

M.Sc. (Information Technology)

Syllabus

Session (2020-2021)



KHALSA COLLEGE
AMRITSAR
-An Autonomous College

Note:

- 1. Copy rights are reserved. Nobody is allowed to edit it in any form. Defaulters will be prosecuted.**
- 2. Subject to change in the syllabi at any time. Please visit the Khalsa College website time to time.**

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	75	25	-	100	36
2	MIT-102	Distributed Computing	75	25	-	100	37
3	MIT-103	Advanced Computer Organization and Architecture	75	25	-	100	38
4	MIT-104	Network Operating System	75	25	-	100	39
5	MIT-105	Computational Problem Solving Using Python	75	25	-	100	40
6	MIT-106P	Programming Laboratory-I(Python)	-	25	75	100	41
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: 75

Theory Internal Assessment M: 25

Section A: It will have question No.1 consisting of 10 very short answer questions from the entire syllabus. Students will attempt 6 questions. Each question will carry **2.5 marks** with answer to each question up to 10 lines in length. The total weightage being **15 marks**.

Section B: It will consist of essay type/numerical questions up to five pages in length. Four questions numbering 2, 3, 4 and 5 will be set by the examiner from Unit-I of the syllabus. The students will be required to attempt any two questions. Each question will carry **15 marks**.

The total weightage of this section shall be **30 marks**.

Section C: It will consist of essay type/numerical questions up to five pages in length. Four questions numbering 6, 7, 8 and 9 will be set by the examiner from Unit-II of the syllabus. The students will be required to attempt any two questions. Each question will carry **15 marks**.

The total weightage of this section shall be **30 marks**.

Unit -I

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.

Unit -II

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 code sign, and case studies in different embedded systems.

References:

1. Ken Arnold, "Embedded Controller Hardware Design", Newnes, 2001.
2. Arnold S. Berger, "Embedded Systems Design: An Introduction to Processes, Tools and Techniques", CMP books, 2001.
3. Fran Vahid, Tony D. Givargis, "Embedded Systems Design – A Unified Hardware/Software Introduction, Wiley, 2001
4. E. A. Lee and S. A. Seshia, "Introduction to Embedded Systems".

M.Sc. (Information Technology)
SEMESTER-I

MIT-102
Distributed Computing

Time: 3 Hrs.

Total Marks: 100
Theory Marks: 75
Theory Internal Assessment M: 25

Section A: It will have question No.1 consisting of 10 very short answer questions from the entire syllabus. Students will attempt 6 questions. Each question will carry **2.5 marks** with answer to each question up to 10 lines in length. The total weightage being **15 marks**.

Section B: It will consist of essay type/numerical questions up to five pages in length. Four questions numbering 2, 3, 4 and 5 will be set by the examiner from Unit-I of the syllabus. The students will be required to attempt any two questions. Each question will carry **15 marks**.

The total weightage of this section shall be **30 marks**.

Section C: It will consist of essay type/numerical questions up to five pages in length. Four questions numbering 6, 7, 8 and 9 will be set by the examiner from Unit-II of the syllabus. The students will be required to attempt any two questions. Each question will carry **15 marks**.

The total weightage of this section shall be **30 marks**.

Unit -I

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.

Unit -II

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:

1. Distributed systems, concepts and design, 3rd Edition, Addison Wesley by George Colouris, Jean Dollimore and Tim Kinder berg, 2006.
2. Distributed system, 2nd Edition, Addison Wesley by Sape Mullender, 2006.
3. Distributed Computing: Fundamentals, Simulations, and Advanced Topics, Wiley, by Jennifer Welch Hagit Attiya
4. "Distributed Systems – Principles and Paradigms" by Andrew S Tanenbaum and Maaten Van Steen

M.Sc. (Information Technology)
SEMESTER-I

MIT-103

Advanced Computer Organization and Architecture

Time: 3 Hrs.

Total Marks: 100

Theory Marks: 75

Theory Internal Assessment M: 25

Section A: It will have question No.1 consisting of 10 very short answer questions from the entire syllabus. Students will attempt 6 questions. Each question will carry **2.5 marks** with answer to each question up to 10 lines in length. The total weightage being **15 marks**.

Section B: It will consist of essay type/numerical questions up to five pages in length. Four questions numbering 2, 3, 4 and 5 will be set by the examiner from Unit-I of the syllabus. The students will be required to attempt any two questions. Each question will carry **15 marks**.

The total weightage of this section shall be **30 marks**.

Section C: It will consist of essay type/numerical questions up to five pages in length. Four questions numbering 6, 7, 8 and 9 will be set by the examiner from Unit-II of the syllabus. The students will be required to attempt any two questions. Each question will carry **15 marks**.

The total weightage of this section shall be **30 marks**.

Unit -I

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

Unit –II

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

References:

1. Computer Architecture and Parallel Processing, Faye A. Briggs, McGraw-Hill International Editions, 2003
2. 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: 75

Theory Internal Assessment M: 25

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Section B: It will consist of essay type/numerical questions up to five pages in length. Four questions numbering 2, 3, 4 and 5 will be set by the examiner from Unit-I of the syllabus. The students will be required to attempt any two questions. Each question will carry **15 marks**.

The total weightage of this section shall be **30 marks**.

Section C: It will consist of essay type/numerical questions up to five pages in length. Four questions numbering 6, 7, 8 and 9 will be set by the examiner from Unit-II of the syllabus. The students will be required to attempt any two questions. Each question will carry **15 marks**.

The total weightage of this section shall be **30 marks**.

Unit -I

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.

Unit -II

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. Forouzan, 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: 75

Theory Internal Assessment M: 25

Section A: It will have question No.1 consisting of 10 very short answer questions from the entire syllabus. Students will attempt 6 questions. Each question will carry **2.5 marks** with answer to each question up to 10 lines in length. The total weightage being **15 marks**.

Section B: It will consist of essay type/numerical questions up to five pages in length. Four questions numbering 2, 3, 4 and 5 will be set by the examiner from Unit-I of the syllabus. The students will be required to attempt any two questions. Each question will carry **15 marks**.

The total weightage of this section shall be **30 marks**.

Section C: It will consist of essay type/numerical questions up to five pages in length. Four questions numbering 6, 7, 8 and 9 will be set by the examiner from Unit-II of the syllabus. The students will be required to attempt any two questions. Each question will carry **15 marks**.

The total weightage of this section shall be **30 marks**.

Unit -I

Introduction: Process of Computational Problem Solving, Python Programming Language

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

Control Structures: Boolean Expressions (Conditions), Selection Control

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

Functions: Fundamental Concepts, Program Routines

Unit -II

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

References:

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 Computing & Problem Solving Through Python, Jeeva Jose and Sojan 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: 75
Practical Internal Assessment M: 25**

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	75	25	-	100	43-44
2	MIT-202	Optional Paper Option (i): Distributed Databases Option (ii): Cloud Computing	75	25	-	100	45
3	MIT-203	Image Processing	75	25	-	100	47-48
4	MIT-204	Fuzzy Systems	75	25	-	100	49-50
5	MIT-205	Network Design and Performance Analysis	75	25	-	100	51
6	MIT-206P	Programming Laboratory-II	-	25	75	100	52
Total Marks						600	

M.Sc. (Information Technology)
SEMESTER-II

MIT-201
Mobile Computing

Time: 3 Hrs.

Total Marks: 100
Theory Marks: 75
Theory Internal Assessment M: 25

Section A: It will have question No.1 consisting of 10 very short answer questions from the entire syllabus. Students will attempt 6 questions. Each question will carry **2.5 marks** with answer to each question up to 10 lines in length. The total weightage being **15 marks**.

Section B: It will consist of essay type/numerical questions up to five pages in length. Four questions numbering 2, 3, 4 and 5 will be set by the examiner from Unit-I of the syllabus. The students will be required to attempt any two questions. Each question will carry **15 marks**.

The total weightage of this section shall be **30 marks**.

Section C: It will consist of essay type/numerical questions up to five pages in length. Four questions numbering 6, 7, 8 and 9 will be set by the examiner from Unit-II of the syllabus. The students will be required to attempt any two questions. Each question will carry **15 marks**.

The total weightage of this section shall be **30 marks**.

Unit -I

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, Tunnelling and encapsulation, Reverse Tunnelling, 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)

Unit -II

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
3. Uwe Hansmann, Lothar Merk, Martin S. Nicklons and Thomas Stober, “Principles of Mobile Computing”, Springer, 2003.
4. William.C.Y.Lee,“Mobile Cellular Telecommunications-Analog and Digital Systems”, Second Edition,Tata Mc Graw Hill Edition ,2006.

M.Sc. (Information Technology)
SEMESTER-II

MIT-202
Option (i)

Distributed Databases

Time: 3 Hrs.

Total Marks: 100

Theory Marks: 75

Theory Internal Assessment M: 25

Section A: It will have question No.1 consisting of 10 very short answer questions from the entire syllabus. Students will attempt 6 questions. Each question will carry **2.5 marks** with answer to each question up to 10 lines in length. The total weightage being **15 marks**.

Section B: It will consist of essay type/numerical questions up to five pages in length. Four questions numbering 2, 3, 4 and 5 will be set by the examiner from Unit-I of the syllabus. The students will be required to attempt any two questions. Each question will carry **15 marks**.

The total weightage of this section shall be **30 marks**.

Section C: It will consist of essay type/numerical questions up to five pages in length. Four questions numbering 6, 7, 8 and 9 will be set by the examiner from Unit-II of the syllabus. The students will be required to attempt any two questions. Each question will carry **15 marks**.

The total weightage of this section shall be **30 marks**.

Unit -I

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.

Unit -II

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 Valduriez, '*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 approach to design, Implementation and Management, 3rd Ed. Pearson Education, 2005.

M.Sc. (Information Technology)
SEMESTER-II

MIT-202
Option (ii)

Cloud Computing

Time: 3 Hrs.

Total Marks: 100
Theory Marks: 75
Theory Internal Assessment M: 25

Section A: It will have question No.1 consisting of 10 very short answer questions from the entire syllabus. Students will attempt 6 questions. Each question will carry **2.5 marks** with answer to each question up to 10 lines in length. The total weightage being **15 marks**.

Section B: It will consist of essay type/numerical questions up to five pages in length. Four questions numbering 2, 3, 4 and 5 will be set by the examiner from Unit-I of the syllabus. The students will be required to attempt any two questions. Each question will carry **15 marks**.

The total weightage of this section shall be **30 marks**.

Section C: It will consist of essay type/numerical questions up to five pages in length. Four questions numbering 6, 7, 8 and 9 will be set by the examiner from Unit-II of the syllabus. The students will be required to attempt any two questions. Each question will carry **15 marks**.

The total weightage of this section shall be **30 marks**.

Unit -I

Introduction: Definition, Vision, Reference Model, Benefits, Limitations, Terminology, Open Challenges.

Virtualization: Definition, Type of Virtualization, Benefits, Limitations, Virtualization and Cloud, Virtual Appliance.

Cloud Computing Architecture: Service Models, Deployment Models, Cloud Entities, Cloud Clients, Service Level Agreement (SLA) and Quality of Service (QoS) in Cloud Computing.

Unit -II

Programming Models in Cloud: Thread Programming, Task Programming and Map-Reduce Programming.

Cloud Security: Infrastructure Security, Data Security, Identity and Access Management, Privacy Management, Security as a Service on Cloud.

Advance Topic in Cloud: Energy Efficiency in cloud, Market Oriented Cloud Computing, Big- Data Analytics, Federated Cloud Computing.

References:

1. Rajkumar Buyya, Christian Vecchiola and Thamarai Selvi, Mastering Cloud Computing: Foundation and Application Programming, Tata McGraw Hill, ISBN-13: 978-1-25-902995-0, New Delhi, India, Feb 2013.
2. Tim Mather, SubraKumaraswamy, ShahedLatif, Cloud Security and Privacy, O'Reilly, ISBN-13: 978-8-18-404815-5.
3. Barrie Sosinsky, Cloud Computing Bible, Wiley India Pvt. Ltd., ISBN-13: 978-8-12-652980-3, New Delhi, India, 2011.
4. Dr. Saurabh Kumar, Cloud Computing: Insights Into New-Era Infrastructure, Wiley India Pvt. Ltd, ISBN-13: 978-8-12-652883-7, New Delhi, India, 2011.
5. Fern Halper, Hurwitz, Robin Bloor, Marcia Kaufman, Cloud Computing for Dummies, Wiley India Pvt. Ltd, ISBN-13: 978-0-47-059742-2, New Delhi, India, 2011.

M.Sc. (Information Technology)
SEMESTER-II

MIT-203
Image Processing

Time: 3 Hrs.

Total Marks: 100
Theory Marks: 75
Theory Internal Assessment M: 25

Section A: It will have question No.1 consisting of 10 very short answer questions from the entire syllabus. Students will attempt 6 questions. Each question will carry **2.5 marks** with answer to each question up to 10 lines in length. The total weightage being **15 marks**.

Section B: It will consist of essay type/numerical questions up to five pages in length. Four questions numbering 2, 3, 4 and 5 will be set by the examiner from Unit-I of the syllabus. The students will be required to attempt any two questions. Each question will carry **15 marks**.

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The total weightage of this section shall be **30 marks**.

Unit -I

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 - Some 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 Highpass 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;

Unit -II

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, Color Transformations - 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 :

1. Digital Image Processing by Gonzalez & Wood, Addison Wesley,
2. Rosenfield, A and Kak, A.C., Picture processing, Academic Press N.Y., 1982.
3. Jain, A.K., Fundamentals of Digital Image Processing, Englewood Cliffs, Prentice Hall, 1989.
4. Chris Soloman, Stuart Gibson, Fundamentals of Digital Image Processing: A Practical Approach using MatLab, John Wiley and Sons, 2007.
5. Pratt, W.K. Digital Image Processing, John Wiley, N.Y./1978.
6. Solomon Chris , Toby Breckon Fundamentals of Digital Image Processing :A Practical Approach with Examples in Matlab

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

**MIT-204
Fuzzy Systems**

Time: 3 Hrs.

**Total Marks: 100
Theory Marks: 75
Theory Internal Assessment M: 25**

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Unit -I

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, λ -Cuts for Fuzzy Relations, Defuzzification to Scalars

Unit -II

Logic and Fuzzy Systems: Part I Logic: Classical Logic, Fuzzy Logic, Approximate Reasoning, Other Forms of the Implication Operation

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, PrenticeHall.
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 RudraPratap, 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: 75

Theory Internal Assessment M: 25

Section A: It will have question No.1 consisting of 10 very short answer questions from the entire syllabus. Students will attempt 6 questions. Each question will carry **2.5 marks** with answer to each question up to 10 lines in length. The total weightage being **15 marks**.

Section B: It will consist of essay type/numerical questions up to five pages in length. Four questions numbering 2, 3, 4 and 5 will be set by the examiner from Unit-I of the syllabus. The students will be required to attempt any two questions. Each question will carry **15 marks**.

The total weightage of this section shall be **30 marks**.

Section C: It will consist of essay type/numerical questions up to five pages in length. Four questions numbering 6, 7, 8 and 9 will be set by the examiner from Unit-II of the syllabus. The students will be required to attempt any two questions. Each question will carry **15 marks**.

The total weightage of this section shall be **30 marks**.

Unit -I

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.

Unit -II

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.

References:

1. James D McCabe, Network Analysis, Architecture and Design, 2nd Edition, MorganKaufman Series in Networking, 2007.
2. Youeu Zheng, Shakil Akhtar, Network for Computer Scientists and Engineers, OxfordUniversity 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: 75
Practical Internal Assessment M: 25**

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	75	25	-	100	54-55
2	MIT-302	Advanced Web Technologies using ASP.NET	75	25	-	100	56-57
3	MIT-303	Linux Administration	75	25	-	100	58
4	MIT-304	System Simulation	75	25	-	100	59
5	MIT-305	Microprocessor and its Applications	75	25	-	100	60
6	MIT-306P	Programming Laboratory-III(Based on Advanced Web Technologies using ASP.NET)	-	25	75	100	61
Total Marks						600	

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

**MIT-301
Network Protocols**

Time: 3 Hrs.

Total Marks: 100

Theory Marks: 75

Theory Internal Assessment M: 25

Section A: It will have question No.1 consisting of 10 very short answer questions from the entire syllabus. Students will attempt 6 questions. Each question will carry **2.5 marks** with answer to each question up to 10 lines in length. The total weightage being **15 marks**.

Section B: It will consist of essay type/numerical questions up to five pages in length. Four questions numbering 2, 3, 4 and 5 will be set by the examiner from Unit-I of the syllabus. The students will be required to attempt any two questions. Each question will carry **15 marks**.

The total weightage of this section shall be **30 marks**.

Section C: It will consist of essay type/numerical questions up to five pages in length. Four questions numbering 6, 7, 8 and 9 will be set by the examiner from Unit-II of the syllabus. The students will be required to attempt any two questions. Each question will carry **15 marks**.

The total weightage of this section shall be **30 marks**.

UNIT-I

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

UNIT-II

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: 75

Theory Internal Assessment M: 25

Section A: It will have question No.1 consisting of 10 very short answer questions from the entire syllabus. Students will attempt 6 questions. Each question will carry **2.5 marks** with answer to each question up to 10 lines in length. The total weightage being **15 marks**.

Section B: It will consist of essay type/numerical questions up to five pages in length. Four questions numbering 2, 3, 4 and 5 will be set by the examiner from Unit-I of the syllabus. The students will be required to attempt any two questions. Each question will carry **15 marks**.

The total weightage of this section shall be **30 marks**.

Section C: It will consist of essay type/numerical questions up to five pages in length. Four questions numbering 6, 7, 8 and 9 will be set by the examiner from Unit-II of the syllabus. The students will be required to attempt any two questions. Each question will carry **15 marks**.

The total weightage of this section shall be **30 marks**.

UNIT-I

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 command Line 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, Caching database data with the SQL data Source controls.

UNIT-II

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 Application State: 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.

References:

1. ASP.NET 3.5: Stephen Walther, Pearson Education, 2005
2. ASP.NET 4.0: In Simple Steps by Kogent Learning Solutions Inc.
3. ASP.NET 4.5: Black Book by Kogent Learning Solution Inc
4. ASP.NET: The Complete Reference Book by Matthew Macdonald ,McGraw Hill education

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

**MIT-303
Linux Administration**

Time: 3 Hrs.

**Total Marks: 100
Theory Marks: 75
Theory Internal Assessment M: 25**

Section A: It will have question No.1 consisting of 10 very short answer questions from the entire syllabus. Students will attempt 6 questions. Each question will carry **2.5 marks** with answer to each question up to 10 lines in length. The total weightage being **15 marks**.

Section B: It will consist of essay type/numerical questions up to five pages in length. Four questions numbering 2, 3, 4 and 5 will be set by the examiner from Unit-I of the syllabus. The students will be required to attempt any two questions. Each question will carry **15 marks**.

The total weightage of this section shall be **30 marks**.

Section C: It will consist of essay type/numerical questions up to five pages in length. Four questions numbering 6, 7, 8 and 9 will be set by the examiner from Unit-II of the syllabus. The students will be required to attempt any two questions. Each question will carry **15 marks**.

The total weightage of this section shall be **30 marks**.

UNIT-I

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.

UNIT-II

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
4. Linux: The Complete Reference, Sixth Edition by Richard Petersen
5. Linux Administration: A Beginners Guide Sixth Edition by Wale Soyinka

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

**MIT-304
System Simulation**

Time: 3 Hrs.

**Total Marks: 100
Theory Marks: 75
Theory Internal Assessment M: 25**

Section A: It will have question No.1 consisting of 10 very short answer questions from the entire syllabus. Students will attempt 6 questions. Each question will carry **2.5 marks** with answer to each question up to 10 lines in length. The total weightage being **15 marks**.

Section B: It will consist of essay type/numerical questions up to five pages in length. Four questions numbering 2, 3, 4 and 5 will be set by the examiner from Unit-I of the syllabus. The students will be required to attempt any two questions. Each question will carry **15 marks**.

The total weightage of this section shall be **30 marks**.

Section C: It will consist of essay type/numerical questions up to five pages in length. Four questions numbering 6, 7, 8 and 9 will be set by the examiner from Unit-II of the syllabus. The students will be required to attempt any two questions. Each question will carry **15 marks**.

The total weightage of this section shall be **30 marks**.

UNIT-I

Introduction : Concept of a system, stochastic activities, continue and discrete system, system modeling, mathematical modelling, 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.

UNIT-II

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 :

- 1.Narsingh Deo, "System Simulation with Digital Computer", Prentice-Hall of India Pvt. Ltd. - 1993.
2. 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: 75

Theory Internal Assessment M: 25

Section A: It will have question No.1 consisting of 10 very short answer questions from the entire syllabus. Students will attempt 6 questions. Each question will carry **2.5 marks** with answer to each question up to 10 lines in length. The total weightage being **15 marks**.

Section B: It will consist of essay type/numerical questions up to five pages in length. Four questions numbering 2, 3, 4 and 5 will be set by the examiner from Unit-I of the syllabus. The students will be required to attempt any two questions. Each question will carry **15 marks**.

The total weightage of this section shall be **30 marks**.

Section C: It will consist of essay type/numerical questions up to five pages in length. Four questions numbering 6, 7, 8 and 9 will be set by the examiner from Unit-II of the syllabus. The students will be required to attempt any two questions. Each question will carry **15 marks**.

The total weightage of this section shall be **30 marks**.

UNIT-I

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.

UNIT-II

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:

1. Walter A. Triebel, Avtar Singh :the 8088 and 8086 microprocessors Fourth Edition
a. Prentice Hall
2. Barry B. Brey, The Intel Microprocessors: Architecture, Programming, and Interfacing, 8th Edition, June 28, 2008, Prentice Hall.
3. Liu Yu Cheng, Gibson :**Microcomputer Systems - The 8086/8088 Family: Architecture, Programming and Design**
4. Douglas V. Hall: Microprocessors and Interfacing – Programming and Hardware, Tata McGraw Hill Publishing Company Ltd., New Delhi.
5. Peter Abel: IBM PC Assembly Language and Programming, PHI, Delhi.

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

MIT-306 P

Programming Laboratory-III

(Based on Advanced Web Technologies using ASP.NET)

Time: 3 Hrs.

Total Marks: 100

Practical Marks: 75

Practical Internal Assessment M: 25

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	75	25	-	100	63
2	MIT-402	Optional Paper Option (i): Network Security Option (ii): Big Data Analytics Option (iii): Ethical Hacking	75	25	-	100	64-68
3	MIT-403	Artificial Neural Network	75	25	-	100	69
4	MIT-404P	Programming Laboratory-IV (Based on Advanced Java Technology)	75	25	-	100	70
5	MIT-405P	Project Work	-	50	150	200	70
Total Marks						600	

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

**MIT-401
Advanced Java Technology**

Time: 3 Hrs.

Total Marks: 100

Theory Marks: 75

Theory Internal Assessment M: 25

Section A: It will have question No.1 consisting of 10 very short answer questions from the entire syllabus. Students will attempt 6 questions. Each question will carry **2.5 marks** with answer to each question up to 10 lines in length. The total weightage being **15 marks**.

Section B: It will consist of essay type/numerical questions up to five pages in length. Four questions numbering 2, 3, 4 and 5 will be set by the examiner from Unit-I of the syllabus. The students will be required to attempt any two questions. Each question will carry **15 marks**.

The total weightage of this section shall be **30 marks**.

Section C: It will consist of essay type/numerical questions up to five pages in length. Four questions numbering 6, 7, 8 and 9 will be set by the examiner from Unit-II of the syllabus. The students will be required to attempt any two questions. Each question will carry **15 marks**.

The total weightage of this section shall be **30 marks**.

UNIT-I

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.

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

UNIT-II

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

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.
4. “Introduction to Java Programming”, Y. Daniel Mliang, Pearsons Publications.
5. Programming with JAVA - E Balgurusamy
6. JAVA: How to Programme- Paul Deital and Harvey Deital

M.Sc. (Information Technology)
SEMESTER-IV

MIT-402
Option (i)
Network Security

Time: 3 Hrs.

Total Marks: 100
Theory Marks: 75
Theory Internal Assessment M: 25

Section A: It will have question No.1 consisting of 10 very short answer questions from the entire syllabus. Students will attempt 6 questions. Each question will carry **2.5 marks** with answer to each question up to 10 lines in length. The total weightage being **15 marks**.

Section B: It will consist of essay type/numerical questions up to five pages in length. Four questions numbering 2, 3, 4 and 5 will be set by the examiner from Unit-I of the syllabus. The students will be required to attempt any two questions. Each question will carry **15 marks**.

The total weightage of this section shall be **30 marks**.

Section C: It will consist of essay type/numerical questions up to five pages in length. Four questions numbering 6, 7, 8 and 9 will be set by the examiner from Unit-II of the syllabus. The students will be required to attempt any two questions. Each question will carry **15 marks**.

The total weightage of this section shall be **30 marks**.

UNIT-I

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.

UNIT-II

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.

References:

1. Roberta Bragg, "Network Security: The Complete Reference", 2017
2. J. Michael Stewart, Network Security, Firewalls And VPNs, 2nd edition
3. Charlie Kaufman, "Network Security: Private Communication in a Public World", Pearson, 2nd edition, 2016.
4. David Kim and Michael G. Solomon, "Fundamentals Of Information Systems Security", 2nd edition, 2013

M.Sc. (Information Technology)
SEMESTER-IV

MCS-403
Option (ii)
Big Data Analytics

Time: 3 Hrs.

Total Marks: 100
Theory Marks: 75
Theory Internal Assessment M: 25

Section A: It will have question No.1 consisting of 10 very short answer questions from the entire syllabus. Students will attempt 6 questions. Each question will carry **2.5 marks** with answer to each question up to 10 lines in length. The total weightage being **15 marks**.

Section B: It will consist of essay type/numerical questions up to five pages in length. Four questions numbering 2, 3, 4 and 5 will be set by the examiner from Unit-I of the syllabus. The students will be required to attempt any two questions. Each question will carry **15 marks**.

The total weightage of this section shall be **30 marks**.

Section C: It will consist of essay type/numerical questions up to five pages in length. Four questions numbering 6, 7, 8 and 9 will be set by the examiner from Unit-II of the syllabus. The students will be required to attempt any two questions. Each question will carry **15 marks**.

The total weightage of this section shall be **30 marks**.

UNIT-I

An Overview of Big Data and Big Data Analytics. Understanding Hadoop Ecosystem (Hadoop Distributed File System, MapReduce, Hadoop YARN, HBase, Combining HBase and HDFS, Hive, Pig, Sqoop, ZooKeeper, Flume, Oozie). MapReduce Framework, Techniques to Optimize MapReduce Jobs, Role of HBase in Big Data Processing
Developing Simple MapReduce Application, Points to Consider while Designing MapReduce. Controlling MapReduce Execution with InputFormat, Reading Data with Custom RecordReader, Organizing Output Data with OutputFormats, Customizing Data with RecordWriter, Optimizing MapReduce Execution with Combiner, Controlling Reducer Execution with Partitioners.

UNIT-II

YARN Architecture, Working of YARN, YARN Schedulers, Backward Compatibility with YARN, YARN Configurations, YARN Commands, YARN Containers. Introduction to NoSQL. Types of NoSQL Data Models, Schema-Less Databases, Materialized Views, Distribution Models.

Analytical Approaches, Introducing to various Analytical Tools, Installing R, Handling Basic Expressions in R, Variables in R, Working with Vectors, Storing and Calculating Values in R, Creating and Using Objects, Interacting with Users, Handling Data in R Workspace, Executing Scripts, Reading Datasets and Exporting Data from R, Manipulating and Processing Data in R, Working with Functions and Packages in R, Performing Graphical Analysis in R, Techniques Used for Visual Data Representation, Types of Data Visualization

References:

1. Big Data, Black Book by DT Editorial Services, Dreamtech Press.
2. Big Data Computing and Communications edited by Yu Wang, Hui Xiong, Shlomo Argamon, XiangYang Li, JianZhong Li Springer
3. Big Data Analytics Beyond Hadoop by Vijay Srinivas Agneeswaran, FT Press.

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

**MIT-402
Options (iii)
Ethical Hacking**

**Time: 3 Hrs.
Theory Marks: 75**

**Total Marks: 100
Theory Internal Assessment M: 25**

Section A: It will have question No.1 consisting of 10 very short answer questions from the entire syllabus. Students will attempt 6 questions. Each question will carry **2.5 marks** with answer to each question up to 10 lines in length. The total weightage being **15 marks**.

Section B: It will consist of essay type/numerical questions up to five pages in length. Four questions numbering 2, 3, 4 and 5 will be set by the examiner from Unit-I of the syllabus. The students will be required to attempt any two questions. Each question will carry **15 marks**.

The total weightage of this section shall be **30 marks**.

Section C: It will consist of essay type/numerical questions up to five pages in length. Four questions numbering 6, 7, 8 and 9 will be set by the examiner from Unit-II of the syllabus. The students will be required to attempt any two questions. Each question will carry **15 marks**.

The total weightage of this section shall be **30 marks**.

UNIT-I

Introduction :

Network Security, Functionality and ease of use Triangle, Essential Terminology and Elements of Security (Threat, Attack, Vulnerabilities, Target of Evaluation, Exploit), Concept of ethical hacking Phases involved in hacking,

Penetration Testing and Ethical Hacking

Foot Printing Introduction to foot printing, Information gathering methodology of the hackers, Active and passive reconnaissance

Scanning

Scanning, Elaboration phase, active scanning. Enumeration, DNS Zone transfer. Detecting live systems on the target network, Discovering services running /listening on target systems, Understanding port scanning techniques, Identifying TCP and UDP services running on the target network, Understanding active and passive fingerprinting

UNIT-II

System Hacking

Aspect of remote password guessing, Role of eavesdropping , Various methods of password cracking, Key(stroke) Loggers, Understanding Sniffers and their working, Comprehending Active and Passive Sniffing, Man-in-the-Middle Attacks, ARP Spoofing/Poisoning and Redirection, DNS and IP Sniffing, HTTPS Sniffing.

Trojans and backdoors: Trojan, Overt and Covert Channels, Working of Trojans, Different Types of Trojans, Different ways of Trojan's entry into a system, Indications of a Trojan Attack
Session Hijacking Understanding Session Hijacking, Spoofing vs. hijacking, Phases involved in Session Hijacking, Types of Session Hijacking, Session hijacking Tools.

Hacking Wireless Networks Introduction to 802.11, Role of WEP, Cracking WEP Keys, Sniffing Traffic, Wireless DOS attacks, WLAN Scanners, WLAN Sniffers, Hacking Tools, Securing Wireless Networks.

References:

1. Network Security and Ethical Hacking, RajatKhare, Luniver Press, 30-Nov-2006.
2. Ethical Hacking, Thomas Mathew, OSB Publisher, 28-Nov-2003.
3. Hacking Exposed: Network Security Secrets & Solutions, Stuart McClure, Joel Scambray and George Kurtz, McGraw-Hill, 2005.
4. Ethical Hacking and Network defense, Simpson, Cengage Learning, 2009. 5. Hackers Beware, Eric Core, EC-Council Press, 2003

M.Sc. (Information Technology)
SEMESTER-IV

MIT-403
Artificial Neural Networks

Time: 3 Hrs.

Total Marks: 100
Theory Marks: 75
Theory Internal Assessment M: 25

Section A: It will have question No.1 consisting of 10 very short answer questions from the entire syllabus. Students will attempt 6 questions. Each question will carry **2.5 marks** with answer to each question up to 10 lines in length. The total weightage being **15 marks**.

Section B: It will consist of essay type/numerical questions up to five pages in length. Four questions numbering 2, 3, 4 and 5 will be set by the examiner from Unit-I of the syllabus. The students will be required to attempt any two questions. Each question will carry **15 marks**.

The total weightage of this section shall be **30 marks**.

Section C: It will consist of essay type/numerical questions up to five pages in length. Four questions numbering 6, 7, 8 and 9 will be set by the examiner from Unit-II of the syllabus. The students will be required to attempt any two questions. Each question will carry **15 marks**.

The total weightage of this section shall be **30 marks**.

UNIT-I

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.

UNIT-II

Single Layer Perceptrons-I : 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, Hopfield'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: 75
Practical Internal Assessment M: 25

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: 150
Project Internal Assessment M: 50**

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.