# M.Sc. (Information Technology)

# Syllabus

# Session (2017-2018)

KHALSA COLLEGE
AMRITSAR
-An Autonomous College

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# M.Sc. (Information Technology)

## Semester I

| Sr. No. | Paper Code | Paper Name | Marks | | | | Page No. |
|---|---|---|---|---|---|---|---|
| | | | Theory | Internal Assessment | Practical | Total | |
| 1 | MIT-101 | Analysis &Design of Embedded Systems | 80 | 20 | - | 100 | 33 |
| 2 | MIT-102 | Distributed Computing | 80 | 20 | - | 100 | 34 |
| 3 | MIT-103 | Advanced Computer Organization and Architecture | 80 | 20 | - | 100 | 35 |
| 4 | MIT-104 | Network Operating System | 80 | 20 | - | 100 | 36 |
| 5 | MIT-105 | Computational Problem Solving Using Python | 80 | 20 | - | 100 | 37 |
| 6 | MIT-106P | Programming Laboratory-I(Python) | - | 20 | 80 | 100 | 38 |
| | | | | | **Total Marks** | **600** | |

# M.Sc. (Information Technology)
# SEMESTER-I

## MIT-101
## Analysis and Design of Embedded Systems

**Time: 3 Hrs.** **Total Marks: 100**
**Theory Marks: 80**
**Theory Internal Assessment M: 20**

**Note:**
**(i) The paper setter is required to set eight questions in all and the candidates will be required to attempt any five questions out of these eight questions. All questions will carry equal marks.**
**(ii) The student can use only Non-programmable & Non-storage type calculator.**

Embedded systems and their characteristics, challenges and issues in embedded software development, Hardware and electronics fundamentals for software engineers, categories of different processor, microprocessor and micro controller,

Study of embedded processors and systems like PIC, AVR, micro controller, Implementation & working of 68000-series computer, Implementation & working of DSP based controller.

Operating system services: different categories of operating system, kernel architecture, and root file system contents, storage device manipulations, setting up boot loader

Development tools, preliminary programming, determining the requirement, design the system architecture, system integration, commissioning the system, Hardware software co design, and case studies in different embedded systems.

**References:**
Ken Arnold, “Embedded Controller Hardware Design”, Newnes, 2001.

Arnold S. Berger, “Embedded Systems Design: An Introduction to Processes, Tools and Techniques”, CMP books, 2001.

Fran Vahid, Tony D. Givargis, “Embedded Systems Design – A Unified Hardware/Software Introduction, Wiley, 2001

# M.Sc. (Information Technology)
# SEMESTER-I

## MIT-102
## Distributed Computing

**Time: 3 Hrs.** **Total Marks: 100**
**Theory Marks: 80**
**Theory Internal Assessment M: 20**

**Note:**
**(i) The paper setter is required to set eight questions in all and the candidates will be required to attempt any five questions out of these eight questions. All questions will carry equal marks.**
**(ii) The student can use only Non-programmable & Non-storage type calculator.**

Introduction: Motivation, objectives, characterization & classification of distributed systems. Distributed system architecture. Hardware & software issues.

Communication: Layered protocols, Client server protocols, RPC, group communication.
Coordination, synchronization & consistency: Logical clocks, Physical clocks, mutual exclusion, election algorithms, atomic broadcast, sequential consistency transaction distributed consensus, Threads: Thread synchronization, implementation issues, and threads vs. RPC.

Models of distributed computing: Client server and RPC, RPC architecture, exceptions, underlying protocols, IDL, marshalling etc.

Group models and peer to peer: Groups for service replication/ reliability, groups for parallelism / performance, client/ server vs. peer-to-peer, multicast, atomic broadcast.
Distributed file system: Security, Naming/ location transparency, R/W semantics, cache coherence, replication.

Distributed shared memory: DSM architecture, consistency models and relation to caching, release consistency, comparison with message passing and RPC.

Security: Introduction, security techniques, cryptographic algorithms, authentication and access control.
Case study: CORBA, MACH

**References:**
Distributed systems, concepts and design, 3rd Edition, Addison Wesley by George Colouris, Jean Dollimore and Tim Kinder berg, 2006.
Distributed system, 2nd Edition, Addison Wesley by Sape Mull ender, 2006.

# M.Sc. (Information Technology)
# SEMESTER-I

## MIT-103
## Advanced Computer Organization and Architecture

**Time: 3 Hrs.** **Total Marks: 100**
**Theory Marks: 80**
**Theory Internal Assessment M: 20**

**Note:**
**(i) The paper setter is required to set eight questions in all and the candidates will be required to attempt any five questions out of these eight questions. All questions will carry equal marks.**
**(ii) The student can use only Non-programmable & Non-storage type calculator.**

Paradigms of Computing: Synchronous – Vector/Array, SIMD, Systolic
Asynchronous – MIMD, reduction Paradigm, Hardware taxonomy: Flynn's classification, Software taxonomy: Kung's taxonomy, SPMD.

Abstract Parallel Computational Models: Combinational circuits, Sorting Network, PRAM Models, Interconnection RAMs.

Parallelism in Uniprocessor Systems: Trends in parallel processing, Basic Uniprocessor Architecture, Parallel Processing Mechanism.

Parallel Computer Structures: Pipeline Computers, Array Computers, Multiprocessor Systems Architectural Classification Schemes: Multiplicity of Instruction-Data Streams, Serial versus Parallel Processing, Parallelism versus Pipelining

Pipelining : An overlapped Parallelism, Principles of Linear Pipelining, Classification of Pipeline Processors, General Pipelines and Reservation Tables

Principles of Designing Pipelined Processors: Instruction Prefetch and Branch Handling, Data Buffering and Busing Structures, Internal Forwarding and Register Tagging, Hazard Detection and Resolution

Superscalar and Superpipeline Design: Superscalar Pipeline Design, Superpipelined Design Structures and Algorithms for Array Processors: SIMD Array Processors, SIMD Computer Organizations, Masking and Data Routing Mechanisms, Inter-PE Communications

**References:**
Computer Architecture and Parallel Processing, Faye A. Briggs, McGraw-Hill International Editions, 2003
Computer Systems Organization & Architecture, John d. Carpinelli, Addison Wesley, 2002

# M.Sc. (Information Technology)
# SEMESTER-I

## MIT-104
### Network Operating Systems

**Time: 3 Hrs.** **Total Marks: 100**
**Theory Marks: 80**
**Theory Internal Assessment M: 20**

**Note:**
**(i) The paper setter is required to set eight questions in all and the candidates will be required to attempt any five questions out of these eight questions. All questions will carry equal marks.**
**(ii) The student can use only Non-programmable & Non-storage type calculator.**

**Introduction of various Network Operating Systems:** MySQL, Unix/Linux OR any other OS.
**Overview of Network Operating System:** Introduction, Architecture, Shell, Kernel, File System, Hardware requirements, Active Directory, Clustering & Load Balancing, Storage Management, Editors, Networking and Communication features, Licensing

**Disk Management:** Terminology and Concepts, Managing Disks, Managing Basic and Dynamic Disks, Disk Quotas, Disk Fragmentation, Remote Storage, RAID and Mirroring.

**Servers:** Managing DHCP, IIS, WINS, DNS and Proxy servers.

**User, Group and Computer Accounts:** Creating and Managing user, Group and Computer Accounts, Managing Access Controls, Troubleshooting Accounts.

**Performance Monitoring and Security:** Task Management, System Monitoring, Performance Logs and Alerts, Monitoring Memory, Network and Process Objects, Auditing Security Events, Audit Policy and Event Viewer.

Telnet and FTP, Distributed Systems.

**Case and Comparative Studies of MySQL, Unix/Linux OR any other OS**.

**References:**


1. MCSA/MCSE; Exam 70-291, Implementing, Managing and Maintaining a Windows Server 2003 Network Infrastructure by Shinder Deborah Littlejohn, Shroff Publishers, 7th Reprint, 2005.
2. Networking: The Complete Reference by Craig Zacker, Tata McGraw-Hill, Seventh Reprint, 2004.
3. Unix Concepts and Applications, Sumitabha Das,Third Edition, Tata McGraw Hill, First Reprint, 2003.
4. Unix and Shell Programming: A Text Book, Behrouz A. Forouzen, Second Reprint, 2005.
5. Linux: A Practical Approach, B.Mohamad Ibrahim, Second Reprint, 2006.
6. Linux Security, Hontanon Ramon J., 2001.
7. The Internet: Douglas E. Comer, 3rd Edition, 2003.

# M.Sc. (Information Technology)
# SEMESTER-I

## MIT-105
## Computational Problem Solving Using Python

**Time: 3 Hrs.** **Total Marks: 100**
**Theory Marks: 80**
**Theory Internal Assessment M: 20**

**Note:**
**(i) The paper setter is required to set eight questions in all and the candidates will be required to attempt any five questions out of these eight questions. All questions will carry equal marks.**
**(ii) The student can use only Non-programmable & Non-storage type calculator.**

**Introduction:** Process of Computational Problem Solving, Python Programming Language

**Data and Expressions:** Literals, Variables and Identifiers, Operators, Expressions and Data Types

**Control Structures: B**oolean Expressions (Conditions), Selection Control

**Lists:** List Structures, Lists (Sequences) in Python, Iterating Over Lists (Sequences) in Python

**Functions:** Fundamental Concepts, Program Routines

**Objects and Their Use:** Software Objects

**Modular Design:** Modules, Top-Down Design, Python Modules

**Text Files:** Using Text Files, String Processing, Exception Handling

**Recursion:** Recursive Functions, Recursive Problem Solving, Iteration vs. Recursion

**Reference Books:**


1. Introduction to Computer Science Using Python: A Computational Problem-Solving Focus, Charles Dierbach, Wiley Publications, 2012, ISBN : 978-0-470-91204-1
2. Introduction To Computation And Programming Using Python, GUTTAG JOHN V, PHI, 2014, ISBN-13: 978-8120348660
3. Introduction to Computating& Problem Solving Through Python, Jeeva Jose andSojan P. Lal,Khanna Publishers, 2015, ISBN-13: 978-9382609810
4. Introduction to Computing and Programming in Python, Mark J. Guzdial, Pearson Education, 2015, ISBN-13: 978-9332556591
5. Fundamentals of Python by Kenneth Lambert, Course Technology, Cengage Learning , 2015
6. Learning Python by Mark Lutz, 5th Edition, O'Reilly Media, 2013

# M.Sc. (Information Technology)
# SEMESTER-I

**MIT-106 P**
**Programming Laboratory – I**
**(Python)**

**Time: 3 Hrs.** **Total Marks: 100**
**Practical Marks: 80**
**Practical Internal Assessment M: 20**

**Programming laboratory based on Python**

# M.Sc. (Information Technology)

## Semester II

| Sr. No. | Paper Code | Paper Name | Marks | | | | Page No. |
|---|---|---|---|---|---|---|---|
| | | | Theory | Internal Assessment | Practical | Total | |
| 1 | MIT-201 | Mobile Computing | 80 | 20 | - | 100 | 40-41 |
| 2 | MIT-202 | Distributed Databases | 80 | 20 | - | 100 | 42 |
| 3 | MIT-203 | Image Processing | 80 | 20 | - | 100 | 43-44 |
| 4 | MIT-204 | Fuzzy Systems | 80 | 20 | - | 100 | 45-46 |
| 5 | MIT-205 | Network Design and Performance Analysis | 80 | 20 | - | 100 | 47 |
| 6 | MIT-206P | Programming Laboratory-II | - | 20 | 80 | 100 | 48 |
| **Total Marks** | | | | | | **600** | |

# M.Sc. (Information Technology)
# SEMESTER-II

## MIT-201
## Mobile Computing

**Time: 3 Hrs.** **Total Marks: 100**
**Theory Marks: 80**
**Theory Internal Assessment M: 20**

**Note:**
**(i) The paper setter is required to set eight questions in all and the candidates will be required to attempt any five questions out of these eight questions. All questions will carry equal marks.**
**(ii) The student can use only Non-programmable & Non-storage type calculator.**

**INTRODUCTION TO MOBILE COMPUTING**: Introduction and need for Mobile computing Mobility and portability , Mobile and Wireless devices , Applications , Brief History of wireless communication. Current Wireless Systems: Overview of Paging Systems, Cordless Phones, Cellular Telephone Systems, Satellite Communication, Wireless LANs, Bluetooth, Modern

**WIRELESS TRANSMISSION**: General Concepts of multiplexing and modulation , Spread Spectrum , Cellular Systems

**CELLULAR CONCEPT:** Introduction. Frequency reuse. Channel Assignment Strategies. Handoff Strategies. Interference and System Capacity, Trunking and Grade of Service. Improving Coverage & Capacity in Cellular Systems

**MEDIUM ACCESS CONTROL LAYER:** Why specialized MAC- hidden and exposed terminals ,near and far terminals , General Concepts and comparison of SDMA, FDMA, TDMA , CDMA

**MOBILE IP-** Goals, assumptions and requirements, Entities and terminologies, Agent Discovery , Registration ,Tunneling and encapsulation, Reverse Tunneling, IPv6 , IP micro-mobility support – Cellular IP, Hawaii, Hierarchical, mobile IPv6 , Mobile Routing-(Destination sequence distance Vector, Dynamic Source Routing, Alternative Metrics, Adhoc Routing Protocols -Flat, Hierarchical, Geographic-position-assisted)

**Mobile TCP:** Traditional TCP , Congestion Control, Slow start, Fast retransmit / Fast recovery , Implications on mobility , Classical TCP improvements , Indirect TCP, Snooping TCP, Mobile TCP, Fast retransmit / Fast recovery, Transmission / Timeout freezing, Selective Retransmission, Transaction oriented TCP , TCP over 2.5/3G wireless networks

**GSM**: Mobile Services (Bearer, Tele-and-supplementary services) , **System Architecture** – (Radio subsystem , Network and switching subsystem , Operation subsystem **), Protocols** – (Localization and calling , Handover ), **Value Added Services** –( SMS: Architecture, Mobile Originated and Mobile Terminated procedures) , Cell Broadcast Service:( Architecture, Message Transfer Procedure) , MMS:( Architecture, Protocol framework, Message Transfer

Procedure) , Location Services:( Logical Reference Model, Control Procedures, Network, Architecture, determination of Location Information, Location based services), **GPRS**

**INTRODUCTION TO 3G MOBILE NETWORKS**: UMTS - System architecture, radio interface, UTRAN –(Architecture, Functions of RNC, Core network ),. Handover –( Hard and soft handover)

**WIRELESS APPLICATION PROTOCOL-**Architecture, Wireless datagram protocol, Wireless transport layer security,. Wireless transaction protocol, Wireless session protocol, Wireless application environment, WAP Push Architecture, protocols

**References:**

[1] Mobile Communications: Jochen Schiller, Pearson Education, 2nd Edition

[2] Mobile Computing: Implementing Pervasive Information and Communications Technologies by Shambhu Upadhyaya, Kevin Kwiat, Abhijit Chaudhury, Springer

# M.Sc. (Information Technology)
# SEMESTER-II

## MIT-202
## Distributed Databases

**Time: 3 Hrs.** **Total Marks: 100**
**Theory Marks: 80**
**Theory Internal Assessment M: 20**

**Note:**
**(i) The paper setter is required to set eight questions in all and the candidates will be required to attempt any five questions out of these eight questions. All questions will carry equal marks.**
**(ii) The student can use only Non-programmable & Non-storage type calculator.**

**Introduction**
Concepts, Advantages and Disadvantages of Distributed Database Management System (DDBMS), Homogenous and Heterogeneous DDBMS. Functions of a DDBMS. Distributed Database Management System Architecture

Architectural Models for DDBMS (Distributed Database Management System): Autonomy, Distribution, Heterogeneity factors; Client Server Systems, Peer-to-Peer Distributed Systems, Global Directory Issues.

Distributed Relational Database Design

Fragmentation: Reasons, Alternatives, Degree, Information requirement. Horizontal, Vertical, Hybrid Fragmentation.

Allocation: Allocation Problem, Information Requirements for allocation.

Distributed Relational Database Query Processing & Optimization

Query Decomposition, Localization of Distributed Data, Query Optimization, Introduction to Distributed Query Optimization Algorithms

Distributed Concurrency Control, Objectives, Distributed Serializability, Centralized two phase locking, Distributed two-phase locking.

**References:**
1. M.TamerOzsu, Patrick Valdureiz, *'Principles of Distributed Database Systems'* Second Edition, Prentice Hall, 2002.
2. RomezElmasri, ShamkantB.Navathe, *'Fundamentals of Database Systems'* Pearson Education, 2005.
3. Silberschatz, Korth, Sudershan "Database System Concepts" 4th Ed. McGraw Hill,2006.
4. Connolly &Begg "Database Systems – A practical approachto design, Implementation and Management, 3rd Ed. Pearson Education, 2005.

# M.Sc. (Information Technology)
# SEMESTER-II

## MIT-203
### Image Processing

**Time: 3 Hrs.** **Total Marks: 100**
**Theory Marks: 80**
**Theory Internal Assessment M: 20**

**Note:**
**(i) The paper setter is required to set eight questions in all and the candidates will be required to attempt any five questions out of these eight questions. All questions will carry equal marks.**
**(ii) The student can use only Non-programmable & Non-storage type calculator.**

**Introduction -** Definition of Digital Image Processing, The Origins of Digital Image Processing, Examples of Fields that Use Digital Image Processing - X-ray Imaging, Ultraviolet Band, Visible and Infrared Bands, Microwave Band, and Radio Band Imaging; Fundamental Steps in Digital Image Processing, Components of an Image Processing System,

**Digital Image Fundamentals -** Elements of Visual Perception, Light and the Electromagnetic Spectrum, Image Sensing and Acquisition - Single Sensor, Sensor Strips, Sensor Arrays, A Simple Image Formation Model; Image Sampling and Quantization - Spatial and Gray-Level Resolution, Aliasing and Moiré Patterns, Zooming and Shrinking Digital Images; Some Basic Relationships Between Pixels - Neighbors, Adjacency, Connectivity, Regions, and Boundaries, Distance Measures, Image Operations on a Pixel Basis; Linear and Nonlinear Operations

**Image Enhancement in the Spatial Domains - S**ome Basic Gray Level Transformations - Negatives, Log, Power-Law, Piecewise-Linear Transformations; Histogram Processing - Histogram Equalization, Histogram Matching (Specification), Local Enhancement; Enhancement Using Arithmetic/Logic Operations - Image Subtraction, Image Averaging; Basics of Spatial Filtering, Smoothing Spatial Filters - Smoothing Linear and Order-Statistics Filters; Sharpening Spatial Filters - Use of Second Derivatives for Enhancement : The Laplacian, Use of First Derivatives for Enhancement: The Gradient; Combining Spatial Enhancement Methods

**Image Enhancement in the Frequency Domain -** Introduction to the Fourier Transform and the Frequency Domain - One-Dimensional Fourier Transform and its Inverse, Two-Dimensional DFT and Its Inverse, Filtering in the Frequency Domain, Correspondence between Filtering in the Spatial and Frequency Domains; Smoothing and Frequency-Domain Filters - Ideal , Butterworth, and Gaussian Lowpass Filters; Sharpening Frequency Domain Filters - Ideal , Butterworth, and Gaussian Highass Filters, Laplacian in the Frequency Domain, Unsharp Masking, High-Boost Filtering, and High-Frequency Emphasis Filtering; Homomorphic Filtering Implementation - Some Additional Properties of the 2-D Fourier Transform, Computing the Inverse Fourier Transform Using a Forward Transform Algorithm, More on periodicity: the Need for Padding, The Convolution and Correlation Theorems, Summary of Properties of the 2-D Fourier Transform, The Fast Fourier Transform;

**Image Restoration -** A Model of the Image Degradation/Restoration Process, Noise Models, Restoration in the Presence of Noise Only – Spatial Filtering - Mean, Order-Statistics, and Adaptive

Filters Filters; Periodic Noise Reduction by Frequency Domain Filtering - Bandreject, Bandpass, and Notch Filters Filters; Estimating the Degradation Function - Estimation by Image Observation, Experimentation and Modeling; Inverse Filtering, Minimum Mean Square Error (Wiener) Filtering, Geometric Mean Filter - Geometric Transformations, Spatial Transformations, Gray-Level Interpolation

**Color Image Processing -** Color Fundamentals, Color Models - RGB, CMY, HSI; Pseudocolor Image Processing - Intensity Slicing, Gray Level to Color Transformations; Basics of Full-Color Image Processing, ColorTransformations - Formulation, Color Complements, Color Slicing, Tone and Color Corrections, Histogram Processing; Smoothing and Sharpening, Color Segmentation, Color Edge Detection, Noise in Color Images

**Morphological Image Processing -** Some Basic Concepts from Set Theory, Logic Operations Involving Binary Images, Dilation and Erosion, Opening and Closing, The Hit-or-Miss Transformation, Some Basic Morphological Algorithms - Boundary Extraction, Region Filling, Extraction of Connected Components, Convex Hull, Thinning, Thickening; Extensions to Gray-Scale Images

**Image Segmentation -**Detection of Discontinuities - Point Detection, Line Detection, Edge Detection, Edge Linking and Boundary Detection - Local Processing, Global Processing via the Hough Transform, Thresholding - The Role of Illumination, Basic Global Thresholding, Basic Adaptive Thresholding, Optimal Global and Adaptive Thresholding, Use of Boundary Characteristics for Histogram Improvement and Local Thresholding, Thresholds Based on Several Variables, Region-Based Segmentation - Region Growing, Region Splitting and Merging,

**References** :

Digital Image Processing by Gonzalez & Wood, Addison Wesley, 2000.
Digital Image Processing by A.K Jain

# M.Sc. (Information Technology)
# SEMESTER-II

## MIT-204
## Fuzzy Systems

**Time: 3 Hrs.** **Total Marks: 100**
**Theory Marks: 80**
**Theory Internal Assessment M: 20**

**Note:**
**(i) The paper setter is required to set eight questions in all and the candidates will be required to attempt any five questions out of these eight questions. All questions will carry equal marks.**
**(ii) The student can use only Non-programmable & Non-storage type calculator.**

**Introduction:** The Case for Imprecision, A Historical Perspective, The Utility of Fuzzy Systems, Limitations of Fuzzy Systems

**The Illusion:** Ignoring Uncertainty and Accuracy, Uncertainty and Information, The Unknown, Fuzzy Sets and Membership, Chance Versus Fuzziness

**Classical Sets and Fuzzy Sets:** Classical Sets: Operations on Classical Sets, Properties of Classical (Crisp) Sets, Mapping of Classical Sets to Functions, Fuzzy Sets: Fuzzy Set Operations, Properties of Fuzzy Sets, Alternative Fuzzy Set Operations

**Classical Relations and Fuzzy Relations:** Cartesian Product, Crisp Relations: Cardinality of Crisp Relations, Operations on Crisp Relations, Properties of Crisp Relations, Composition, Fuzzy Relations: Cardinality of Fuzzy Relations, Operations on Fuzzy Relations, Properties of Fuzzy Relations, Fuzzy Cartesian Product and Composition, Tolerance and Equivalence Relations: Crisp Equivalence Relation, Crisp Tolerance Relation, Fuzzy Tolerance and Equivalence Relations: Value Assignments, Max–Min Method

**Properties of Membership Functions, Fuzzification, and Defuzzification**: Features of the Membership Function, Various Forms, Fuzzification, Defuzzification to Crisp Sets, $\lambda$-Cuts for Fuzzy Relations, Defuzzification to Scalars

**Logic and Fuzzy Systems:** Part I Logic: Classical Logic, Fuzzy Logic, Approximate Reasoning, Other Forms of the Implication Operation
Part II Fuzzy Systems :Natural Language, Linguistic Hedges, Fuzzy (Rule-Based) Systems, Graphical Techniques of Inference

**Development of Membership Functions:** Membership Value Assignments: Intuition, Inference, Rank Ordering, Neural Networks, Genetic Algorithms, Inductive Reasoning

**Decision Making with Fuzzy Information**: Fuzzy Synthetic Evaluation, Fuzzy Ordering, Non-transitive Ranking, Preference and Consensus, Multiobjective Decision Making

**Fuzzy Classification:** Classification by Equivalence Relations, Crisp Relations, Fuzzy Relations, Cluster Analysis, Cluster Validity, *c*-Means Clustering, Fuzzy *c*-Means (FCM), Fuzzy *c*-Means Algorithm

**Introduction to MATLAB:** Fuzzy Logic Toolbox, Fuzzy Logic Simulink Demos .
**MATLAB simulation**: Fuzzy Logic Controller (FLC) implementation. Simulink Fuzzy Logic Controller (FLC) implementation. Applications of FLC to Control System. Develop Fuzzy Inference System for various applications.

**References:**


1. Fuzzy Logic wit Engineering Applications by Timothy J. Ross, Wiley, Third Edition
2. Fuzzy logic intelligence, Control and Information by John Yen and Reza Langari, Pearson Education, 2003.
3. Uncertain Rule-based Fuzzy Logic System: Introduction and New Directions by Jerry M. Mendel, Prentice Hall.
4. Fuzzy Sets, Fuzzy Logic and Fuzzy System – edited by George J. Keir& Bo Yuan 1996. World Scientific Press.
5. Fuzzy Set Theory: Foundations and Applications by George J. Klir, Ute. St. Clair, Bo Yuan, Prentice Hall,1997.
6. Getting Started with MATLAB: A Quick Introduction for Scientists and Engineers by Rudra Pratap, Oxford University Press, 2010.

# M.Sc. (Information Technology)
## SEMESTER-II
### MIT-205
### Network Design and Performance Analysis

**Time: 3 Hrs.** **Total Marks: 100**
**Theory Marks: 80**
**Theory Internal Assessment M: 20**

**Note:**
**(i) The paper setter is required to set eight questions in all and the candidates will be required to attempt any five questions out of these eight questions. All questions will carry equal marks.**
**(ii) The student can use only Non-programmable & Non-storage type calculator.**

Requirements, planning, & choosing technology: Business requirements, technical requirement user requirements, traffic sizing characteristics time & delay consideration.

Traffic engineering and capacity planning: Throughput calculation traffic characteristics & source models, traditional traffic engineering, queued data & packet switched traffic modeling, designing for peaks, delay or latency

Network performance modeling- creating traffic matrix, design tools, components of design tools, types of design projects.

Technology Comparisons- Generic packet switching networks characteristics, private vs. public networking, Business aspects of packet, frame and cell switching services, High speed LAN protocols comparison, Application performance needs, Throughput, burstiness, response time and delay tolerance, selecting service provider, vendor, service levels etc.

Access Network Design- N/W design layers, Access N/W design, access n/w capacity, Backbone n/w design, Backbone segments, backbone capacity, topologies, Tuning the network, securing the network,

Design for network security.

Network Optimization: Network optimization theory: Goals of network optimization, measurements for network optimization, optimization tools, optimization techniques.

**Reference:**
1. James D McCabe, Network Analysis, Architecture and Design, 2nd Edition, Morgan Kaufman Series in Networking, 2007.
2. Youeu Zheng, Shakil Akhtar, Network for Computer Scientists and Engineers, Oxford University Press, 2007.
3. Foruzan, Data Communications & Networking, Tata –Mcgraw Gill, 2006.

# M.Sc. (Information Technology)
# SEMESTER-II

## MIT-206 P
## Programming Laboratory-II

**Time: 3 Hrs** **Total Marks: 100**
**Practical Marks: 80**
**Practical Internal Assessment M: 20**

**Programming Laboratory based on Image Processing or Fuzzy Systems or Mobile Computing.**

# M.Sc.(Information Technology)

## Semester III

| Sr. No. | Paper Code | Paper Name | Marks | | | | Page No. |
|---|---|---|---|---|---|---|---|
| | | | Theory | Internal Assessment | Practical | Total | |
| 1 | MIT-301 | Network Protocols | 80 | 20 | - | 100 | 50-51 |
| 2 | MIT-302 | Advanced Web Technologies using ASP.NET | 80 | 20 | - | 100 | 52-53 |
| 3 | MIT-303 | Linux Administration | 80 | 20 | - | 100 | 54 |
| 4 | MIT-304 | System Simulation | 80 | 20 | - | 100 | 55 |
| 5 | MIT-305 | Microprocessor and its Applications | 80 | 20 | - | 100 | 56 |
| 6 | MIT-306P | Programming Laboratory-III(Based on Advanced Web Technologies using ASP.NET) | - | 20 | 80 | 100 | 57 |
| | | | | | **Total Marks** | **600** | |

**M.Sc. (Information Technology)**
**SEMESTER-III**

## MIT-301
## Network Protocols

**Time: 3 Hrs.** **Total Marks: 100**
**Theory Marks: 80**
**Theory Internal Assessment M: 20**

**Note:**
**(i) The paper setter is required to set eight questions in all and the candidates will be required to attempt any five questions out of these eight questions. All questions will carry equal marks.**
**(ii) The student can use only Non-programmable & Non-storage type calculator.**

**Review of Basic Concepts**: TCP/IP Protocol Suite, Underlying Technologies : LAN (802.3), Wireless Lans (802.11) , Point-to-point WANS, Switched WANS, Protocols , Standards, Standards Organizations: Internet Standards, Internet Administration, IEEE Standards ,Frame Format, Addressing, Ethernet Evolution, Standard Ethernet, Fast Ethernet, Gigabit Ethernet, Ten-Gigabit Ethernet

**IPv4 Addresses:** Address Space, Notation, Range of Addresses, Operations, CLASSFUL ADDRESSING: Classes, Classes and Blocks, Two-Level Addressing, Three-Level Addressing: (Subnetting & Supernetting), CLASSLESS ADDRESSING: Variable-Length Blocks, Two-Level Addressing-(Block Allocation, Subnetting), SPECIAL ADDRESSES: Special Blocks, Special Addresses in Each block, NAT -Address Translation, Translation Table

**Delivery and Forwarding of IP Packets:** DELIVERY: Direct Delivery & Indirect Delivery, FORWARDING: Forwarding Based on Destination Address, Forwarding Based on Label

**Internet Protocol Version IPv4:** DATAGRAMS, FRAGMENTATION: Maximum Transfer Unit, Fields Related to Fragmentation, OPTIONS: Format, Option Types, CHECKSUM: Checksum Calculation at the Sender, Checksum Calculation at the Receiver, Checksum in the IP Packet, IP PACKAGE

**Address Resolution Protocol (ARP):** ADDRESS MAPPING: Static Mapping, Dynamic Mapping, THE ARP PROTOCOL: Packet Format, Encapsulation, Operation, Proxy ARP, ARP PACKAGE, Reverse address resolution protocol, Primary and backup RARP servers.

**Internet Control Message Protocol Version:** MESSAGES: Message Format ,Error Reporting Messages, Query Messages, Checksum, DEBUGGING TOOLS, Ping, Traceroute, ICMP PACKAGE: Input Module ,Output Module

**Routing Protocols (RIP, OSPF, and BGP) :** Introduction: Cost or Metric, Static versus Dynamic Routing Tables, Routing Protocol: INTRA- AND INTER-DOMAIN ROUTING, DISTANCE VECTOR ROUTING-(Bellman-Ford Algorithm, Distance Vector Routing Algorithm, Count to Infinity, RIP ,RIP Message Format, Requests and Responses, Timers in RIP, RIP Version 2, Encapsulation, LINK STATE ROUTING- Building Routing Tables, OSPF, Areas, Metric, Types of Links, Graphical Representation, OSPF Packets, Link State Update Packet, Other Packets, Encapsulation, PATH VECTOR ROUTING: Reachability, Routing Tables, BGP:Types of Autonomous , Systems, Path Attributes, BGP Sessions, External and Internal BGP, Types of Packets, Packet Format, Encapsulation

**Transport Layer:** TRANSPORT-LAYER SERVICES, Process-to-Process Communication, Addressing: Port Numbers, Encapsulation and Decapsulation, Multiplexing and Demultiplexing, Flow

Control, Error Control,Combination of Flow and Error Control, Congestion Control, Connectionless and Connection-Oriented Services

**Transport-layer protocols:** Simple Protocol, Stop-and-Wait Protocol, Go-Back-*N* Protocol, Selective-Repeat Protocol, Bidirectional Protocols: Piggybacking

**User Datagram Protocol :** USER DATAGRAM , UDP SERVICES, Process-to-Process Communication, Connectionless Services, Congestion Control, Encapsulation and Decapsulation, Queuing, Multiplexing and Demultiplexing, Comparison between UDP and Generic Simple Protocol, UDP APPLICATIONS:UDP Features, Typical Applications, UDP PACKAGE: Control-Block Table, Input Queues, Control-Block Module, Input Module, Output Module, Examples

**Transmission Control Protocol:** TCP SERVICES: Process-to-Process Communication, Stream Delivery Service ,Full-Duplex Communication, Multiplexing and Demultiplexing, Connection-Oriented Service, Reliable Service, TCP FEATURES: Numbering System, Flow Control, Error Control, Congestion Control, SEGMENT, Format, Encapsulation, A TCP CONNECTION: Connection Establishment, Data Transfer, Connection Termination, Connection Reset, STATE TRANSITION DIAGRAM ,Scenarios, TCP implementation issues.

**References:**

1. Douglas E.Comer, Internetworking with TCP/IP: Principles, Protocols
2. Forouzan, TCP-IP, Protocol Suit, TMH.
3. Comer, Internetworking with TCP-IP, Vol. 3.
4. Unix Network Programming, W. Richard Stevens.
5. SNMP, Stallings, Pearson.
6. TCP-IP Network Administration, Hunt Craig.

**M.Sc. (Information Technology)**
**SEMESTER-III**

## MIT-302

**Advanced Web Technologies using ASP.NET**

**Time: 3 Hrs.** **Total Marks: 100**
**Theory Marks: 80**
**Theory Internal Assessment M: 20**

**Note:**
**(i) The paper setter is required to set eight questions in all and the candidates will be required to attempt any five questions out of these eight questions. All questions will carry equal marks.**
**(ii) The student can use only Non-programmable & Non-storage type calculator.**

**Introduction to .Net Framework**

Developing console applications, C# Type Conversion Methods, boxing and unboxing, compiling & building projects, using command line argument, compiling a C# program using commandLine utility CSC.EXE

**Introduction to Web Applications:**

**Standard Controls:** Display information, Accepting user input, Submitting form data, Displaying images, Using the panel control, Using the hyperlink control.

**Validation Controls:** Using the required field validator control, Using the range validator control using the compare validator control, Using the regular expression validator control, Using the custom validator control, Using the validation summary controls.

**Rich Controls:** Accepting file uploads, Displaying a calendar, Displaying advertisement, Displaying different page views, Displaying a wizard.

**Designing Website with Master Pages:** Creating master pages, Modifying master page content, Loading master page dynamically.

**SQL Data Source Control:** Creating database connections, Executing database commands, Using ASP.NET parameters with the SQL data source controls, Programmatically executing SQL data source commands, Cashing database data with the SQL data Source controls.

**List Controls:** Dropdown list control, Radio button list controls, list box controls, bulleted list controls, custom list controls.

**Grid View Controls:** Grid view control fundamentals, Using field with the grid view control, Working with grid view control events extending the grid view control.

**Building Data Access Components with ADO.NET:** Connected the data access, Disconnected data access, Executing a synchronous database commands, Building data base objects with the .NET framework.

**Maintaining ApplicationState:** Using browser cookies, Using session state, Using profiles.

**Caching Application Pages and Data:** page output caching, partial page caching, data source caching, data caching, SQL cache dependences.

**Reference:**

**ASP.NET 3.5:** Stephen Walther, Pearson Education, 2005
**ASP.NET 4.0:** In Simple Steps by Kogent Learning Solutions Inc.
**ASP.NET 4.5:** Black Book by Kogent Learning Solution Inc.

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**SEMESTER-III**

## MIT-303
**Linux Administration**

**Time: 3 Hrs.** **Total Marks: 100**
**Theory Marks: 80**
**Theory Internal Assessment M: 20**

**Note:**
**(i) The paper setter is required to set eight questions in all and the candidates will be required to attempt any five questions out of these eight questions. All questions will carry equal marks.**
**(ii) The student can use only Non-programmable & Non-storage type calculator.**

**Introduction :** Introduction to LINUX, Installing LINUX, Partitions, LILO, Installing software packages. Updating with Gnome, Updating with KDE, Command line installing.

**File Structure :** LINUX files, File structure, File & Directory permission, Operations on a file.

**Administering Linux :** Creating a user A/C, modifying a user A/C, Deleting a user A/C, Checking Disk Quotas, System Initialization, System start-up & shutdown, Installing & managing H/W devices.

**Setting Up A LAN :** Understanding LAN, Setting up Wireless LAN, Understanding IP address, Troubleshooting LAN.

**Setting Up Print Server :** Choosing CUPS, Working with CUPS Printing, Managing Printing, Configuring Print Server.

**Setting Up File Server :** Setting up an NFS, SAMBA, Installing & Running send mail.

**Troubleshooting :** Troubleshooting LINUX in GRUB mode.

**Setting Up Web Server :** Configuring the Apache Server, Starting & stopping the server, Monitoring Server Activities.

**Setting Up DHCP & NIS :** Setting up DHCP Server, Setting up DHCP Client, Setting up Network Information Service.

**References :**
1. Redhat Linux(10) Bible : Christopher Negus, 2003
2. Linux Unleashed : Tim Parker, 2006
3. Linux Administration Tools : Charles Fisher, 2007

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## MIT-304
**System Simulation**

**Time: 3 Hrs.** **Total Marks: 100**
**Theory Marks: 80**
**Theory Internal Assessment M: 20**

**Note:**
**(i) The paper setter is required to set eight questions in all and the candidates will be required to attempt any five questions out of these eight questions. All questions will carry equal marks.**
**(ii) The student can use only Non-programmable & Non-storage type calculator.**

**Introduction** : Concept of a system, stochastic activities, continue and discrete system, system modeling, mathematical modeling, principle used in modeling.

**Simulation of Systems** : Concepts of simulation of continuous systems with the help of two examples; use of integration formulas; concepts of discrete system simulation with the help of two examples, Generation of random numbers, Generation of non- uniformly distributed numbers.

**Simulation of Queuing Systems** : Rudiments of queuing theory, Simulation of Single-Server queue, two-server queue, general queues.

**Simulation in Inventory Control and Forecasting** : Elements of inventory theory, inventory models, Generation of Poisson and Erlang variats, forecasting and regression analysis.

**Design and Evaluation of Simulation Experiments** : Experimental layout and validation.

**Simulation Languages** : Continuous and discrete simulation languages, Block-Structured continuous simulation languages, expression based languages, discrete system simulation languages, simscript, GPSS, SIMULA, Simpack, GASP IV, CSIM, factors in selection of a discrete system simulation languages.

**Case Studies** : Analytic Vs Simulation Models, Applications to Operating Systems, Databases, Computer Networks Architectures.

**References :**
Narsingh Deo, “System Simulation with Digital Computer”, Prentice-Hall of India Pvt. Ltd. - 1993.
Gordon, “System Simulation”, Prentice Hall of India Pvt. Ltd. – 1993

**M.Sc. (Information Technology)**
**SEMESTER-III**

## MIT-305
**Microprocessor and its Applications**

**Time: 3 Hrs.** **Total Marks: 100**
**Theory Marks: 80**
**Theory Internal Assessment M: 20**

**Note:**
**(i) The paper setter is required to set eight questions in all and the candidates will be required to attempt any five questions out of these eight questions. All questions will carry equal marks.**
**(ii) The student can use only Non-programmable & Non-storage type calculator.**

**Introduction** : Introduction to Microprocessor, General Architecture of Microcomputer System. Microprocessor Units, Input unit, Output unit, Memory unit and auxiliary storage unit.

**Architecture of 8086/8088 Microprocessor** : Description of various pins, configuring the 8086/8088 microprocessor for minimum and maximum mode systems, Internal architecture of the 8086/8088 microprocessor, system clock, Bus cycle, Instruction execution sequence.

**Memory Interface of 8086/8088 Microprocessor** : Address space and data organization, generating memory addresses hardware organization of memory address space, memory bus status code, memory control signals, read/write bus cycles, program and data storage memory, dynamic RAM system.

**Input/Output Interface of the 8086/8088 Microprocessor** : I/O interface, I/O address space and data transfer, I/O instructions, I/O bus cycles, Output ports, 8255A Programmable Peripheral Interface (PPI), Serial communication interface (USART and UART) – the RS- 232 C interface.

**Interrupt Interface of 8086/8088 Microprocessor:** Types of Interrupt, Interrupt Vector Table (IVT).

**Pentium Processor Family:** Internal architecture ,software architecture of Pentium processor,Real mode & Protected mode Register Sets ,enhancement to instruction set.

**References :**
Walter Triebel : The 8086 Microprocessor – Architecture, Software and Interfacing Techniques, PHI, Delhi.
Walter Triebel : The 8088 Microprocessor – Architecture, Software and Interfacing Techniques, PHI, Delhi.
Douglas V. Hall : Microprocessors and Interfacing – Programming and Hardware, Tata McGraw Hill Publishing Company Ltd. , New Delhi.
Peter Abel : IBM PC Assembly Language and Programming, PHI, Delhi.

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**SEMESTER-III**

**MIT-306 P**
**Programming Laboratory-III**
**(Based on Advanced Web Technologies using ASP.NET)**

**Time: 3 Hrs.** **Total Marks: 100**
**Practical Marks: 80**
**Practical Internal Assessment M: 20**

**Programming Laboratory based on Advanced Web Technologies using ASP.NET and LINUX**.

# M.Sc. (Information Technology)

## Semester IV

| Sr. No. | Paper no. | Paper | Marks | | | | Page No. |
|---|---|---|---|---|---|---|---|
| | | | Theory | Internal Assessment | Practical | Total | |
| 1 | MIT-401 | Advanced Java Technology | 80 | 20 | - | 100 | 59 |
| 2 | MIT-402 | Network Security | 80 | 20 | - | 100 | 60 |
| 3 | MIT-403 | Artificial Neural Network | 80 | 20 | - | 100 | 61 |
| 4 | MIT-404P | Programming Laboratory-IV(Based on Advanced Java Technology) | 80 | 20 | - | 100 | 62 |
| 5 | MIT-405P | Project Work | - | 40 | 160 | 200 | 63 |
| | | | | | **Total Marks** | **600** | |

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**SEMESTER-IV**

## MIT-401
**Advanced Java Technology**

**Time: 3 Hrs.** **Total Marks: 100**
**Theory Marks: 80**
**Theory Internal Assessment M: 20**

**Note:**
**(i) The paper setter is required to set eight questions in all and the candidates will be required to attempt any five questions out of these eight questions. All questions will carry equal marks.**
**(ii) The student can use only Non-programmable & Non-storage type calculator.**

**Java I/O:** I/O Basics, Streams, reading Console input and writing console output, Print Writer Class, Reading & Writing Files, Byte Streams, Character Streams & Serialization.

**Multithreaded Programming:** The Java Thread Model, Thread Priorities, Synchronization, Interthread communication, Suspending Resuming and Stopping Threads.

**Applets:** Applet Basics, Applet Architecture, Applet: Display, Repaint, Parameter Passing.

**Event Handling:** The Delegation Event Model, Event Classes, Event Listener Interfaces.

**AWT:** Window Fundamentals, Working with Frame Windows, Graphics, Color and Fonts.

**Servlets:** Life Cycle of a Servlet, The Servlet API, Reading Servlet Parameters, Handling HTTP Requests and Responses, Cookies & Session Tracking.

**References:**

1. The Complete Reference – JAVA 2 by Ptrick Naughton & Herbert Schildt TMH Publications.

2. The Java Tutorial Continued by Compione, Walrath, Huml SUN JAVA Tutorial Team, Addison Wessley, 2007.

3. Java2 Black Book Steven Holzner OT Dreamtech Press, www.idgbooksindia.com, 2007.

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**SEMESTER-IV**

## MIT-402
**Network Security**

**Time: 3 Hrs.** **Total Marks: 100**
**Theory Marks: 80**
**Theory Internal Assessment M: 20**

**Note:**
**(i) The paper setter is required to set eight questions in all and the candidates will be required to attempt any five questions out of these eight questions. All questions will carry equal marks.**
**(ii) The student can use only Non-programmable & Non-storage type calculator.**

Essential of Network Perimeter Security : Terms. Defense in depth

Packet Filtering: TCP/IP Primer, How Packet filtering Works, TCP And UDP Ports, TCP's Tree way handshake, The Cisco Router as a packets filter, An Alternative packet filter: IP Chains, The Cisco ACL, Effective Users of Packets-filtering devices, Tracking Rejected Traffic, Problem with Packets Filters, Dynamic packet Filtering and be Reflexive.

Stateful Firewalls : How a Stateful Firewall works, The concept of state , Stateful Filtering and stateful Inspection.

Proxy Firewalls : Fundamentals of Proxying, Pros And Cons of Proxy Firewalls, Types of Proxies, Tools of Proxying.

Security Policy : Firewalls Are Policy, How to develop Policy, Perimeter Consideration.
Network Instruction Detection : Network instruction detection basics, The roles of Network IDS in a parameter defense, IDS Sensor placement, Using an IDS Management Networks.
The Need for Host Hardening : Removing or Disabling of Unnecessary Programs. Limiting access to data And Configuration Files, Controlling User and Privileges, Maintaining Host Security Logs, Applying Patches, additional Hardening Guidelines.

Host Defenses : Hosts and the perimeter, Antivirus Software, Host-Based Firewalls, Host – based Instruction detection, Challenges Of host defenses components.
Instruction Prevention System : What is IPS, IPS Limitation, NIPS, Host-Based instruction Prevention System, Monitoring file Integrity, Monitoring Application Behaviour.
Fundamentals of Secure Premier Design : Gathering Design Requirements, Design Elements for Premier Security.

Separation Resources : Security Zones, Common Design Elements, VLAN-Based Separation.

**M.Sc. (Information Technology)**
**SEMESTER-IV**

## MIT-403
**Artificial Neural Networks**

**Time: 3 Hrs.** **Total Marks: 100**
**Theory Marks: 80**
**Theory Internal Assessment M: 20**

**Note:**
**(i) The paper setter is required to set eight questions in all and the candidates will be required to attempt any five questions out of these eight questions. All questions will carry equal marks.**
**(ii) The student can use only Non-programmable & Non-storage type calculator.**

**Neural Network Technology** : Evolution of ANN, Architecture of ANN, Knowledge representation.

**Neural Network Learning** : Basic learning rules, supervised by unsupervised learning, Method of steepest Descent, LMS Algorithm.

**Single Layer Perceptrons-I** :Preceptron Model, Preceptron learning algorithms : Simple learning algorithm, pocket algorithm without and with Ratches, Linear Machines, Kessler's construction, Linear Machines Learning algorithm, Representing Boolean functions.

**Single Layer Perceptrons-II** :Anderson's BSB Model, Hopfied's Model, K-Means Clustering, Topology-Preserving Maps, ART1 and ART2.

**Multilayer Preceptrons** : Back-Propagation, Applications of Back-propagation : NETtalk, Handwritten Character Recognition, Pattern Recognition.

**References :**
1. [SG] Gallant S.L., Neural Networks Learning & Expert Systems, MIT Press, 1993.
2. [SH] Haykin S., Neural Networks : A Comprehensive Foundation, Pearson Education Inc., Second Edition, 2003.
3.[FS] Freeman J.A., Skapura D.M., Neural Network Algorithms, Applications and Programming Techniques, Addison-Wesley Publications, 1992.

**M.Sc. (Information Technology)**
**SEMESTER-IV**

**MIT-404P**
**Programming Laboratory-IV**
**(Based on Advanced Java Technology)**

**Time: 3 Hrs.** **Total Marks: 100**
**Practical Marks: 80**
**Practical Internal Assessment M: 20**

Programming Laboratory based on Advanced Java Technology.

**M.Sc. (Information Technology)**
**SEMESTER-IV**

**MIT–405P**
**Project Work**

**Time: 3 Hrs.** **Total Marks: 200**
**Project Marks: 160**
**Project Internal Assessment M: 40**

The Project is to be prepared based on some current problems from industry / business / academic domain using some currently available technology / platform.

**Note:**
1. The end semester project work evaluation is to be conducted by following panel of examiners:-
   a. Internal Examiner
   b. External Examiner.
   c. Head/Head's nominee .
2. The Project are to be submitted as per the common ordinances for P.G. courses under semester system.