformation, Linear Algebra, Algebra of Quaternions,

#### **Unit – IV**

**Posets and lattices**, Partially Ordered Sets (Posets), Totally Order Set, Diagrammatic Representation of a Poset: (House diagrams) Definitions, Maximal Element, Minimal Element, Duality, Product of Two Posets, lattice, Duality and the Idempotent Law, Semi-lattices, Complete lattices, Sub lattice, Convex Sub lattice, Distributive lattice, Complements, Complemented lattices. **Boolean Algebra & Its Applications** Boolean Expressions and Boolean Functions Identities of Boolean Algebra, Duality, Algebra of Switching Circuits.

## MIT-10    **Advanced Java**

### **Unit – I**

**The Genesis of Java**, Introduction and Creation, Applets and Applications, Security, Bytecodes, Java Buzzwords, Simple, Multi-threaded, Architecture Neutral, Java and Java Script, New in JDK, **An Overview of Java**, What is an Object, Features of Object Oriented Programming, The First Simple Programme, Compiling, **Data Types, Variables and Arrays**, Data Types in Java, Literals, Characters, Variable Declaration, Symbolic Constants, Type Casting, Arrays, Vectors, Array Declaration Syntax, **Operating in Java**, Arithmetic Operators, Basic Assignment Operators, Relational Operators, Boolean Logical Operators, Ternary Operator, Operator Precedence, **Control Statements**, Java's Selection Statements, Switch, Nested Switch, Iteration Constructs, Continue, Return.

### **Unit - II**

**Class an Introduction**, What is a Class, What are Methods, **Methods and Classes in Details**, Methods Overloading, Constructor Overloading, Objects as Parameters, Returning objects, Recursion, Access Control/ Visibility, Understanding Static, Final, Nested and Inner Classes, The String Class, Command Line Arguments, **Inheritance**, Inheritance Basic, Member Access and Inheritance, Super Class Variable and Sub Class Object, Using Super to Call Superclass Constructors, Another Use of Super, Multilevel hierarchy, Calling Constructor, Overriding Methods, Abstract Classes Method, Final and Inheritance, Object Class, **Interfaces and Packages**, Defining Interface, What is a Package, Class path Variable, access Protection, Important Packages, **Exception Handling**, Fundamentals of Exception Handling, Types of Exceptions, Uncaught Exceptions, Try and Catch Keywords, Throw, Throws and Finally, Nested Try Statements, Java Built in Exceptions, User Defined Exceptions.

### **Unit – III**

**Multithreaded Programming**, The Java Thread Model, Priorities, Synchronization, Messaging, Thread Class and Runnable Interface, Creation of Threads, Creating Multiple Threads, Synchronization and Deadlock, Suspending, Resuming and Stopping Threads, **Applets and Input Output**, Input/Output Basics, Streams (Byte and Character), Reading From and writing to Console, Reading and Writing Files, Printwriter Class, Fundamentals Of Applets, Transient and Volatile Modifier, Strictfp, Native Methods, Problems with Native Methods, **Handling Strings**, String Length, Operations on Strings, Extract Character Methods, String Comparison Methods, Searching and Modifying, Data Conversion and Value of () Methods, Changing Case of Characters, String Buffer, **Exploring Java. Lang**, Wrapper Classes and Simple Type Wrappers, Void, Abstract Process Class, Runtime Class and Memory Management, Other Programme Execution, System Class, Environment Properties, Using Clone () and Clonable () Interface, Class and Class loader, Math Class, Thread, Thread Group and Runnable Interface, Throwable Class, Security Manager, The java. lang. ref and java. lang. reflect packages, **Java..Util-The Utility Classes**, The Enumeration Interface, Vector, Stack, Dictionary, Hash table, Properties, Using Store () and Load (), String Tokenizer, Bit set Class, Date and Date Comparison, Time Zones, Random Class, Observe

## **Unit – IV**

**Input Output Classes**, File in Java, Directory, File Name Filter Interface, Creating Directory, The Stream Classes, Input Stream and Output Stream, File input Stream and File Output Stream, Byte Array Input Stream and Byte Array Output Stream, Filtered Byte Stream, Buffered ByteStream, Print Stream, Random Access File, Stream Tokenizer, Stream Benefits, **Networking**, Basic of Networking, Proxy Server, Domain Naming Services, Networking Classes and Interfaces, InetAddress Class, TCP/IP Sockets, Datagram Packet, Network, **Applet Class**, Applet Basics, Applet Life Cycle, A Simple Banner Applet, Handling Events, getDocumentBase(), getCodeBase(), showDocumentBase(), Audio Clip and Applet Stub interface, **AWT: Windows, Graphics and Text**, AWT Classes, Window Fundamentals, Working With Frame Windows, Frame Window in An Applet, Event Handling in a Frame Window, A Window Program, Displaying Information While Working with Graphics and Color, Working With Fonts, Managing Text Output Using Font metrics, Exploring Text and Graphics, **AWT: Controls, Layouts and Menus**, Control Fundamentals, Layouts, Menus, Dialog Class, Other Controls.

## **Unit - V**

**Images**, File Formats, Image Fundamentals, Image Observer, Mediatracker, **JDBC**, JDBC Introduction of Class and Methods, Register Driver, Establish a Session, Execute a Query, Result Set, Closing the Session, **Swings**, JAPPLET, **Java Beans**, What is a Java Bean? Advantages of Java Beans, Application Builder Tools, The Bean Developer Kit (BDK), JAR Files, Introspection, Developing a Simple Bean, Using Bound Properties, Using The Bean Info Interface, Constrained Properties, Persistence, Customisers, **The Basic Servlet API**, The Get Method, The POST Method, Mime Content Types, **Java and Corba Connectivity**, The Compatibility Problem, An Overview of IDI And liop, A Working COBRA System, CORBA Servers, CORBA Clients, A Simple CORBA Service, Legacy Applications and Corba .

# **MIT-11 Microprocessor and Assembly Language Programming**

## **Unit – I**

**Introduction to Microprocessor**, Evolution of Microprocessor, Overview of Intel Pro-Pentium, Motorola 68000 Series, Introduction to DEC Alpha, Power PC, RISC & CISC Architecture

## **Unit – II**

**Basic Microprocessor Architecture and Interface**, Internal Architecture, External System Bus Architecture, Memory and Input/Output Interface

## **Unit – III**

**Programming Mode**, Register Organization of 8086, Memory Addressing and Instruction Formats, Memory Interfacing, Cache Memory and Cache Controllers

## **Unit – IV**

**Basic I/O Interface**, I/O Interface, 8255 Programmable Interface, 8254 Programmable Timer, 8251 Programmable/Communication Interface, Interrupts, 8259 Programmable Interrupts Controller

## **Unit – V**

**8086 Assembly Language Programming**, Introduction set of 8086, Assembler Directives and Operators, A Few Machine Level Programs, Machine coding and Programs, Programming with an Assembler, Assembly Language Example Programs

# MIT-12 Numerical Methods and Statistical Analysis

## Unit – I

**Introduction**, Limitation of Number Representation, Arithmetic rules for Floating Point Numbers, Errors in Numbers, Measurement of Errors, **Solving Equations**, Introduction, Bisection Method, Regula Falsi Method, Secant Method, Convergence of the iterative methods.

## Unit – II

**Interpolation**, Introduction, Lagrange Interpolation, Finite Differences, Truncation Error in Interpolation, **Curve Fitting**, Introduction, Linear Regression, Polynomial Regression, Fitting Exponential and Trigonometric Functions

## Unit – III

**Numerical Differentiation and Integration**, Introduction, Numerical Differentiation Formulae, Numerical Integration Formulae, Simpson's Rule, Errors in Integration Formulae, Gaussian Quadrature Formulae, Comparison of Integration Formulae, **Solving Numerical Differential Equations**, Introduction, Euler's Method, Taylor Series Method, Runge-Kutta Method, Higher Order Differential Equations.

## Unit – IV

**Introduction to Statistical Computation**, History of Statistics, Meaning and scope of Statistics, Various measures of Average, Median, Mode, Geometric Mean, Harmonic Mean, Measures of Dispersion, Range, Standard Deviation, **Probability Distributions**, Introduction, Counting Techniques, Probability, Axiomatic or Modern Approach to Probability, Theorems on Probability, Probability Distribution of a Random Variable, Mean and Variance of a Random Variable, Standard Probability Distributions, Binomial Distribution, Hyper geometric Distribution Geometrical Distribution, Uniform Distribution (Discrete Random Variable), Poisson Distribution, Exponential Distribution, Uniform Distribution (Continuous Variable), Normal Distribution

## Unit – V

**Estimation**, Sampling Theory, Parameter and Statistic, Sampling Distribution of Sample Mean, Sampling Distribution of the Number of Successes, The Student's Distribution, Theory of Estimation, Point Estimation, Interval Estimation, **Hypothesis Testing**, Test of Hypothesis, Test of Hypothesis Concerning Mean, Test of Hypothesis Concerning Proportion, Test of Hypothesis Concerning Standard Deviation

# MIT-13 Artificial Intelligence

## Unit – I

**What is Artificial Intelligence**, Artificial Intelligence: An Introduction, AI Problems, The Underlying Assumption, AI Techniques, Games, Theorem Proving, Natural Language Processing, Vision Processing, Speech Processing, Robotics, Expert System, Search Knowledge, Abstraction.

## Unit – II

**Problem, Problem Space and Search**, Defining the Problem as a State Space, Production Systems, Heuristic Search, Heuristic Search Techniques, Best-First Search, Branch-and-Bound, Problem Reduction, Constraint Satisfaction, Means-End Analysis.

**Knowledge Representation**, Representation and Mapping, Approaches to Knowledge Representation, Issues in Knowledge Representation, The Frame Problem.

## Unit – III

**Predicate Logic**, Representing Simple Facts in Logic, Representing Instance and its Relationships, Modus Ponens, Resolution, Natural Deduction, Dependency-Directed Backtracking, **Rule Based Systems**, Procedural versus Declarative Knowledge, Forward versus Backward Reasoning, Matching, Conflict Resolution, Use of Non Back Track,

## Unit – IV

**Structured Knowledge Representation Semantic Net**, Semantic Nets, Frames, Slots Exceptions, Slot-Values as Objects, Handling Uncertainties, Probabilistic Reasoning, Use of Certainty Factor, Fuzzy Logic

## Unit – V

**Learning**, Concept of Learning, Rote Learning, Learning by Taking Advice, Learning in Problem Solving, Learning by Induction, Explanation-Based Learning, Learning Automation, Learning in Neural Networks, **Expert Systems**, Need and Justification of Expert Systems, MYCIN, Representing and Using Domain Knowledge, RI.

# MIT-14 Computer Graphics

## Unit – I

**Computer Graphics Application** : Introduction to Computer Graphics, Application of Computer Graphics, **Devices for Graphics Output**, Monitor Basics, Picture Tube, Display Basics, Text Mode and Graphics Mode, Adapters and Displays, Monochrome Display Adapter (MDA), Color Graphics Adapter (CGA), Hercules Graphics Card, Enhanced Graphics Adapter, Professional Graphics Adapter, Digital vs Analog, Video Graphics Array, Super VGA, Refresh Cathode-Ray Tubes, Raster-Scan Displays, Random-Scan Displays, **Computer Display**, Flat-Panel Displays, Raster Scan Systems, Random Scan Systems, Hard Copy Output Devices

## Unit – II

**Graphics Input Devices**, Keyboards, Mouse, Trackball and Spaceball, Joysticks, Data Glove, Digitizers, Image Scanners, Touch Panels, Light Pens, Voice Systems, Input of Graphical Data, Logical Classification of Input Devices, Input Functions, Initial Values for Input Device Parameters, Interactive Picture Construction Techniques, **Matrices and Determinants**, Matrices, Types of Matrices, Determinants, Matrix (Definition), Type of Matrices, Submatrices of a Matrix: (Definition), Equality of Two Matrices: (Definition), Addition of Matrices, Scalar Multiplication, Multiplication of Two Matrices (Definition), Transpose of a Matrix (Definition), Symmetric and Skew-Symmetric Matrices, Adjoint and Inverse of a Matrix, Determinants, Properties of Determinants

**Vectors**, Definition of a Vector, Vectors and Coordinate System, Algebra of Vectors Addition, Multiplication of a Vector by a Scalar, Components of a Vector, Direction and Magnitude of a Vector in Terms of its Components, Collinear and Coplanar Vectors, Some Applications to Geometry.

## Unit – III

**Raster Scan Graphics**, Derivative of a Function, Digital Differential Analyzer, Bresenham's Algorithm, Integer Bresenham's Algorithm, General Bresenham's Algorithm, Circle Generation - Bresenham's Algorithm, Scan Conversion-Generation of the Display, Real-Time Scan Conversion, Run-Length Encoding, Cell Encoding, Frame Buffers, Addressing the Raster, Line Display, Character Display, Solid Area Scan Conversion, Polygon Filling, Scan-Converting Polygons, A Simple Ordered Edge List Algorithm, More Efficient Ordered Edge List Algorithms, The Edge Fill Algorithm, The Edge Flag Algorithm, Seed Fill Algorithms, A Simple Seed Fill Algorithm, A Scan Line Seed Fill Algorithm, Fundamentals of Antialiasing, Simple Area Antialiasing, The Convolution Integral And Antialiasing, Half toning, **Windows and Clipping**, Two-Dimensional Clipping, Sutherland-Cohen Subdivision Line-Clipping Algorithm, Midpoint Subdivision Algorithm, Generalized Two-Dimensional Line Clipping for Convex Boundaries

## Unit – IV

**2D- Transformation**, Representation of Points, Transformations and Matrix, Transformation of Straight Line, 2-D - Rotation, Reflection, Scaling, Combined Transformations, Translation and Homogeneous Coordinates, Translation, Rotation about an Arbitrary Point, Reflection through an Arbitrary Line, **3-D-Transformation**, Representation of Points, 3D- Scaling, 3D-Shearing, 3D- Rotation, Three Dimensional Translation, 3D- Reflection, Multiple

Transformations, Rotation about an Axis Parallel to a Coordinate Axis, Rotation about an Arbitrary Axis in Space, Three.

### **Unit – V**

**The Dimensional Perspective Geometry**, Geometric Projection, Orthographic Projections, Oblique Projections, Perspective Transformations, Single-Point Perspective Transformation, Two-Point Perspective Transformation, Three-Point Perspective Transformation.

**Hidden-Surface, Lines and Bezier Curve**, Hidden Surfaces and Lines, Back-Face Detection, Back-Face Removal, Z-Buffers Algorithm, The Painter's Algorithm, Binary Space Partition, Franklin Algorithm, Cubic Bezier Curve (No Derivations Needed), Properties of Bezier Curve, Joining Condition, Problems, **Multimedia and Animation**, Multimedia, Multimedia Terms, Multimedia Hardware, Hardware Peripherals, Basic tools in Multimedia, Multimedia Building Blocks (Media Forms/Elements), Sound, Image, Animation, Video, JPEG, MPEG, DVI Indeo, P\*64, Graphic File Formats, Multimedia Applications

## **MIT-15 Simulation and Modeling :**

### **Unit – I**

**System**, Introduction, System Study, System Examples.

### **Unit – II**

**Modeling and Simulation-I**, System Modeling, system Simulation, Simulation and Modeling Process

**Modeling and Simulation-II**, Introduction, Discrete System Models, Continuous System Models, Modeling and Simulation Platforms, Introduction, SIMSCRIPT, GPSS, CSMP III

### **Unit – III**

**Model Verification and Validation**, Validation and Verification, Estimation Methods, Simulation Run Statistics, Replication of Runs, Regenerative Techniques

### **Unit – IV**

**Monte Carlo Methods**, Introduction, Random Number Generation, Test for Randomness, An Application

### **Unit – V**

**Application of Simulation and Modeling**, Introduction, Application in Management, Application in optimization, Application in Artificial Intelligence, Application in Sociology, Application in Economics, Application in Life Sciences, Application in Database Designing, Application in Computer Designing

# MIT-16 Software Engineering

## Unit – I

**Introduction to Software and Software Engineering:** The Origin of Software Engineering, Characteristics of Software Engineering, Software Crisis, **Software Engineering: Models :** Life Cycle Model, Spiral Model, Models of the Software Process

## Unit- II

**Software Engineering Methodologies:** Software Process, Software Metrics, **Configuration Management Issues :** Organizing the Process.

## Unit – III

**Software Requirement Analysis and Specification :** Requirements Definition, Nonfunctional Requirements Definition, Formal Specification, Algebraic Specification, Model-based Specification, Z Schemas, Specification using Functions, Specification using Sequences, Validation, The Prototyping Process, Prototyping Techniques

## Unit- IV

**Principles of Software Project Management :** Principles of Software Project Management, Principles or Laws of Project Management, Software Project and Personnel Planning, Cost Estimation of Building a System, Software Metrics, The Project Plan, Resource Tracking and Stimulation Example, Quality Assurance Planning, Risk Analysis

## Unit - V

**Software Design :** Top-down Design, Systems Design, Design Decomposition, Software Design Quality, Design Description Languages, User Interface Design, User Interface Design Objectives, Function-oriented Design, Data-flow Diagrams, Structure Charts, Data Dictionaries, Deriving Structure Charts, Design Example, Concurrent Systems Design, Object-oriented Design, Inappropriate Object-oriented Design, Design Quality Assurance, Design Reviews, Design Quality Metrics, User Interface Evaluation, Verification and Validation, The Output Interface.