Semester II (First Year) Curriculum

Code	Course Title	Max Marks		Total Marks	Hours per week		Credits
		External	Internal		Theory	Practical	
MCA-20201	Computer Networks	75	25	100	4	-	4
MCA-20202	Object Oriented Programming through JAVA	75	25	100	4	-	4
MCA-20203	Database Management Systems	75	25	100	4	-	4
MCA-20204	Formal Languages and Automata Theory	75	25	100	4	-	4
MCA-20205	Data Mining Concepts and Techniques	75	25	100	4	-	4
MCA-20206	Elective-I 1.Artificial Intelligence and Expert Systems 2.Internet of Things 3.Image Processing	75	25	100	4	-	4
MCA-20207	Object Oriented Programming through JAVA Lab	50	50	100	-	3	2
MCA-20208	Database Management Systems Lab	50	50	100	-	3	2
MCA-20209	Skill Development Course with Python	50	50	100	1	2	2
	Total Credits						30

Note:2 lab Hrs and 1 Theory Hrs/Week or 2 Theory Hrs/ Week for Skill Development Course and only Lab Lab Exam will be conducted

Summer Internship (Mandatory) after First Year (to be evaluated during IIIsemester).

Course Code &Title: MCA-20201 COMPUTER NETWORKS
Semester: II
Course Index: C201

Course Objectives:
The learning objectives of this course are:

Course Objectives
To learn about the basics of computer networks and Data Communication.
To learn about Data Link Layer, IEEE Standards, design issues in networks.
To learn about Internet Transport Protocols and different types of protocols.
To learn about various types of Network Devices and different types of Networks

Course Outcomes:
By the end of the course, the student will be

C201.1	Understand the basics of computer networks and Data Communication.
C201.2	Understand about Data Link Layer, IEEE Standards, design issues in networks.
C201.3	Understand Internet Transport Protocols and different types of protocols.
C201.4	Overview of various types of Network Devices and different types of Networks

MCA-20201 COMPUTER NETWORKS

Instruction:4Hrs/week	**Time:3 Hours**	**Credits:4**
Internal:25Marks	**External:75Marks**	**Total: 100Marks**

UNIT I

Introduction to Computer Networks: Introduction, Network Hardware, Network Software, Reference Models, Data Communication Services & Network Examples, Internet Based Applications.

Data Communications: Transmission Media, Wireless Transmission, Multiplexing, Switching, Transmission in ISDN, Broad Band ISDN, ATM Networks

UNIT II

Data Link Control, Error Detection & Correction, Sliding Window Protocols, LANs & MANs: IEEE Standards for LANs & MANs-IEEE Standards 802.2, 802.3, 802.4, 802.5, 802.6, High Speed LANs.

Design Issues in Networks: Routing Algorithms, Congestion Control Algorithms, Network Layer in the Internet, IP Protocol, IP Address, Subnets, and Internetworking.

UNIT III

Internet Transport Protocols: Transport Service, Elements of Transport Protocols, TCP and UDP Protocols, Quality of Service Model, Best Effort Model, Network Performance Issues.

Over View of DNS, SNMP, Electronic Mail, FTP, TFTP, BOOTP, HTTP Protocols, World Wide Web, Firewalls.

UNIT IV

Network Devices: Over View of Repeaters, Bridges, Routers, Gateways, Multiprotocol Routers, Brouters, Hubs, Switches, Modems, Channel Service Unit CSU, Data Service Units DSU, NIC, Wireless Access Points, Transceivers, Firewalls, Proxies.

Overview of Cellular Networks, Ad-hoc Networks, Mobile Ad-hoc Networks, Sensor Networks

Text Books:

1. Computer Networks, Andrews S Tanenbaum, Edition 5, PHI, ISBN: -81-203- 1165-5
2. Data Communications and Networking, Behrouz A Forouzan, Tata McGraw- Hill Co Ltd, Second Edition

Reference Books:

1. Computer Networks, Mayank Dave, Cengage.
2. Computer Networks, A System Approach, 5thed, Larry L Peterson and Bruce S Davie, Elsevier.
3. An Engineering Approach to Computer Networks-S.Keshav, 2nd Edition, Pearson Education.
4. Understanding Communications and Networks, 3rd Edition, W.A. Shay, Thomson.

Course Code & Title: MCA-20202 Object Oriented Programming through JAVA

Semester: II

Course Index: C202

Course Objectives:

The learning objectives of this course are:

Course Objectives
Learn Introduction to OOP and concept of Inheritance.
Learn about Interfaces, Packages and Enumeration, Exceptions & Assertions.
Learn about MultiThreading and Applets.
Learn the concept of Event Handling and Abstract Window Toolkit.

Course Outcomes:

By the end of the course, the student will be

Course Index	Course Outcomes
C202.1	Understand Introduction to OOP and concept of Inheritance.
C202.2	Understand about Interfaces, Packages and Enumeration, Exceptions & Assertions.
C202.3	Understand about MultiThreading and Applets.
C202.4	Understand the concept of Event Handling and Abstract Window Toolkit.

MCA-20202 Object Oriented Programming through JAVA

Instruction: 4 Periods/week **Time: 3 Hours** **Credits: 4**
Internal: 25 Marks **External: 75 Marks** **Total:100 Marks**

UNIT I

Introduction to OOP: Introduction, Principles of Object Oriented Languages, Applications of OOP, Programming Constructs: Variables, Primitive Datatypes, Identifiers- Naming Conventions, Keywords, Literals, Operators-Binary, Unary and ternary, Expressions, Precedence rules and Associativity, Primitive Type Conversion and Casting, Flow of control-Branching, Conditional, loops. Classes and Objects- classes, Objects, Creating Objects, Methods, constructors-Constructor overloading, cleaning up unused objects-Garbage collector, Class variable and Methods-Static keyword, this keyword, Arrays, Command line arguments.

Inheritance: Types of Inheritance, Deriving classes using extends keyword, Method overloading, super keyword, final keyword, Abstract class.

UNIT II

Interfaces, Packages and Enumeration: Interface-Extending interface, Interface Vs Abstract classes, Packages-Creating packages, using Packages, Access protection, java.lang package. **Exceptions & Assertions** – Introduction, Exception handling techniques- try… catch, throw, throws, finally block, user defined exception, Exception Encapsulation and Enrichment, Assertions.

UNIT III

MultiThreading: java.lang.Thread, The main Thread, Creation of new threads, Thread priority, Multithreading- Using isAlive () and join (), Synchronization, suspending and Resuming threads, Communication between Threads Input/Output: reading and writing data, java.io package, **Applets**– Applet class, Applet structure, An Example Applet Program, Applet : Life Cycle, paint(), update() and repaint().

UNIT IV

Event Handling -Introduction, Event Delegation Model, java.awt.event Description, Sources of Events, Event Listeners, Adapter classes, Inner classes.

Abstract Window Toolkit:Why AWT?, java.awt package, Components and Containers, Button, Label, Checkbox, Radio buttons, List boxes, Choice boxes, Text field and Text area, container classes, Layouts, Menu, Scroll bar, **Swing**: Introduction, JFrame, JApplet, JPanel, Components in swings, Layout Managers, JList and JScroll Pane, Split Pane, JTabbedPane, Dialog Box Pluggable Look and Feel.

Text Books:

1. The Complete Reference Java, 8ed, Herbert Schildt, TMH
2. Programming in JAVA, Sachin Malhotra, Saurabhchoudhary, Oxford.

References:

1. JAVA for Beginners, 4e, Joyce Farrell, Ankit R. Bhavsar, Cengage Learning.
2. Introduction to Java programming, 7th ed, Y Daniel Liang, Pearson.

Course Code &Title: MCA-20203 DATABASE MANAGEMENT SYSTEMS
Semester: II
Course Index: C203

Course Objectives:
The learning objectives of this course are:

Course Objectives
To learn about the Introduction of Database System, Data Modeling Using the Entity-Relationship Model
To learn about Relational Data Model and Relational Database Constraints, Relational Algebra and Relational Calculus, Schema Definition, Basic Constraints and Queries
To learn about Relational Database Design, Indexing Structures for files
To learn about Transaction Processing, Concurrency Control Techniques

Course Outcomes:
By the end of the course, the student will be

C203.1	Able to understand the Introduction of Database System, Data Modeling Using the Entity-Relationship Model
C203.2	Able to understand Relational Data Model and Relational Database Constraints, Relational Algebra and Relational Calculus, Schema Definition, Basic Constraints and Queries
C203.3	Able to understand Relational Database Design, Indexing Structures for files
C203.4	Able to understand Transaction Processing, Concurrency Control Techniques

MCA-20203 DATABASE MANAGEMENT SYSTEMS

Instruction:4Periods/week	**Time:3 Hours**	**Credits:4**
Internal:25Marks	**External:75Marks**	**Total: 100Marks**

UNIT I

Database and Database Users: Data models, schemas, and instances, three-schemas architecture and data independence, database languages and interfaces, the database system environment, Centralized and client/server architectures for DBMSs, Classification of database management system.

Data Modeling Using the Entity-Relationship Model: Using High—Level Conceptual data model,Entitytypes,entitysetsAttributesandkeys,Relationshipstypes,relationshipsets,roles and structural constraints, Weak Entity types, ER diagrams Meaning conventions and design issues, Enhance Entity Relationship model,

Relational data model and relational database constraints: Relational model constraints and relational schemas, update operations.

UNIT II

Relational Algebra and Relational Calculus: Unary Relational operations, Relational Algebra operations, Binary Relational operation, Additional Relational operation, Examples of Queries in Relational Algebra, Domain Relational Calculus.

Relational database design by ER and EER Relational Mapping: Relational database design using ER to Relational Mapping, Mapping EER Model Construct to Relations, **Schema Definition, Basic Constraints and Queries:** SQL Data definition, Specifying basic constraints in SQL, Schema change Statements in SQL, Basic queries in SQL, More complex SQL queries, INSERT DELETE UPDATE queries in SQL, Views in SQL, Data base stored Procedures.

UNIT III

Relational Database Design: Informal design Guide lines for Relation Schema, Functional Dependences, Normal forms based on Primary keys, General definitions of Second and Third Normal form, BOYCE-CODE Normal form, Algorithm for Relational database schema design, Multi-valued dependencies and fourth Normal forms,

File Organization and Indexes: Introduction, Secondary Storage Devices, Buffering Blocks, placing file records on disk, Operations on Files, Hashing Techniques, Parallelizing Disk Access using RAID Technology, Indexing Structures for files.

UNIT IV

Algorithm for query processing and Optimization: Translating SQL Queries into Relational Algebra, Algorithms for SELECT and JOIN Operations, Algorithms for PROJECT and SET Operations,

Introduction to Transaction Processing Concepts and Theory: Introduction to Transaction Process, Transaction and System Concepts, Characterizing Schedules, Concurrency Control Techniques, Database Recovery Concepts, Recovery Techniques.

Text Book:

1. Fundamentals of Database System, Elmasri, Navathe, Pearson Education.

References Books:

1. Database Management Systems, Raghu Ramakrishnan, Johannes Gehrke, McGraw- Hill.
2. Database Concepts, Abraham Silberschatz, Henry F Korth, S Sudarshan, McGraw-Hill

Course Code & Title: MCA-20204 FORMAL LANGUAGES & AUTOMATA THEORY
Semester: II
Course Index: C204

Course Objectives:
The learning objectives of this course are:

Course Objectives
Learn the concept of Finite Automata and Regular Expressions, Regular sets &Regular Grammars.
Learn the concept of Context Free Grammars and Languages, Push down Automata
Learn about Turing Machines, Universal Turing Machines and Undecidability in detail.
Learn the concept of The Propositional calculus and The Predicate calculus.

Course Outcomes:
By the end of the course, the student will be

Course Index	Course Outcomes
C204.1	Understand the concept of Finite Automata and Regular Expressions, Regular sets &Regular Grammars.
C204.2	Understand the concept of Context Free Grammars and Languages, Push down Automata
C204.3	Understand about Turing Machines, Universal Turing Machines and Undecidability in detail.
C204.4	Understand the concept of The Propositional calculus and The Predicate calculus.

MCA-20204 FORMAL LANGUAGES & AUTOMATA THEORY

Instruction: 4 Periods/week **Time: 3 Hours** **Credits: 4**
Internal: 25 Marks **External: 75 Marks** **Total: 100 Marks**

UNIT-I

Finite Automata and Regular Expressions: Basic Concepts of Finite State Systems, Chomsky Hierarchy of Languages, Deterministic and Non-Deterministic Finite Automata, Finite Automata with ϵ-moves, Regular Expressions.

Regular sets &Regular Grammars: Basic Definitions of Formal Languages and Grammars, Regular Sets and Regular Grammars, Closure Properties of Regular Sets, Pumping Lemma for Regular Sets, Decision Algorithm for Regular Sets, Minimization of Finite Automata.

UNIT-II

Context Free Grammars and Languages: Context Free Grammars and Languages, Derivation Trees, simplification of Context Free Grammars, Normal Forms, Pumping Lemma for CFL, Closure properties of CFL's.

Push down Automata: Informal Description, Definitions, Push-Down Automata and Context free Languages, Parsing and Push-Down Automata.

UNIT-III

Turing Machines: The Definition of Turing Machine, Design and Techniques for Construction of Turing Machines, Combining Turing Machines.

Universal Turing Machines and Undecidability: Universal Turing Machines. The Halting Problem, Decidable & Undecidable Problems - Post Correspondence Problem.

UNIT-IV

The Propositional calculus: The Prepositional Calculus : Introduction – Syntax of the Prepositional Calculus – Truth-Assignments – Validity and Satisfiability – Equivalence and Normal Forms – resolution in Prepositional Calculus.

The Predicate calculus: Syntax of the Predicate Calculate Calculus – Structures and Satisfiability – Equivalence – Un-solvability and NP-Completeness.

TEXT BOOKS:

1. Introduction to Automata Theory, Languages and Computations – J.E. Hopcroft, & J.D. Ullman , Pearson Education Asia.
2. Elements of The Theory Of Computation, Harry R Lewis, Cristos h. Papadimitriou, Pearson Education / Prentice-Hall of India Private Limited.

REFERENCE BOOKS:

1. Introduction to languages and theory of computation – John C. Martin (MGH)
2. Theory of Computation, KLP Mishra and N. Chandra Sekhar, IV th Edition, PHI
3. Introduction to Theory of Computation – Michael Sipser (Thomson Nrools/Cole)

Course Code &Title: MCA-20205 DATA MINING CONCEPTS AND TECHNIQUES
Semester: II
Course Index: C205

Course Objectives:
The learning objectives of this course are:

Course Objectives
To learn about the overview of Data Warehouse Basic Concepts, Data Warehouse Modelling, Pre-processing
To learn about the Introduction to Data Mining , Basic Statistical Descriptions of Data, Data Visualization, Measuring data Similarity and Dissimilarity
To learn about the Concept Description, Generalization by AOI , Mining Frequent Patterns, Associations and Correlations, Mining Frequent Itemset
To learn about the Basic Concepts of Classification ,Different Methods of Classification

Course Outcomes:
By the end of the course, the student will be

Course Index	Course Outcomes
C205.1	Able to understand about the overview of Data Warehouse Basic Concepts, Data Warehouse Modelling, Pre-processing
C205.2	Able to understand about the Introduction to Data Mining , Basic Statistical Descriptions of Data, Data Visualization, Measuring data Similarity and Dissimilarity
C205.3	Able to understand about the Concept Description, Generalization by AOI , Mining Frequent Patterns, Associations and Correlations, Mining Frequent Item set
C205.4	Able to understand about the Basic Concepts of Classification ,Different Methods of Classification

MCA-20205 DATA MINING CONCEPTS AND TECHNIQUES

Instruction:4Periods/week **Time:3Hours** **Credits: 4**
Internal:25Marks **External:75Marks** **Total: 100Marks**

UNIT I

Data Warehouse and OLAP Technology: An overview Data Warehouse Basic Concepts, Data Warehouse Modeling: Data Cube and OLAP, Data Warehouse Implementation Data Preprocessing: An Overview, Data Cleaning, Data Integration, Data Reduction, Data Transformation and Data Discretization, From Data Warehousing to Data Mining

UNIT II

Introduction to Data Mining: Motivation and importance, what is Data Mining, Data Mining on what kind of data, what kinds of patterns can be mined, which technologies are used, which kinds of applications are targeted, Major issues in Data Mining. Getting to know your Data: Data Objects and Attribute Types, Basic Statistical Descriptions of Data, Data Visualization, Measuring data Similarity and Dissimilarity

UNIT III

Concept Description: Characterization and comparison What is Concept Description, Data Generalization by Attribute-Oriented Induction(AOI), AOI for Data Characterization, Efficient Implementation of AOI, AOI for Class comparisons. Mining Frequent Patterns, Associations and Correlations: Basic Concepts, Frequent Itemset Mining Methods: Apriori method, generating Association Rules, Improving the Efficiency of Apriori, Pattern-Growth Approach for mining Frequent Item sets, Mining Frequent Itemsets using vertical data format, Mining Closed and Max Patterns.

UNIT IV

Classification Basic Concepts: Basic Concepts, Decision Tree Induction: Decision Tree Induction, Attribute Selection Measures, Tree Pruning, Bayes Classification Methods, Classification by Back Propagation, Support Vector Machines. Cluster Analysis: Cluster Analysis, Partitioning Methods, Hierarchal methods, Density based methods-DBSCAN and OPTICS.

Text Book:

1. Data Mining Concepts and Techniques—JiaweiHan, MichelineKamber and Jian Pei,Morgan Kaufman Publications 3rd edition.

Reference Books:

1. Introduction to Data Mining –Pang-Ning Tan, Michael Steinbach, Vipin Kumar
2. Introduction to Data Mining, Adriaan, Addison Wesley Publication
3. Data Mining Techniques, A.K.Pujari, University Press.

Course Code &Title: MCA-20206 ARTIFICIAL INTELLIGENCE AND EXPERT SYSTEMS (Elective-I) **Semester: II** **Course Index: C206**	
Course Objectives: The learning objectives of this course are:	
Course Objectives	
To learn about the basic concept of Artificial Intelligence.	
To learn about the algorithms and logics in Artificial Intelligence.	
To learn about the theories and functions related to Artificial Intelligence.	
To learn about the concept, characteristics and applications of Expert Systems.	
Course Outcomes: By the end of the course, the student will be	
C206.1	Understand the basic concept of Artificial Intelligence.
C206.2	Understand the algorithms and logics in Artificial Intelligence.
C206.3	Understand about the theories and functions related to Artificial Intelligence.
C206.4	Understanding the concept, characteristics and applications of Expert Systems.

MCA-20206 ARTIFICIAL INTELLIGENCE AND EXPERT SYSTEMS (Elective-I)

Instruction:4Periods/week **Time:3Hours** **Credits: 4**

Internal:25Marks **External:75Marks** **Total: 100Marks**

UNIT- I

Problems and Search: What is Artificial Intelligence, The AI Problems, and Underlying Assumption, what is an AI Technique?

Problems, Problems Spaces, and Search: Defining the problem as a state space search, production systems, problems characteristics, issues in the design of search programs.

UNIT- II

Heuristic Search Techniques: Generate-and-test, Hill Climbing, Best-First Search, Problem Reduction, Means-Ends Analysis, Genetic Algorithms; Constraint Satisfaction Problems, Backtracking Search for CSPs, Games, Optimal Decisions in Games.

Knowledge Representation Issues: Representations and Mapping, Approaches to Knowledge Representation, The frame problem, The Wumpus World.

UNIT- III

Representing Knowledge using Rules: Procedural Vs Declarative knowledge, Logic Programming, Forward Vs Backward Reasoning, Matching, Control Knowledge

Symbolic Reasoning under Uncertainty: Introduction to Nonmonotonic Reasoning, Logics for Non-monotonic Reasoning, Implementation issues, Augmenting a Problem solver, implementation: DFS, BFS.

Statistical Reasoning: Probability and Bayes Theorem, Certainty Factors and Rule-Based Systems. Bayesian Networks, Dempster-Shafer Theory, Fuzzy Logic.

UNIT- IV

Expert System, Concepts and Characteristics, Applications and Domains of Expert System, Elements of an Expert System, Stages in the Development of an Expert System, Semantic Nets, Frames.

Speech Recognition, Forms of Learning, Inductive learning, Learning Decision Trees, Single Layer Feed Forward, Multi-Layer Feed Forward Neural Networks.

TEXT BOOKS

1. Artificial Intelligence, Second Edition, Elaine Rich, Kevin Knight, Tata McGraw-Hill Edition.
2. Expert Systems: Principles and Programming, Joseph C Giarratano, Gary D Riley Thomson Publication, 4th Edition.

Reference Books:

1. Artificial Intelligence: A Modern Approach, Stuart Russell, Peter Norvig, Pearson Education 2ndEdiction.

Course Code &Title: MCA-20206 INTERNET OF THINGS (Elective-I)
Semester: II
Course Index: C206

Course Objectives:
The learning objectives of this course are:

Course Objectives
To learn about the Introduction to Internet of Things, IoT Enabling Technologies, IoT Levels & Deployment Templates Domain Specific IoTs
To learn about the IOT & M2M, SNMP
To learn about the IoT Platforms Design Methodology
To learn about the IoT Physical Devices & Endpoints

Course Outcomes:
By the end of the course, the student will be

Course Index	Course Outcomes
C206.1	Able to understand about the Introduction to Internet of Things, IoT Enabling Technologies, IoT Levels & Deployment Templates Domain Specific IoTs
C206.2	Able to understand about the IOT & M2M, SNMP
C206.3	Able to understand about the IoT Platforms Design Methodology
C206.4	Able to understand about the IoT Physical Devices & Endpoints

MCA-20206 INTERNET OF THINGS(Elective-I)

Instruction:4Periods/week **Time:3Hours** **Credits: 4**
Internal:25Marks **External:75Marks** **Total: 100Marks**

UNIT-I

Introduction to Internet of Things: Definition & Characteristics of IoT, Physical Design of IoT, Logical Design of IoT, IoT Enabling Technologies, IoT Levels & Deployment Templates Domain Specific IoTs: Home, Cities, Environment, Energy systems, Logistics, Agriculture, Health & Lifestyle.

UNIT-II

IOT & M2M: Introduction, M2M, Difference between IoT and M2M, SDN and NFV for IoT, Need for IoT Systems Management, Simple Network Management Protocol (SNMP), Limitations of SNMP, Network Operator Requirements, NETCONF, YANG, IoT Systems Management with NETCONF-YANG, NETOPEER

UNIT-III

IoT Platforms Design Methodology: IoT Design Methodology, Case Study on IoT System for Weather Monitoring, Motivation for Using Python, IoT Systems - Logical Design using Python, Installing Python, Python Data Types & Data Structures, Control Flow, Functions, Modules, Packages, File Handling, Date/Time Operations, Classes, Python Packages of Interest for IoT.

UNIT-IV

IoT Physical Devices & Endpoints: Raspberry Pi, About the Board, Linux on Raspberry Pi, Raspberry Pi Interfaces, Programming Raspberry Pi with Python, Other IoT Devices, IoT Physical Servers & Cloud Offerings, Introduction to Cloud Storage Models & Communication APIs, WAMP - AutoBahn for IoT, Xively Cloud for IoT, Python Web Application Framework - Django, Designing a RESTful Web API, Amazon Web Services for, SkyNet IoT Messaging Platform.

Text Book:

1.Internet of Things, A.Bahgya and V.Madisetti, Univesity Press, 2015

Reference Book:

1. Fundamentals of Python, K.A.Lambert and B.L.Juneja, Cengage Learning, 2012

Course Code &Title: MCA-20206 IMAGE PROCESSING (Elective-I)
Semester: II
Course Index: C206

Course Objectives:
The learning objectives of this course are:

Course Objectives
To learn about the Fundamentals of Image Processing, Basics of Histogram , Definition and Algorithm of Histogram Equalization
To learn about the Image Transforms**:** A Detail Discussion On Fourier Transform, DFT,FFT, Image Enhancement
To learn about the EDGE Enhancement, Smoothening Filters in Frequency Domain. Butter Worth Filter, Homomorphic Filters, Image Compression
To learn about the Image Segmentation, Morphology

Course Outcomes:
By the end of the course, the student will be

Course Index	Course Outcomes
C206.1	Able to understand about the Fundamentals of Image Processing, Basics of Histogram , Definition and Algorithm of Histogram Equalization
C206.2	Able to understand about the Image Transforms**:** A Detail Discussion On Fourier Transform, DFT,FFT, Image Enhancement
C206.3	Able to understand about the EDGE Enhancement, Smoothening Filters in Frequency Domain. Butter Worth Filter, Homomorphic Filters, Image Compression
C206.4	Able to understand about the Image Segmentation, Morphology

MCA-20206 IMAGE PROCESSING (Elective-I)

Instruction:4Periods/week **Time:3Hours** **Credits: 4**
Internal:25Marks **External:75Marks** **Total: 100Marks**

UNIT I

Fundamentals of Image Processing: Image Acquisition, Image Model, Sampling, Quantization, Relationship between Pixels, Distance Measures, Connectivity, Image Geometry, Photographic Film.

Histogram: Definition, Decision of Contrast Basing On Histogram, Operations Basing on Histograms Like Image Stretching, Image Sliding, Image Classification. Definition and Algorithm of Histogram Equalization.

UNIT II

Image Transforms: A Detail Discussion On Fourier Transform, DFT, FFT.

Image Enhancement:

a) Arithmetic and Logical Operations, Pixel or Point Operations, Size Operations.
b) Smoothing Filters-Mean, Median, Mode Filters – Comparative Study.
c) Edge Enhancement Filters – Directorial Filters, Sobel, Laplacian, Robert, KIRSCH Homogeneity.
d) Low Pass Filters, High Pass Filters, Sharpening Filters. – Comparative Study.

UNIT III

Image Enhancement: Design of Low Pass, High Pass, EDGE Enhancement, Smoothening Filters in Frequency Domain. Butter Worth Filter, Homomorphic Filters in Frequency Domain Advantages of Filters in Frequency Domain, Comparative Study of Filters in Frequency, Domain and Spatial Domain.

Image Compression: Run Length Encoding, Contour Coding, Huffman Code, Compression Due to Change in Domain, Compression Due to Quantization Compression at the Time of Image Transmission. Brief Discussion on:-Image Compression Standards.

UNIT IV

Image Segmentation: Characteristics of Segmentation, Detection of Discontinuities, Thresholding Pixel Based Segmentation Method. Region Based Segmentation Methods, Segmentation by Pixel Aggregation, Segmentation by Sub Region Aggregation, Histogram Based Segmentation, Spilt and Merge Technique, Motion in Segmentation.

Morphology: Dilation, Erosion, Opening, Closing, Hit-And-Miss Transform, Boundary Extraction, Region Filling, Connected Components, Thinning, Thickening, Skeletons, Pruning Extensions to Gray – Scale Images, Application of Morphology inIP.

Text Book:

1. Digital Image Processing, Rafael C. Gonzalez and Richard E. Woods, Addison Wesley

Reference Books:

1. Fundamentals Of Electronic Image Processing By Arthyr– R – Weeks,Jr.(PHI)
2. Image Processing, Analysis and Machine Vision by Milan SonkaVaclanHalavaRoger Boyle, Vikas Publishing House.
3. Digital Image Processing, S. Jayaraman, S. Esakkirajan & T. VeeraKumar, TMH.
4. Fundamentals of Digital Image Processing, Chris Solomon, Tobi Breckon, Wiley-Blackwell.

Course Code & Title: MCA-20207 Object Oriented Programming through JAVA Lab
Semester: II
Course Index: C207

Course Objectives:
The learning objectives of this course are:

Course Objectives
Learn how to write programs in Java using OOP.
Learn how to write programs related to real life scenario.
Learn how to write programs in Java using Inheritance and using Adapter classes.

Course Outcomes:
By the end of the course, the student will be

Course Index	Course Outcomes
C207.1	Students can able to write programs in Java using OOP.
C207.2	Students can able to code programs related to real life scenario.
C207.3	Students can able to code programs in Java using Inheritance and using Adapter classes.

MCA-20207 Object Oriented Programming through JAVA Lab

Instruction: 3 Periods/week **Time: 3 Hours** **Credits: 2**

Internal: 50 Marks **External: 50 Marks** **Total:100 Marks**

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1. Write a java program to print quadratic roots using command line arguments.
2. Write a java program to print multiplication table using arrays.
3. Write a java program to demonstrate method overloading concept.
4. Write a java program to create an abstract class named Shape that contains two integers and an empty method named print Area (). Provide three classes named Rectangle, Triangle, and Circle such that each one of the classes extends the class Shape. Each one of the classes contains only the method print Area () that prints the area of the given shape.
5. Write a java program to implement hierarchical inheritance.
6. Write a java program to demonstrate multiple inheritance by using Interface.
7. Write a java package for book class and then import and display the result.
8. Write a java program to implement the concept of exception handling by creating user defined exception.
9. Write a java program to show multi-threaded application.
10. Develop an applet in Java that receives an integer in one text field, and computes its factorial Value and returns it in another text field, when the button is clicked.
11. Write a Java program that handles all mouse events and shows the event name at the center of the window when a mouse event is fired (Use Adapter classes).
12. Write a java program using swing components.

TEXT BOOKS

1. Java The complete reference, 9th edition, Herbert Schildt, McGraw Hill Education Pvt. Ltd.
2. Understanding Object-Oriented Programming with Java, updated edition, T. Budd, Pearson Education.