

Master of Computer Applications

Syllabus

School of Distance Education (SDE)

Online mode MCA

2023-2024 onwards



BHARATHIAR UNIVERSITY

(A State University, Accredited with “A++” Grade by NAAC,

Ranked 21st among Indian Universities by MHRD-NIRF)

Coimbatore - 641 046, Tamil Nadu, India

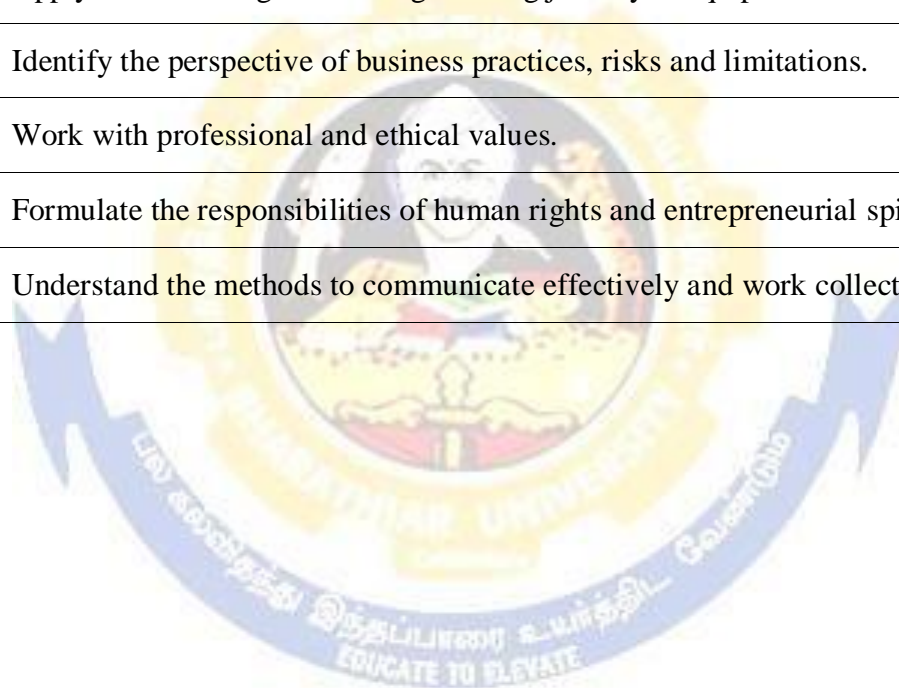
Program Educational Objectives (PEOs)	
The M.C.A. program describe accomplishments that graduates are expected to attain within five to seven years after graduation	
PEO1	To emerge as a System Analyst/ Software Engineer/ Data Analyst.
PEO2	The students can come up with a good solution for Business Models
PEO3	Design and Development of solutions to System Security
PEO4	Emerge as a Good Teacher and Researcher.



Program Specific Outcomes (PSOs)	
After the successful completion of MCA program, the students are expected to	
PSO1	Obtain sound knowledge in the basic concepts of computer science including theory and programming familiar with relevant trends in computer science domains.
PSO2	Integrate and apply efficiently the contemporary IT tools to all computer applications.
PSO3	Acquire professional skills in software design process and practical competence in broad range of open source programming languages to withstand technological change and provide solutions to new ideas and innovations.
PSO4	Able to pursue careers in IT industry/ consultancy/ research and development, teaching and allied areas related to computer applications.
PSO5	Provide various computing skills like analysis, design and development of innovative software products to meet the industry needs with legal, ethical and social acceptable solutions for computer based technical problems.



Program Outcomes (POs)	
On successful completion of the M.C.A. program	
PO1	Develop creativity and problem solving skills with the knowledge of computing and mathematics.
PO2	Ability to develop and carry out experiments, interpret and infer data.
PO3	Design algorithms and develop software to aid solutions to industry and governments.
PO4	Review the latest technology and tool handling mechanism.
PO5	Analyze the outcome to solve global environment related issues.
PO6	Apply the knowledge in lifelong learning journey to equip themselves.
PO7	Identify the perspective of business practices, risks and limitations.
PO8	Work with professional and ethical values.
PO9	Formulate the responsibilities of human rights and entrepreneurial spirit.
PO10	Understand the methods to communicate effectively and work collectively.



BHARATHIAR UNIVERSITY: COIMBATORE- 641 046

M.C.A Online Mode

(For the students admitted during the academic year 2023 – 24 onwards)

Course Code	Title of the Course	Credits	Hours		Maximum Marks		
			Theory	Practical	CIA	ESE	Total
FIRST SEMESTER							
	Paper I : Java Programming	4	4	-	25	75	100
	Paper II Relational Database Management Systems RDBMS	4	4	-	25	75	100
	Paper III Computer Networks	4	4	-	25	75	100
	Paper IV Operating Systems	4	4	-	25	75	100
	Elective I: Artificial Intelligence and Expert Systems	4	4	-	25	75	100
	Practical I : Java Programming Lab	3	-	5	40	60	100
	Practical II : RDBMS with ORACLE Lab	3	-	5	40	60	100
	Total	26					700
SECOND SEMESTER							
	Paper V : Data mining and Big Data Analytics	4	4	-	25	75	100
	Paper VI : .NET Programming	4	4	-	25	75	100
	Paper VII : Operations Research	4	4	-	25	75	100
	Paper VIII : Software Project Management	4	4		25	75	100
	Elective II: Internet of Things	4	4	-	25	75	100
	Practical III :Data mining Lab	3	-	4	40	60	100
	Practical IV : .NET Programming Lab	3	-	4	40	60	100
	Practical V: Web Application Development and Hosting	2	-	2	20	30	50
	Total	28					750
THIRD SEMESTER							
	Paper IX : PHP Programming	4	4	-	25	75	100
	Paper X : Software Testing	4	4	-	25	75	100
	Paper XI :Network Security and Cryptography	4	4	-	25	75	100
	Paper XII : Cloud Computing	4	4	-	25	75	100
	Elective III: Digital Image Processing	4	4	-	25	75	100
	Practical VI : PHP Programming Lab	3	-	5	40	60	100
	Practical VII : Software Testing Lab	3	-	5	40	60	100
	Practical VIII : Mini Project	2	-	-			*100
	Total	28					800

FOURTH SEMESTER							
Project	Major Project Work	8			50	150	*200
	Total	90					2450
	Grand Total						

* Project report - 80 marks; Viva-voce – 20 marks

** Project report - 160 marks; Viva-voce – 40 marks

During II or III Semester (Optional)



**First
Semester**

SCHOOL OF DISTANCE EDUCATION (ONLINE MODE)

BHARATHIAR UNIVERSITY, COIMBATORE-641007

Course code	JAVA PROGRAMMING	Core -I
Pre-requisite	Basics of C and C++ Programming	
Course Objectives:		
The main objectives of this course are to enable the students:		
<ol style="list-style-type: none"> 1. To understand basic concepts of object oriented programming, methods data types, class and objects, packages, interfaces and threads. 2. To apply and analyze Java Concepts in Databases through JDBC, 3. To understand and apply Servlet technology RMI for a distributed architecture. 4. To enable the students to learn various exception handling mechanisms, Graphics and File functions. 		
Expected Course Outcomes:		
On the successful completion of the course, student will be able to:		
1	Understand the basics of Java programming	
2	Understand Java methods	
3	Obtain knowledge about concepts, syntax and use of packages, interfaces, threads and exception handling for writing programs	
4	Familiarize the JDBC object services and make use these services for database access programs	
5	Apply multithreading, string manipulation, Java Beans and Servlets concepts	
Unit:1		
INTRODUCTION		
Introduction: History of JAVA, JAVA class libraries – Basics of a typical JAVA environment – Arithmetic, Equality and Relational Operators – Thinking about Objects, Applet: Adding Integers (Example) – Control Structures: if, if/else, while, for, switch, do/while, break and continue – Operators: Assignment, Increment and Decrement and Logical – Primitive Data types..		
Unit:2		
CLASS, METHODS AND PACKAGES		
Methods: program modules in JAVA – Methods – Method definitions – JAVA API packages – Duration of identifiers – Scope rules – Method overloading - Arrays – References and Reference parameters – Passing arrays to methods – Multiple subscripted arrays – Class scope – Controlling access to members – Creating packages – Constructors – Overloaded constructors – Set and Get methods – Final instance variables – Packages access – Using this reference – Finalizers – static Class members – Data abstraction and Information Hiding – Super classes and Subclasses – protected members – Constructors and Finalizers in subclass – inner class definitions – Type wrapper class for primitive types.		

Unit:3	STRING AND GRAPHICS	
<p>String constructors – String methods: length, CharAt, getChars, hashCode, value of, intern and miscellaneous string methods – Substrings and concatenating strings – stringBuffer class – stringTokenizer Class – Graphics contexts and Graphics Objects – color and Font controls – Drawing lines, Rectangles, Ovals, Arcs, Polygons and Polylines - The JAVA2D API – Swing overview – JLabel – Event handling model – JtextField, JpasswordField, Jbutton, JcheckBox, Jradio Button, JcomboBox, Jlist, JtextArea, Jslider – Mouse event handling, Adapter classes – Layout managers – Panels – Using menus with frames – Boxlayout manager.</p>		
Unit:4	EXCEPTION HANDLING AND FILES	
<p>The basics of JAVA exception handling – Try blocks – Throwing, Catching and Rethrowing an exception – Throws clause – finally block – Class Thread: an overview – Thread states – Thread priorities and scheduling – Thread synchronization – Runnable interface – Thread groups – Loading, displaying and scaling images – Files and Streams – Creating, Reading and Updating a sequential access file – Creating, Writing and Reading a random access file – Class file – Reading, Inserting and Updating a database (Use JDBC to a MS Access)</p>		
Unit:5	SERVLET	
<p>Overview of Servlet technology - Handling HTTP GET and POST requests – Session tracking – RMI: defining, implementing the RMI – Define the Client – Compile Execute the server and the client – Networking : Reading a file on a web server – Establishing a simple server and a simple client (using stream sockets) – Random and BitSet Class – Class arrays – Interface Collection and Class Collections – Sets – Maps – JAVABEANS : Preparing a class to be a JavaBean – Creating a JavaBean – Adding Beans and Properties to a JavaBean – Connecting Beans with Events in the BeanBox – the BeanInfo class.</p>		
Text Books		
1	Deitel and Deitel, “Java How to Program”, Third Edition, PHI/Pearson Education Asia.	
2	Keyur shab, “Java 2 programming”, Tata McGraw-Hill Pub. Company Ltd.	
Reference Books		
1	C.Xavier, “Programming with Java 2”, SciTech Publications (India) P. Ltd.	
2	Cays S. Horstmann, Gary Cornell, “Core Java2 Volume I – Fundamentals”, Pearson Edition, 2001 5. Cays S. Horstmann, Gary Cornell, “Core Java2 Volume II – Fundamentals”, Pearson Edition, 2003	

Course code		RELATIONAL DATABASE MANAGEMENT SYSTEMS	Core -II
Pre-requisite	Basic knowledge about database		
Course Objectives:			
The main objectives of this course are to:			
<ol style="list-style-type: none"> 1. To enable the students to understand the basics of database management systems. 2. To enable the students to understand ER model, structure of relational database and indexing. 3. To enable the students to apply advance database concepts to create secured, distributed databases. 			
Expected Course Outcomes:			
On the successful completion of the course, student will be able to:			
1	Understood the basic principles of database management systems, parallel & distributed databases		
2	Gained knowledge over various database models, schemas and SQL statements		
3	Construct Logical database design		
4	Apply normalization and functional dependency in database design with security concern		
5	Design and build a simple database system and demonstrate competence with the fundamental tasks involved with modeling, designing, and implementing a DBMS		
Unit:1			
DATABASE SYSTEM			
Overview of database systems: Managing data- A historical perspective – File systems versus a DBMS - Advantages of a DBMS- Describing and storing Data in a DBMS - Queries in a DBMS - Transaction management – Structure of a DBMS. Database design & ER diagrams – Entities, Attributes, and Entity Sets – Relationships and Relationship Sets- Additional feature of the ER model- conceptual Database design with the ER model.			
Unit:2			
RELATIONAL MODEL			
Relational Model: Integrity constraints over relations – Enforcing integrity constraints – Querying relational data – Logical database design : ER to Relational –Introduction to Views – Destroying / Altering Tables & Views. Relational Algebra and Calculus: Relational Algebra – Relational Calculus			
Unit:3			
SQL			
SQL: Queries, Programming, Triggers: The form of a basic SQL Query – UNION, INTERSECT and EXCEPT – Nested Queries – Aggregate operators – Null values –Complex integrity constraints in SQL - Triggers & Active data bases. Transaction Management			

Overview: The ACID Properties - Transactions & Schedules – Concurrent execution of Transactions – Lock-based concurrency control – Performance of Locking –Transaction support in SQL.	
Unit:4	NORMAL FORMS AND SECURITY
<p>Schema Refinement and Normal forms: Introduction to Schema refinement – Functional dependencies – Reasoning about functional dependencies – Normal forms –Properties of Decompositions – Normalization – Schema Refinement in data base design – other kinds of dependencies. Security : Introduction to Database security -Access control – Discretionary Access control – Mandatory Access control – Additional issues to security. Concurrency control : 2PL, serializability and Recoverability – Introduction to Lock Management - Lock Conversions –Specialized Locking techniques - Concurrency control without locking.</p>	
Unit:5	DISTRIBUTED DATABASE
<p>Parallel & Distributed databases: Introduction – Architecture for parallel databases – Parallel Query evaluation – Parallelizing individual operations –Parallel Query Optimization – Introduction to distributed Databases – Distributed DBMS architecture sorting data in a distributed DBMS. Object Database Systems: Motivation Example – Structured data types – Operation on structured data types – Encapsulation & ADTS – Inheritance - Objects, OIDS and Reference Types - Database design for and ORDBMS – OODBMS – Comparing RDBMS, OODBMS and ORDBMS.</p>	
Text Books	
1	Raghu Ramakrishnan, Johannes Gehrke –“Database Management Systems”, Third Edition, McGraw-Hill Higher Education.
2	Silberschatry, Korth, Sundarshan, “Database system Concepts”, Fourth Edition, Mc Graw-Hill Higher Education
Reference Books	
1	Elmasri, Navathe, “Fundamentals of Database Systems”, Third Edition, Pearson Education Asia
2	S.S. Khandare, “Database Management and Oracle Programming”, First Edition, 2004, S.Chand and Company Ltd. 5. Nilesh Shah, “Database Systems using Oracle”, 2002, Prentice Hall of India. 6. Rajesh Narang, “Database Management Systems”, 2004, Prentice Hall of India
Related Online Contents [MOOC, SWAYAM, NPTEL, Websites etc.]	
1	https://www.javatpoint.com/what-is-rdbms
2	https://www.tutorialspoint.com/sql/sql-rdbms-concepts.htm
3	https://nptel.ac.in/courses/106/105/106105175/

Course code		COMPUTER NETWORKS	Core -III
Core/Elective/Supportive		Core	
Pre-requisite		Basics of Networks	Syllabus Version 2020-21 Onwards
Course Objectives:			
The main objectives of this course are :			
<ol style="list-style-type: none"> 1. To make the students understand the basics of computer networks and its importance in communication and resource sharing. 2. To enable the students to understand OSI reference model and related models. 3. To enable the students to learn and apply algorithms related to network scheduling and error detection and correction . 4. To enable the students to understand and apply the design issues in construction of computer networks. 			
Expected Course Outcomes:			
On the successful completion of the course, student will be able to:			
1	Understand the basics knowledge about computer networks.		
2	Understand the basics of physical layer and public switched telephone networks.		
3	Understand the fundamentals of elementary data link protocol and sliding window protocols		
4	Apply various operations of algorithms in networks		
5	Analyze about various types of protocol and layers		
K1 - Remember; K2 - Understand; K3 - Apply; K4 - Analyze; K5 - Evaluate; K6– Create			
Unit:1	INTRODUCTION		
Introduction: Use of computer networks – Network Hardware – Network software – Reference models – Example of networks.			
Unit:2	PHYSICAL LAYER		
The Physical Layer: The Theoretical basis for data communication – Guided transmission Media – Wireless transmission – Communication satellites – The Public switched Telephone network – Cable Television - Mobile telephone system.			
Unit:3	DATA LINK LAYER		
Data link layer: Data link layer design issues – Error detection and correction – Elementary data link protocols – Sliding window protocols – Protocol Verification - Example data link Protocols.			
Unit:4	NETWORK LAYER		
Network layer : Network layer design issues – Routing algorithms – Congestion, Control			

algorithms – Quality of service – Internetworking – Network layer in the internet. Transport layer: The transport service – Elements of transport protocol – A simple transport protocol - The internet Transport Protocols : UDP – The Internet Transport Protocols : TCP - Performance issues.	
Unit:5	SESSION LAYER
Session layer : Design issues, synchronization - Presentation layer : Design issues, cryptography – Application layer : Design issues, file transfer, E-mail.	
Text Books	
1	Andrew S. Tanenbaum, “Computer Networks”, IV Edition, PHI/Pearson Education
2	P. Green – Computer Network Architectures and Protocols, Plenum Press, 1982.
3	Harry Katzan – An Introduction to “Distributed Data Processing”, A Petrocelli Book, New York / Princeton.
4	Godbole – Data Communication & Networking, TMH.
Reference Books	
1	Leon Garcia – Communication Networks : Fundamental Concepts & Key Architecture, TMH.
2	Hari & Barani, “Projects in Networking”, 2005, SCITECH Publications
3	Kanthi Swarup, P.K. Gupta and Manmohan, (2012), “Operations Research”, Sultan Chand and Sons.
4	S.D.Sharma, (2010), “Operations Research”, Sultan Chand’s Publications (India).
5	Manmohan and Gupta, (2011), “Problems on Operations Research”, Prentice Hall of India.
Related Online Contents [MOOC, SWAYAM, NPTEL, Websites etc.]	
1	https://www.javatpoint.com/computer-network-tutorial
2	https://www.geeksforgeeks.org/computer-network-tutorials/
3	https://nptel.ac.in/courses/106/106/106106091/
Course Designed By:	

Course code	OPERATING SYSTEMS		Core IV
Core/Elective/ Supportive	Core		
Pre-requisite	Basic knowledge about various operating systems (DOS, Windows)	Syllabus Version	2020-21 Onwards
Course Objectives:			
The main objectives of this course are to:			
<ol style="list-style-type: none"> 1. Enable the students to understand about operating systems, process management, CPU scheduling, memory management and secondary storage management. 2. To enable the students to learn and apply the concepts using LINUX operating system. 3. To enable students to understand and analyse shell programming. 			
Expected Course Outcomes:			
On the successful completion of the course, student will be able to:			
1	Understand the design issues associated with operating systems		
2	Master various process management concepts like scheduling, deadlock management		
3	Analyze on memory management		
4	Analyze about the disk performance optimization and file systems		
5	Analyze on Linux operating system		
Unit:1	INTRODUCTION		
INTRODUCTION: Definition of OS-Mainframe System-Desktop Systems-Multi processor System-Distributed-Clustered-Real time Systems-Handheld Systems-Operating System Structure-System Components-Services-System Calls-System Programs-System Design and Implementation.			
Unit:2	PROCESS MANAGEMENT		
PROCESS MANAGEMENT: Concepts-Process Scheduling-Operations on Processes-Cooperating Processes-Inter Process Communication-CPU Scheduling-Scheduling Concepts Criteria-Scheduling Algorithms-Multiprocessor Scheduling-Real time Scheduling.			
Unit:3	PROCESS SYNCHRONIZATION		
PROCESS SYNCHRONIZATION: Critical Section-Synchronization Hardware Semaphores-Problems of Synchronization-Critical Regions-Monitors-Deadlocks Characterization-Handling Deadlocks-Deadlock Prevention – Avoidance-Detection-Deadlock Recovery.			
Unit:4	MEMORY MANAGEMENT		
MEMORY MANAGEMENT: Storage Hierarchy-Storage Management Strategies Contiguous-			

Non Contiguous Storage Allocation-Single User-Fixed Partition-Variable Partition Swapping-Virtual Memory-Basic Concepts-Multilevel Organization-Block Mapping-Paging Segmentation-Page Replacement Methods-Locality-Working Sets.	
Unit:5	I/O AND FILE SYSTEMS
I/O AND FILE SYSTEMS: Disk Scheduling-File Concepts-File System Structure-Access Methods-Directory Structure-Protection-Directory Implementation-Allocation Methods-Free Space Management Case Study: Linux Operating System – Commands, Shell Programming, Report writing	
Text Books	
1	Silberschatz and Galvin, Operating System Concepts, 6th Edition, John Wiley & Sons, Inc., 2004.
2	Milankovic M., Operating System Concepts and Design, 2nd Edition, McGraw Hill, 1992.
Reference Books	
1	P.C.Bhatt, An Introduction to Operating Systems-Concepts and Practice, Prentice Hall Of India, 2004.
2	H.M.Deitel, An Introduction to Operating Systems, 2nd Edition, Pearson Education, 2002.
Related Online Contents [MOOC, SWAYAM, NPTEL, Websites etc.]	
1	https://www.javatpoint.com/os-tutorial
2	https://www.tutorialspoint.com/operating_system/index.htm
3	https://nptel.ac.in/courses/106/106/106106144/
Course Designed By:	

Course code		PRACTICAL I : JAVA PROGRAMMING LAB	Practical I	
Core/Elective/Supportive		Practical		
Pre-requisite	Basic programming knowledge in C and C++	Syllabus Version	2020-21 Onwards	
Course Objectives:				
The main objectives of this course are to:				
<ol style="list-style-type: none"> 1. To teach fundamentals of object oriented programming in Java. 2. To familiarize java environment to create, debug and run simple java programs 3. To provide knowledge on JAVA API , SWINGS to create java Applications 4. To introduce JDBC for navigation of records 5. To understand RMI, JAVABEANS & its implementation 				
Expected Course Outcomes:				
On the successful completion of the course, student will be able to:				
1	Understand Object Oriented features using JAVA			
2	Apply the concept of Polymorphism and Inheritance			
3	Implement Exception Handling Mechanism			
4	Develop interactive applications using Servlets and JAVABEANS			
LIST OF PROGRAMS			75 hours	
<ol style="list-style-type: none"> 1. Create an employee package to maintain the information about the employee. Use constructors to initialize the employee number and use overloading method to set the basic pay of the employee. By using this package create a java program. 2. Program to implement polymorphism, inheritance and inner classes. 3. Create a frame with user specific size and position it at user specific position (use command line argument). Then different shapes with different colours (use menus). 4. Java program to handle different mouse events. 5. Create an applet for a calculator application. 6. Java program to maintain the student information in text file. 7. Animate images at different intervals by using multi threading concepts. 8. Program to send a text message to another system and receive the text message from the system (use socket programming). 9. Java program by using JDBC concepts to access a database. 10. Java program to implement RMI. 11. Java program by using to implement the tree viewer. 12. Java bean program to view an image. 13. Java program that prohibit to reading of text files that containing bad words. 				
Expert lectures, online seminars – webinars				

Total Practical hours		75 hours
Text Books		
1	Deitel and Deitel, “ Java How to Program”, Third Edition, PHI/Pearson Education Asia.	
2	Keyur shab,“Java 2 programming”, Tata McGraw-Hill Pub. Company Ltd.	
Reference Books		
1	C.Xavier,“Programming with Java 2”,SciTech Publications (India) P. Ltd.	
2	Cays S. Horstmann, Gary Cornell, “Core Java2 Volume I – Fundamentals”, Pearson Edition, 2001 5. Cays S. Horstmann, Gary Cornell, “Core Java2 Volume II – Fundamentals”, Pearson Edition, 2003	
Related Online Contents [MOOC, SWAYAM, NPTEL, Websites etc.]		
1	https://www.javatpoint.com/java-programs	
2	https://www.tutorialspoint.com/java/index.htm	
3	https://nptel.ac.in/courses/106/105/106105191/	
Course Designed By:		

Course code		PRACTICAL II : RDBMS WITH ORACLE LAB	Practical II	
Core/Elective/Supportive		Practical		
Pre-requisite	Basic programming using databases to store and retrieve data		Syllabus Version	2020-21 Onwards
Course Objectives:				
The main objectives of this course are to:				
<ol style="list-style-type: none"> 1. To study the features of commercial RDBMS packages such as Oracle and Developer 2000 2. To give Foundation knowledge in database concepts, technology and practice to groom students into well informed database application developers. 3. To give strong practice in SQL programming through a variety of database problems. 4. To practice host language interface with embedded SQL. 5. Develop database applications using front-end tools and back-end DBMS 6. To create forms and report writer package 				
Expected Course Outcomes:				
On the successful completion of the course, student will be able to:				
1	Understand Entity Relationship model and develop E-R diagrams for some applications			
2	Write SQL queries to user specifications			
3	Develop triggers, procedures, user defined functions and design accurate and PLSQL programs in Oracle			
4	Prepare technical report on the observations of the experiments			
LIST OF PROGRAMS			75 hours	
PRACTICAL II RDBMS LAB				
Study the features of commercial RDBMS packages such as Oracle and Developer 2000.				
Laboratory exercise should include defining scheme of applications, creation of a database, writing SQL queries to retrieve information from database.				
Use of host language interface with embedded SQL.				
Use of forms and report writer package.				
Some sample applications, which may be programmed, are given below.				
<ul style="list-style-type: none"> • Banking system various schemes • Online reservation system. • Personal information. • Student mark processing system (Internal and External marks). 				

<ul style="list-style-type: none"> • Hotel management. • Stock maintenance. • College admission system. (both, UG and PG) 	
Expert lectures, online seminars – webinars	
Total Practical hours	75 hours
Text Books	
1	Raghu Ramakrishnan, Johannes Gehrke –“Database Management Systems”, Third Edition, McGraw-Hill Higher Education.
2	Silberschatry, Korth, Sundarshan, “Database system Concepts”, Fourth Edition, Mc Graw-Hill Higher Education
Reference Books	
1	Elmasri, Navathe, “Fundamentals of Database Systems”, Third Edition, Pearson Education Asia
2	S.S. Khandare, “Database Management and Oracle Programming”, First Edition, 2004, S.Chand and Company Ltd. 5. Nilesh Shah, “Database Systems using Oracle”, 2002, Prentice Hall of India. 6. Rajesh Narang, “Database Management Systems”, 2004, Prentice Hall of India
Related Online Contents [MOOC, SWAYAM, NPTEL, Websites etc.]	
1	https://www.javatpoint.com/what-is-rdbms
2	https://www.tutorialspoint.com/sql/sql-rdbms-concepts.htm
3	https://nptel.ac.in/courses/106/105/106105175/
Course Designed By:	



**Second
Semester**

Course code		DATA MINING AND BIG DATA ANALYTICS	Core V
Core/Elective/Supportive		Core	
Pre-requisite	Basic Knowledge about various types of Data and statistical methods for retrieval and analysis .	Syllabus Version	2020-21 Onwards
Course Objectives:			
The main objectives of this course are to:			
<ol style="list-style-type: none"> 1. To motivate the students as well to enrich their knowledge about the concepts of data manipulation and big data. 2. To enable the students to understand and analyse various datamining applications. 3. To enable the students to understand and apply Big Data to Business problems. 4. To enable the students to analyse business models by high performance deep analytics. 			
Expected Course Outcomes:			
On the successful completion of the course, student will be able to:			
1	Understand the basic data mining techniques and algorithms		
2	Understand about the Big Data evaluation		
3	Analyze on clustering methods		
4	Compare and evaluate different data mining techniques like classification and prediction		
5	Apply and Analyze Big Data to Business problems		
Unit:1	INTRODUCTION		
Introduction – Data Mining – Relational Databases – Data Warehouses – Transactional databases – Data Mining functionalities – Classification of Data Mining systems – Major Issues in Data Mining.			
Unit:2	DATA PREPROCESSING		
Data Preprocessing – Data cleaning – Missing value, noising data and inconsistent data – Data integration and Transformation – Data reduction – Data cube aggregation – Dimensionality reduction and data compression – Data mining primitives.			
Unit:3	CLASSIFICATION		
Classification and predictions – Issues regarding classification and prediction – Classifications by decision tree induction – Classification by Back propagation – Other classification methods.			
Unit:4	CLUSTER		
Cluster Analysis – Types of Data in Cluster Analysis – Interval – Scaled variables, Binary variables, Nominal ordinal and ratio - scaled variables – Clustering methods – Partitioning			

Course code		.NET PROGRAMMING	Core VI
Core/Elective/ Supportive		Core	
Pre-requisite	Basics of internet programming.	Syllabus Version	2020-21 Onwards
Course Objectives:			
The main objectives of this course are to:			
<ol style="list-style-type: none"> 1. To enable the students to understand and apply the practical aspects of application development using .Net framework. 2. To enable the students to understand the Common Language Runtime (CLR), .Net framework classes. 3. To enable the students to understand and apply the .NET concepts using C#. 4. To enable the students to understand and apply .NET concepts using ADO.netProgramming 			
Expected Course Outcomes:			
On the successful completion of the course, student will be able to:			
1	Understand the concepts of .NET Framework Technology		
2	Apply error handling techniques in .NET		
3	Demonstrates the C# console applications		
4	Design and develop the Web applications using C#		
5	Design and develop the distributed data driven applications using .NET framework		
Unit:1	EVOLUTION OF WEB DEVELOPMENT		
<p>Evolution of Web Development: HTML Forms-Server Side and Client Side Programming. Developing ASP.Net Applications – Visual Studio: Creating Websites- Designing a Webpage- The anatomy of a Web form – Writing Code. Web Form Fundamentals: The anatomy of an ASP.Net application – Introducing Server Controls – Improving the Currency Converter – A Deeper Look at HTML Control Classes – The Page Class. Web Controls: Steeping up to Web Controls – Web Control Classes – List Controls – Table Controls – Web Control Events and AutoPostBack</p>			
Unit:2	STATE MANAGEMENT		
<p>State Management: The problem of State – View State – Transferring Information between Pages – Cookies – Session State – Session State Configuration. Error Handling, Logging, and Tracing: Common Errors – Exception Handling – Handling Exceptions – Throwing Your Own Exceptions – Logging Exceptions – Error Pages – Page Tracing. Deploying ASP.Net Applications: ASP.Net Applications and the Web Server – Internet Information Services(IIS) – Managing Websites with IIS Manager – Deploying a Simple Site – Deploying with Visual Studio.</p>			
Unit:3	C#		
<p>C# Language: C# Languages Basics – Variables and Data Types – Variable operations – Object based manipulation – Conditional Logic – Loops – Methods. Types, Objects and Namespaces:</p>			

Classes – Value types and reference types – Understanding namespaces and assemblies.	
Unit:4	ENUMERATORS, INTERFACES AND EVENTS
C#: Enumerators and Iterators – Exceptions - Serializing objects - Deep serialization-XML based serialization - Multithreading – Interfaces and Structures - Delegates and Events – Indexers and Properties.	
Unit:5	ADO.NET FUNDAMENTALS
ADO.NET Fundamentals: Understanding Data Management – Configure database – SQL Basics - ADO.Net basics – Direct Data Access – Disconnect Data Access. Data Binding: Single-Value data binding	
Text Books	
1	Matthew MacDonald (2008), Beginning ASP.NET 3.5 in C#, 2/e; A press Berkeley.
2	Jesse Liberty (2003), Programming Visual Basic .NET, 2/e; O'Reilly, Shroff Publishers and Distributors Pvt. Ltd.
3	Bill Evjen, Jason Beres (2009), Visual Basic .Net Bible, Hungry Minds Inc.
Reference Books	
1	Herbert Schildt (2010), Complete Reference C#, Tata McGraw-Hill.
2	Joe Duffy(2010), Professional .Net Framework 2.0l, Wiley India.
Related Online Contents [MOOC, SWAYAM, NPTEL, Websites etc.]	
1	https://www.tutorialspoint.com/asp.net/index.htm
2	https://www.javatpoint.com/net-framework
3	https://www.btechguru.com/training--dot-net--c-sharp-dot-net--framework--microsoft-net-framework-part-1-video-lecture--11280--27--139.html
Course Designed By:	

Course code		OPERATIONS RESEARCH	Core VII
Core/Elective/ Supportive		Core	
Pre-requisite	Basic applications of Mathematics and Business Mathematics.	Syllabus Version	2020-21 Onwards
Course Objectives:			
The main objectives of this course are to:			
<ol style="list-style-type: none"> 1. Learn formulation of LPP, mathematical formulation, feasible solution to transport problem, EOQ model. 2. Learn individual replacement, group replacement and the characteristics of queuing theory. 3. apply PERT / CPM for Network Construction. 			
Expected Course Outcomes:			
On the successful completion of the course, student will be able to:			
1	Firm basis for understanding the linear programming problems.		
2	To construct networks, apply queuing theory and replacement model concepts.		
3	Apply the optimality in transportation problem.		
4	Analyze on inventory control.		
5	Solve a wide range of problems related to network construction through PERT / CPM		
Unit:1	LINEAR PROGRAMMING		
LINEAR PROGRAMMING : Formulation of LPP – Graphical solutions to LPP –Simplex Method - Big M method – Two – Phase Simplex Method - Duality in Linear Programming: Primal & Dual Problems – Dual Simplex Method.			
Unit:2	PROBLEMS		
THE TRANSPORTATION PROBLEM: Introduction – Mathematical Formulation- Finding Initial Basic Feasible Solutions – Moving towards Optimality – Unbalanced Transportation Problems – Degeneracy.			
THE ASSIGNMENT PROBLEM: Introduction – Mathematical formulation - Hungarian Assignment Method – Maximization in Assignment Problem – Unbalanced Assignment Problem – Impossible Assignment.			
Unit:3	INVENTORY CONTROL		
INVENTORY CONTROL : Introduction – Costs involved in inventory - Deterministic models : EOQ models without and with shortage - Buffer stock and Reorder Level – Price Break models – ABC Analysis.			
Unit:4	REPLACEMENT MODEL		
REPLACEMENT MODEL: Introduction – Replacement of items that deteriorates gradually :			

value of money does not change with time – value of money changes with time – Replacement of items that fails suddenly : Individual Replacement –Group Replacement.	
PERT/CPM: Introduction – Construction of Network - CPM calculations –PERT Calculations.	
Unit:5	QUEUING THEORY
QUEUING THEORY: Introduction - Characteristics of queuing system - Problems of single server with finite / infinite population model – Problems of multi server with finite /infinite population model.(No derivation).	
Text Books	
1	Kanti Swarup, P.K. Gupta, Man Mohan, “Operations Research”, Sultan Chand & Sons.
2	P.K. Gupta, D.S Hira, “Problems in Operations Research”, S.Chand& Company Ltd.
3	Hamdy A. Taha, “Operations Research – An Introduction”, Seventh Edition, PHI/Pearson Education.
Reference Books	
1	Frederick S. Hillier, Gerald J. Lieberman, “Introduction to Operations Research”, Tata McGraw Hill Pub Company Ltd., Seventh Edition.
2	J.K.Sharma, “Operations Research Theory and Applications”, Macmillan India Ltd., Second Edition.
Related Online Contents [MOOC, SWAYAM, NPTEL, Websites etc.]	
1	https://www.tutorialspoint.com/linear_programming/index.asp
2	https://www.cs.toronto.edu/~stacho/public/IEOR4004-notes1.pdf
3	https://www.classcentral.com/course/swayam-operations-research-14219
Course Designed By:	

Course code		SOFTWARE PROJECT MANAGEMENT	Core VIII	
Core/Elective/Supportive		Core		
Pre-requisite		Basics of Software .	Syllabus Version	2020-21 Onwards
Course Objectives:				
The main objectives of this course are to enable the students:				
<ol style="list-style-type: none"> 1. To understand basics and importance of Software Engineering. 2. To get a deep insight to software project management concepts. 3. To understand the software project, Analyze project Characteristics, estimate efforts, project evaluation, and selection of process model, software effort estimation, risk management and managing contracts. 				
Expected Course Outcomes:				
On the successful completion of the course, student will be able to:				
1	Understand the basic concepts of Software Project Management			
2	Identify the different project contexts and suggest an appropriate management strategy			
3	Demonstrate through application, knowledge of the key project management skills, such as product and work break-down structure, schedule, governance including progress reporting, risk and quality management			
4	Analyze a comparison on Product Versus Process Quality Management			
5	Perform case studies on cost estimation models like COCOMO			
Unit:1 INTRODUCTION				
Introduction: Software Engineering, Software Myths, Layered Technology, Process Models, Software Project Management - Software Project Versus Other Project – Requirement Specification – Information and Control in Organization – Introduction to step wise Project Planning – Select – Identify Scope and Objectives - Identify Project Infrastructure – Analyze Project Characteristics – Products and Activities – Estimate Effort for each Activity – Identify Activity Risks – Allocate Resources - Review / Publicize Plan – Execute Plan and Lower Levels of Planning.				
Unit:2 PROJECT EVALUATION				
Project Evaluation : Introduction – Strategic Assessment – Technical Assessment – Cost Benefit Analysis – Cash Flow Forecasting – Cost Benefit Evaluation Techniques – Risk Evaluation – Selection of an Appropriate Project Approach – Choosing Technologies – Choice of Process Models – Structured Methods – Rapid Application Development – Waterfall Model – VProcess Model – Spiral Model – Software Prototyping – Ways of Categorizing Prototypes – Tools – Incremental Delivery – Selection Process Model.				

Unit:3	SOFTWARE EFFORT ESTIMATION	
<p>Software Effort Estimation : Introduction – Problems with Over and Under Estimates – Basis for Software Estimating – Software Effort Estimation Technique – Albrecht Function Point Analysis – Function Points – Object Points – Procedural Code Oriented Approach – COCOMO – Activity Planning – Project Schedules - Projects and activities – Sequencing and Scheduling Activities – Network Planning Models – Formulating a Network Planning – Adding Time Dimension – Forward Pass – Backward Pass – Identifying the Critical Path – Activity Float - Shortening Project Duration – Identifying Critical Activities – Precedence Networks.</p>		
Unit:4	RISK MANAGEMENT	
<p>Risk Management : Introduction – Nature of Risk Management Identification – Analysis – Reducing – Evaluating – Z values – Resource Allocation – Nature of Resources – Requirements – Scheduling – Critical Paths – Counting the Cost – Resource Schedule – Cost Schedule – Scheduling Sequence – Monitoring and Control – Creating the Framework - Collecting the Data – Visualizing the Progress – Cost Monitoring – Prioritizing Monitoring – Change Control.</p>		
Unit:5	SOFTWARE QUALITY	
<p>Managing Contracts : Introduction – Types of Contract – Stages in Contract Placement – Terms of Contract – Contract Management – Acceptance – Managing People and Organizing Teams – Organizational Behavior Background – Selecting the Right Person for the Job – Instruction in the Best Methods – Motivation – Decision Making – Leadership – Organizational Structures – Software Quality – Importance – Practical Measures – Product Versus Process Quality Management – External Standards – Techniques to Help Enhance Software Quality.</p>		
Text Books		
1	Roger .S.Pressman: Software Engineering, Tata McGrawHill , V Edition.	
2	Bob Hughes and Mike Cottrell, “Software Project Management”, McGraw Hill, Second Edition.	
Reference Books		
3	Walker Royce, “Software Project Management”, Addison Wesley.	
4	Derrel Ince, H. Sharp and M. Woodman, “Introduction to Software Project Management and Quality Assurance”, Tata McGraw Hill, 1995.	
Related Online Contents [MOOC, SWAYAM, NPTEL, Websites etc.]		
1	https://www.tutorialspoint.com/software_engineering/software_project_management.htm	
2	https://www.javatpoint.com/software-project-management	
3	https://onlinecourses.nptel.ac.in/noc19_cs70/preview	

Course Designed By:

Course code		PRACTICAL III : DATA MINING LAB	Practical III	
Core/Elective/Supportive		Practical		
Pre-requisite	Basics of Datamining algorithms and various tools available.		Syllabus Version	2020-21 Onwards
Course Objectives:				
The main objectives of this course are to:				
<ol style="list-style-type: none"> 1. To enable the students to learn the concepts of Data Mining algorithms namely classification, clustering, regression.... 2. To understand & write programs using the algorithms 3. To apply statistical interpretations for the solutions 4. Able to use visualizations technique 5. To apply WEKA tool in attribute selection, decision tree, etc... 				
Expected Course Outcomes:				
On the successful completion of the course, student will be able to:				
1	To write programs using R for Association rules, Clustering techniques			
2	To implement data mining techniques like classification, prediction			
3	Able to use different visualizations techniques using R			
4	To understand different data mining algorithms to solve real world applications and train data using WEKA tool			
LIST OF PROGRAMS			60 hours	
<ol style="list-style-type: none"> 1. Implement any 3 classification algorithms and compare the results. 2. Implement any 2 clustering algorithms using any open source data mining tool. 3. Implement the algorithm to generate a decision tree for the given data set. 4. Develop an application to extract association mining rules. 5. Develop an application for implementing one of the clustering techniques. 6. Develop an application for implementing Naïve Bayes classifier. 7. Implement Apriori approach. 8. Design a knowledge flow layout to load, apply attribute selection, and normalize the attributes and to store the results in a CSV saver using WEKA tool. 9. Create a decision tree and train the tree using the given dataset as the training data. Report the model obtained after training using WEKA tool. 				
Total Practical hours			60 hours	
Text Books				

1	Jinweihan, Micheline Kambler, "Data Mining: Concepts and Techniques", Morgan Kaufman Publishers, New Delhi. (For Unit I, II, III and IV).
2	Paul C Zikopoulos, Dirk deRoos, Krishnan Parasuraman, Thomas Deutsch, David Corrigan, James Giles, "Harness the Power of Big Data", The McGraw-Hill Publications, 2013, First Edition. (For Unit V).
Reference Books	
1	Pieter Adriaans, DolfZantinge, "Data Mining", Addison Wesley, 1998. Sam Anohory, Dennis Murrey, "Dataware housing in the real world", Pearson, 2004.
Related Online Contents [MOOC, SWAYAM, NPTEL, Websites etc.]	
1	https://www.tutorialspoint.com/big_data_analytics/index.htm
2	https://nptel.ac.in/courses/110/106/110106072/
3	https://nptel.ac.in/courses/106/105/106105174/
Course Designed By:	

Course code		PRACTICAL IV : .NET PROGRAMMING LAB (Effective for the candidates admitted from the academic Year 2020- 2021)	Practical IV	
Core/Elective/ Supportive		Practical		
Pre-requisite	OOPs, database concepts and Internet Programing to develop Web applications.		Syllabus Version	2020-21 Onwards
Course Objectives:				
The main objectives of this course are to:				
1.To Understand & write web applications using ASP.NET				
2.To implement OOPS concepts using C#				
3.To Develop the Web applications using C#				
4.To Design and develop the data base applications using ADO.NET control.				
Expected Course Outcomes:				
On the successful completion of the course, student will be able to:				
1	Understand to create web pages using ASP.NET			
2	Capable of developing interactive web applications using ASP.NET			
3	Able to write dynamic web applications using C#			
4	Must be able develop data base applications using ADO.NET control			
LIST OF PROGRAMS			60 hours	
ASP.NET PROGRAMS				
1. College Website				
2. Online Examination System				
3. Online Mobile phone shop				
4. Online registration form				
C# PROGRAMS				
5. Student Information using inheritance.				
6. Sales bill preparation using interface.				
7. Insert record using data grid view.				
8. Create user login form.				
ADO.NET Programming				
9. Develop a Windows application with ADO.NET to perform Insert, Delete, Update and Select operations.				

10. Build an ADO.NET program which displays the Employee information in the relevant fields from the database which already exists.	
Total Practical hours	60 hours
Text Books	
1	Matthew MacDonald (2008), Beginning ASP.NET 3.5 in C#, 2/e; A press Berkeley.
2	Jesse Liberty (2003), Programming Visual Basic .NET, 2/e; O'Reilly, Shroff Publishers and Distributors Pvt. Ltd.
3	Bill Evjen, Jason Beres (2009), Visual Basic .Net Bible, Hungry Minds Inc.
Reference Books	
1	Herbert Schildt (2010), Complete Reference C#, Tata McGraw-Hill.
2	Joe Duffy(2010), Professional .Net Framework 2.0l, Wiley India.
Related Online Contents [MOOC, SWAYAM, NPTEL, Websites etc.]	
1	https://www.tutorialspoint.com/asp.net/index.htm
2	https://www.javatpoint.com/net-framework
3	https://www.btechguru.com/training--dot-net--c-sharp-dot-net--framework--microsoft-net-framework-part-1-video-lecture--11280--27--139.html
Course Designed By:	

Course code	PRACTICAL V : WEB APPLICATION DEVELOPMENT AND HOSTING (Effective for the candidates admitted from the academic Year 2020-2021)	Practical V	
Core/Elective/Supportive	Practical		
Pre-requisite	Basic Programming using HTML Tags	Syllabus Version	2020-21 Onwards
Course Objectives:			
The main objectives of this course are to:			
1. Able to design a web page using HTML tags			
2. To enable the students to use Framesets, hyper links and different formatting features of HTML tags			
3. Enable the students to use Forms & other controls in a web page			
4. To create interactive applications using PHP			
Expected Course Outcomes:			
On the successful completion of the course, student will be able to:			
1	Understand & implement the basic HTML tags to create static web pages		
2	Capable of using hyperlinks, frames , images, tables,in a web page		
3	Able to write dynamic web applications using HTML forms		
4	Must be able to write dynamic web applications in PHP & HTML tags using XAMPP.		
LIST OF PROGRAMS		30 hours	
1. Develop a website for your college using advanced tags of HTML.			
2. Write names of several countries in a paragraph and store it as an HTML document, world.html. Each country name must be a hot text. When you click India (for example), it must open india.html and it should provide a brief introduction about India.			
3. Develop a HTML document to i)display Text with Bullets / Numbers - Using Lists ii) to display the Table Format Data.			
4. Develop a Complete Web Page using Frames and Framesets which gives the Information about a Hospital using HTML.			
5. Develop a HTML document to print your Bio-Data in a neat format using several components			

6. Develop a Registration Form for an inter-collegiate function and validate using Java Script.	
7. Develop and display customer details using XML with XSL transformation and validate the document using DTD or XSD	
8. Develop and display student personal details in XML format.	
Total Practical hours	
30 hours	
Text Books	
1	Ivan Bayross, “Web Enabled Commercial Applications Development Using HTML, JavaScript, DHTML and PHP”, BPB Publications, 4th Revised Edition, 2010.
Reference Books	
1	A.K.Saini and Sumint Tuli, “Mastering XML”, First Edition, New Delhi, 2002.
Related Online Contents [MOOC, SWAYAM, NPTEL, Websites etc.]	
1	https://www.tutorialspoint.com/xml/index.htm
2	https://www.tutorialspoint.com/internet_technologies/websites_development.htm
3	https://www.youtube.com/watch?v=PlxWf493en4
Course Designed By:	



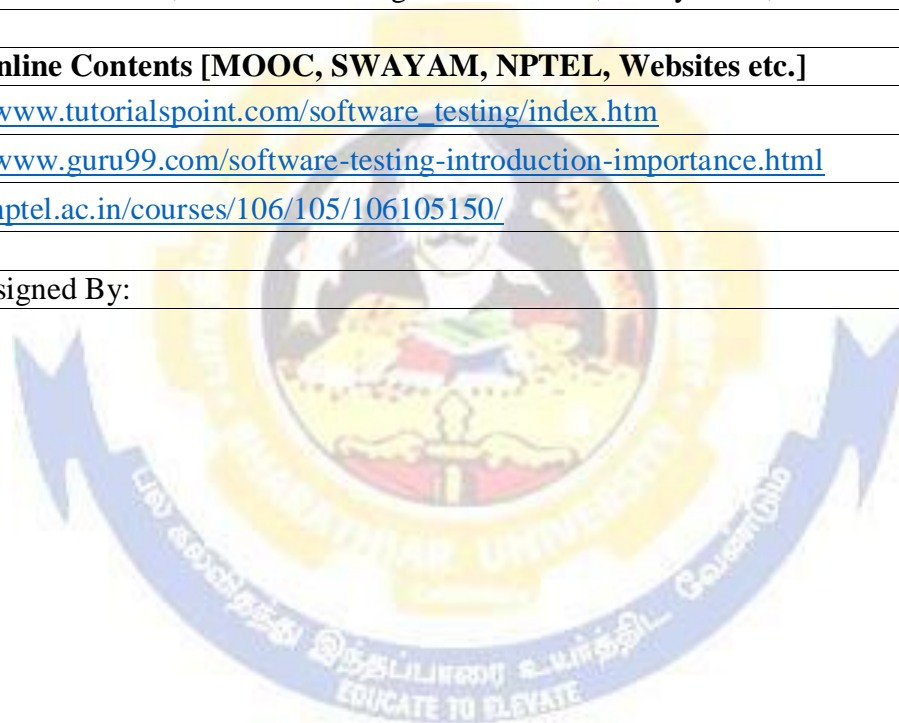
**Third
Semester**

Course code	PHP PROGRAMMING		Core IX	
Core/Elective/ Supportive	Core			
Pre-requisite	Basic programming knowledge and Internet Programming.		Syllabus Version	2020-21 Onwards
Course Objectives:				
The main objectives of this course are to:				
<ol style="list-style-type: none"> 1. Present the Introduction to PHP, PHP functions, database handling and in addition AJAX is taught. 2. Enable the students to learn the fundamentals of Open Source software and get experience in PHP and AJAX. 3. Acquire skills to write PHP programs. 				
Expected Course Outcomes:				
On the successful completion of the course, student will be able to:				
1	Understand the concepts of open source softwares			
2	Understand the functions and browser handling power of PHP			
3	Apply object oriented concepts and file handling concepts of PHP			
4	Evaluate database and set sessions, cookies and FTP			
5	Develop web pages using PHP			
Unit:1				
OPEN SOURCE SOFTWARE				
<p>Open Source Softwares: Overview of Free/ Open Source Software: The Open Source Definition - Examples of OSD Compliant Licenses - Examples of Open Source Software Product – The Open Source Software Development Process – A History of Open Source software: The Berkeley Software Distribution – The Free Software Foundation – Linux – Apache – Mozilla – Open Source Software.</p> <p>PHP: Introduction – Essential PHP – Operators and Flow control: Working with math, assignment, increment and decrement, string, bitwise, execution, comparison and logical operators, Working with loops – Strings and Arrays.</p>				
Unit:2				
FUNCTIONS AND WEB PAGES				
<p>PHP Functions and Browser handling power: Creating Functions, passing functions, passing arrays, pass by reference, default arguments, returning data, arrays, lists, references, accessing global data, working with static variables, PHP conditional functions, variable functions, nesting functions – Reading data in web pages: Handling text fields, areas, check boxes, radio buttons, list boxes, password controls, hidden controls, image maps, file uploads, buttons – PHP Browser handling power.</p>				

Unit:3	OOPS AND FILES	
<p>Working with Object oriented programming and File handling: Object oriented programming: creating classes, objects, setting access to properties and methods, using constructors and destructors, inheritance, overriding and overloading methods, auto loading classes – File Handling: open, read, close, parsing files, copy, delete, write and append files.</p>		
Unit:4	DATABASE, SESSION AND COOKIES	
<p>Working with databases and setting sessions, cookies and FTP: Databases: creating, accessing, updating, inserting, deleting and sorting databases – Setting sessions, cookies and FTP: setting, reading, and deleting cookies, working, downloading, uploading, deleting, creating and removing directories with FTP.</p>		
Unit:5	AJAX	
<p>AJAX and Drawing Images on the server: Ajax: Handling AJAX requests, downloading images using AJAX, downloading javascript with AJAX– Drawing images on the server: creating and displaying images, drawing lines, rectangles, ellipse, arcs, polygons, figures, individual pixels, text, virtual text, working with image files, tiling images, copying images.</p>		
Text Books		
1	Joseph Feller, Brian Fitzgerald, Eric S. Raymond, “Understanding Open Source Software Development”, Addison-Wesley Professional, 1st Edition, 2001.	
2	“The Complete Reference PHP Covers PHP 5.2, “Steven Holzner, Tata McGraw-Hill Edition 2008.	
Reference Books		
1	PHP6 and MySQL6 Bible – Steve Svehring.	
2	PHP Programming Solutions – VickramViswani.	
Related Online Contents [MOOC, SWAYAM, NPTEL, Websites etc.]		
1	https://www.tutorialspoint.com/php/index.htm	
2	https://www.javatpoint.com/php-tutorial	
3	http://www.nptelvideos.com/video.php?id=2138&c=27	
Course Designed By:		

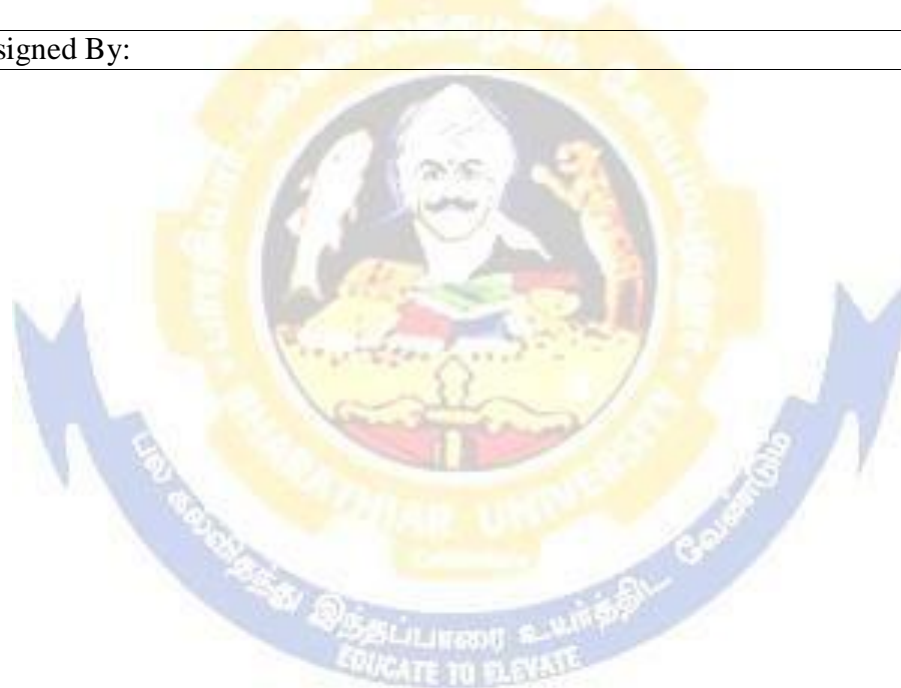
Course code		SOFTWARE TESTING	Core X	
Core/Elective/ Supportive		Core		
Pre-requisite		Basics of software testing .	Syllabus Version	2020-21 Onwards
Course Objectives:				
The main objectives of this course are to:				
<ol style="list-style-type: none"> 1. Provides principles of Software Testing and tools. 2. Enable the students to learn about the principle and tools of Software testing. 3. Improve knowledge in software testing tools. 				
Expected Course Outcomes:				
On the successful completion of the course, student will be able to:				
1	Understand the fundamentals of software testing			
2	Gain software testing experience by applying software testing knowledge and methods to practice-oriented software testing projects			
3	Analyze path testing concept			
4	Analyze state testing concept			
5	Execute programs and test data in Client-Server Architecture			
Unit:1				
SOFTWARE TESTING				
Purpose of Software testing – Some Dichotomies – a model for testing – Playing pool and consulting oracles – Is complete testing possible – The Consequence of bugs – Taxonomy of Bugs.				
Unit:2				
TESTING FUNDAMENTALS				
Software testing Fundamentals – Test case Design – Introduction of Black Box Testing and White Box testing – Flow Graphs and Path testing – Path testing Basics - Predicates, Path Predicates and Achievable Paths - Path Sensitizing – Path Instrumentation – Implementation and Application of Path Testing.				
Unit:3				
TRANSACTION FLOW				
Transaction Flow testing – Transaction Flows – techniques – Implementation Comments – Data Flow Testing – Basics – Strategies – Applications, Tools and effectiveness – Syntax Testing – Why, What, How – Grammar for formats – Implementation – Tips.				
Unit:4				
LOGIC TESTING				
Logic Based Testing – Motivational Overview – Decision tables – Path Expressions – KV Charts – Specifications – States, State Graphs and transition Testing – State Graphs – Good & bad states – state testing Metrics and Complexity.				

Unit:5	TESTING TYPES
Testing GUIs – Testing Client – Server Architecture – Testing for Real-time System – A Strategic Approach to Software testing – issues – unit testing – Integration Testing – Validation testing – System testing – The art of Debugging.	
Text Books	
1	Boris Beizer, Software testing techniques, DreamTech Press, Second Edition – 2003.
2	Myers and Glenford.J., The Art of Software Testing, John-Wiley & Sons,1979.
Reference Books	
1	Roger.S.Pressman, Software Engineering – A Practitioner’s Approach,McGraw Hill, 5th edition, 2001.
2	Marnie.L. Hutcheson, Software Testing Fundamentals, Wiley-India,2007.
Related Online Contents [MOOC, SWAYAM, NPTEL, Websites etc.]	
1	https://www.tutorialspoint.com/software_testing/index.htm
2	https://www.guru99.com/software-testing-introduction-importance.html
3	https://nptel.ac.in/courses/106/105/106105150/
Course Designed By:	



Course code	NETWORK SECURITY AND CRYPTOGRAPHY		Core XI	
Core/Elective/ Supportive	Core			
Pre-requisite	Basics of Networks and its Security		Syllabus Version	2020-21 Onwards
Course Objectives:				
The main objectives of this course are to:				
<ol style="list-style-type: none"> 1. Deal with principles of encryption algorithms, and conventional and public key cryptography. 2. Enable to know the levels of network security and security tools. 				
Expected Course Outcomes:				
On the successful completion of the course, student will be able to:				
1	Remember the basic knowledge on security models			
2	Understand the concept of AES and DES cipher			
3	Apply on encryption function			
4	Analyze about public key cryptography and RSA			
5	Analyze on authentication functions in security			
Unit:1				
INTRODUCTION				
Service mechanism and attacks – The OSI security architecture – A model for network security – symmetric Cipher model – Substitution techniques – transposition techniques – simplified des – block chipper principles – the strength of des – blockcipher design principles and modes of operation.				
Unit:2				
ENCRYPTION				
Triple des-blow fish – RCS Advanced Symmetric Block Ciphers –RC4 stream Cipher confidentially using symmetric encryption – introduction to number theory – public – key cryptography and RSA.				
Unit:3				
KEY MANAGEMENT				
Key management – Diffie Hellman key exchange – message authentication and hash function – hash algorithm – digital signature and authentication protocols – digital signature standard.				
Unit:4				
SECURITY				
Authentication application – pretty good privacy – S/MIME – IP security – web security considerations –secure socket layer transport layer security –secure electronic transaction.				
Unit:5				
INTRUDERS AND VIRUS				
Intruders –intrusion detection – password management –viruses and related threats – virus				

countermeasures – fire wall design principles – trusted systems	
Text Books	
1	William Stallings, “Cryptography and Network Security Principles and Practices”. Fourth Edition, PHI.
2	Atul Kahate, “Cryptography and Network Security”, Second Edition, TMH.
Reference Books	
1	Behrouz A.Forouzan, “Cryptography and Network Security”, TMH.
Related Online Contents [MOOC, SWAYAM, NPTEL, Websites etc.]	
1	https://nptel.ac.in/courses/106/105/106105031/
2	http://www.nptelvideos.in/2012/11/cryptography-and-network-security.html
3	https://www.tutorialspoint.com/cryptography/index.htm
Course Designed By:	



Course code		CLOUD COMPUTING	Core XII	
Core/Elective/ Supportive		Core		
Pre-requisite		Basics of cloud and its applications	Syllabus Version	2020-21 Onwards
Course Objectives:				
The main objectives of this course are to:				
<ol style="list-style-type: none"> 1. Understand the cloud computing architectures, applications and challenges. 2. Know how the data is stored in the cloud and the various services offered by the cloud. 3. Develop the skills in Web Application Development using cloud technologies. 				
Expected Course Outcomes:				
On the successful completion of the course, student will be able to:				
1		Understand the basic knowledge on virtualization		
2		Understand the concept of cloud computing services and its business value		
3		Analyze various web based applications for collaborating everyone in cloud computing		
4		Assess various industrial platforms for the developments		
5		Analyze on cloud mobility and governance		
Unit:1				
INTRODUCTION				
Introduction – Essentials – Benefits – Why cloud – Business and IT perspective – cloud and virtualization – cloud service requirements – dynamic cloud infrastructure – cloud computing characteristics – cloud adoption – cloud rudiments. Cloud deployment models: introduction – cloud characteristics – measured service accounting – cloud deployment models – security in a public cloud – public versus private clouds – cloud infrastructure self-service.				
Unit:2				
SERVICES				
Cloud as a service: introduction – gamut of cloud solutions – principal technologies- cloud strategy – cloud design and implementation using SOA – conceptual cloud model – cloud service defined. Cloud solutions: introduction – cloud ecosystem – cloud business process management – cloud service management – on premise cloud orchestration and provisioning engine – computing on demand.				
Unit:3				
VIRTUALIZATION				
Cloud offerings: Introduction – introduction storage, retrieval archive and protection-cloud analytics – testing under cloud – information security – virtual desktop infrastructure-storage cloud. Cloud Management: Introduction – resiliency – provisioning – asset management-cloud governance – high availability and disaster recovery – charging models – usage reporting, and metering. Cloud Virtualization Technology: Introduction – virtualization demand – virtualization benefits – server virtualization – virtualization for x86 architecture – hypervisor management				

software – virtual infrastructure requirements.	
Unit:4	CLOUD INFRASTRUCTURE
Cloud Infrastructure: Introduction – storage virtualization – storage area networks-network-attached storage – cloud server virtualization – networking essential to the cloud. Cloud and SOA: Introduction – SOA Journey to Infrastructure – SOA and the cloud – SOA Defined – SOA and infrastructure as a service – SOA based cloud infrastructure steps – SOA Business and IT services.	
Unit:5	CLOUD MOBILITY
Cloud Mobility: Introduction – the business problem – mobile enterprise application platforms – mobile application architecture overview. Cloud Governance: Introduction – service level agreement and compliance – data privacy and protection risks – enterprise governance – risk management – third party management – information management.	
Text Books	
1	Dr. Kumar Saurabh “Cloud Computing-Unleashing Next Gen Infrastructure to Application”, 3rd Edition, Wiley India Pvt Ltd, 2014.
2	RajkumarBuyya, James Broberg, AndrzejGoscinski , “Cloud computing principles and paradigms”, Wiley India, 2014.
Reference Books	
1	Michael Miller, “Cloud computing web based application that change the way you work & collaborate online”, Pearson Education, 2013.
2	Kris Jamsa, “Cloud Computing: SaaS, PaaS, IaaS, Virtualization, Business”
Related Online Contents [MOOC, SWAYAM, NPTEL, Websites etc.]	
1	https://nptel.ac.in/courses/106/105/106105167/
2	https://www.tutorialspoint.com/cloud_computing/index.htm
3	https://www.javatpoint.com/cloud-computing-tutorial
Course Designed By:	

Course code		PRACTICAL VI : PHP PROGRAMMING LAB	Practical VI	
Core/Elective/ Supportive		Practical		
Pre-requisite		Basic knowledge on HTML, MySQL, CSS and Java Script.	Syllabus Version	2020-21 Onwards
Course Objectives:				
The main objectives of this course are to:				
<ul style="list-style-type: none"> ● Understand the features like basic functions and features in PHP. ● Be able to know the implementation of File handling, OOPs concepts, cookies in PHP ● Able to write PHP programs for File manipulation ● Able to write a Data base application in PHP 				
Expected Course Outcomes:				
On the successful completion of the course, student will be able to:				
1	Understand to write programs in PHP for OOPS concepts			
2	Capable of developing interactive web applications using PHP			
3	Able to write PHP programs for File handling			
4	Must be able develop data base applications using PHP			
LIST OF PROGRAMS			75 hours	
<ol style="list-style-type: none"> 1. Write a PHP Program for Stringhandling. 2. Write a PHP Program for associative array. 3. Write a PHP Program to use various Functions of PHP. 4. Write a PHP Program to read form data. 5. Write a PHP Program to implement Overloading and overriding. 6. Write a PHP Program to implement Inheritance. 7. Write a PHP Program for File handling. 8. Develop PHP Program to Create a Database and to Insert , Delete and List the records. 9. Write a PHP Program to implement cookies. 10. Write a PHP Program for Drawing images on a webpage. 				

Total Practical hours		75 hours
Text Books		
1	Joseph Feller, Brain Fitzgerald, Eric S. Raymond, “Understanding Open Source Software Development”, Addison-Wesley Professional, 1st Edition, 2001.	
2	“The Complete Reference PHP Covers PHP 5.2, “Steven Holzner, Tata McGraw-Hill Edition 2008.	
Reference Books		
1	PHP6 and MySQL6 Bible – Steve Svehring.	
2	PHP Programming Solutions – VickramViswani.	
Related Online Contents [MOOC, SWAYAM, NPTEL, Websites etc.]		
1	https://www.tutorialspoint.com/php/index.htm	
2	https://www.javatpoint.com/php-tutorial	
3	http://www.nptelvideos.com/video.php?id=2138&c=27	
Course Designed By:		



Course code		PRACTICAL VII : SOFTWARE TESTING LAB	Practical VII	
Core/Elective/Supportive		Practical		
Pre-requisite		Basics of various software testing and testing tools	Syllabus Version	2020-21 Onwards
Course Objectives:				
The main objectives of this course are to:				
<ol style="list-style-type: none"> 1. This course focuses on the Testing phase of SDLC 2. This course enables the students to learn about Software Testing & its Types 3. It also enable the students to write Test Cases, about different testing tools and its applications 4. It gives a clear picture about the role of Testing phase & its importance in SDLC. 				
Expected Course Outcomes:				
On the successful completion of the course, student will be able to:				
1	Understand the concepts of Software Testing, & its tools			
2	Able to understand different testing phases & to execute it			
3	Must be able to evaluate the results with respect to the specifications			
4	Application of different tools, according to the testing process.			
LIST OF PROGRAMS			75 hours	
Various S/W Testing Can Be Done Related To the Methods Given Below Using Any of the S/W Testing Tools				
<ol style="list-style-type: none"> 1. Design Phase testing 2. Program Phase Testing. 3. Debugging 4. Evaluation of test results 5. Installation phase testing & Acceptance testing 				
Total Practical hours			75 hours	
Text Books				
1	Boris Beizer, Software testing techniques, DreamTech Press, Second Edition – 2003.			
2	Myers and Glenford.J., The Art of Software Testing, John-Wiley & Sons,1979.			
Reference Books				
1	Roger.S.Pressman, Software Engineering – A Practitioner’s Approach,McGraw Hill, 5th edition, 2001.			

2	Marnie.L. Hutcheson, Software Testing Fundamentals, Wiley-India,2007.
Related Online Contents [MOOC, SWAYAM, NPTEL, Websites etc.]	
1	https://www.tutorialspoint.com/software_testing/index.htm
2	https://www.guru99.com/software-testing-introduction-importance.html
3	https://nptel.ac.in/courses/106/105/106105150/
Course Designed By:	



PRACTICAL VIII- MINI PROJECT (GUIDELINES FOR MINI PROJECT)

- The aim of the Mini Project is to lay a foundation for the Main Project.
- Each student should carry out individually one Mini Project Work and it may be a case study using the software packages that they have learnt or may be an implementation of a concept in a paper prescribed on a journal.
- It should be compulsorily done in the college only under the supervision of the staff concerned.
- University Exam will be conducted as like a practical exam with one Internal and one External Examiner, which carries 50 marks for project evaluation and 25 marks for viva examination. Remuneration for the examiners is equivalent as that of practical examination.





Course code	ARTIFICIAL INTELLIGENCE AND EXPERT SYSTEMS		Elective - I	
Core/Elective/Supportive	Elective - I		Elective - I	
Pre-requisite	Basics of Artificial Intelligence and its applications		Syllabus Version	2020-21 Onwards
Course Objectives:				
The main objectives of this course are to:				
<ol style="list-style-type: none"> 1. Enrich the knowledge about the concepts of Artificial Intelligence. 2. Know the concepts of AI problems and techniques. 3. Learn about Structures & Expert System. 				
Expected Course Outcomes:				
On the successful completion of the course, student will be able to:				
1	Demonstrate AI problems and techniques			
2	Know the various searching techniques, constraint satisfaction problems and example problems			
3	Apply and analyze basic principles of AI in solutions that require problem solving, inference, perception, knowledge representation, and learning			
4	Analyze knowledge Structures & Expert System			
5	Analyze and design a real world problem for implementation and understand the dynamic behavior of a system			
Unit:1				
INTRODUCTION				
Introduction: AI Problems – AI techniques – Criteria for success. Problems, Problem Spaces, Search: State space search – Production Systems – Problem Characteristics – Issues in design of Search.				
Unit:2				
SEARCH TECHNIQUES				
Heuristic Search Techniques: Generate and Test – Hill Climbing – Best-First, Problem Reduction, Constraint Satisfaction, Means-end analysis. Knowledge representation issues: Representations and mappings – Approaches to Knowledge representations – Issues in Knowledge representations – Frame Problem.				
Unit:3				
PREDICATE LOGIC				
Using Predicate Logic: Representing simple facts in logic – Representing Instance and Isa relationships – Computable functions and predicates – Resolution – Natural deduction. Representing knowledge using rules: Procedural Vs Declarative knowledge – Logic programming – Forward Vs Backward reasoning – Matching – Control knowledge.				
Unit:4				
REASONING				

Statistical Reasoning: Probability and Bayes Theorem- Certainty Factors and Rule- Based systems Bayesian Networks - Dempster - Shafer Theory-Fuzzy logic . Knowledge representation: Syntactic - Semantic Spectrum of Representation-Logic and Slot-and Filter Structures - Other Representational Techniques – Planning – Understanding.	
Unit:5	EXPERT SYSTEM
Learning – Common sense – Perception and Action – Expert System.	
Text Books	
1	Elaine Rich and Kevin Knight," Artificial Intelligence", Tata McGraw Hill Publishers company Pvt. Ltd, Second Edition, 1991.
Reference Books	
1	George F Luger, "Artificial Intelligence", 4th Edition, Pearson Education Publ., 2002.
Related Online Contents [MOOC, SWAYAM, NPTEL, Websites etc.]	
1	https://www.javatpoint.com/artificial-intelligence-tutorial
2	https://www.tutorialspoint.com/artificial_intelligence/artificial_intelligence_expert_systems.htm
3	https://nptel.ac.in/courses/106/105/106105077/
Course Designed By:	

Course code		INTERNET OF THINGS	Elective - II	
Core/Elective/Supportive		Elective - II		
Pre-requisite	Basics of Sensors and its applications	Syllabus Version	2020-21 Onwards	
Course Objectives:				
The main objectives of this course are to:				
<ol style="list-style-type: none"> 1. About Internet of Things where various communicating entities are controlled and managed for decision making in the application domain. 2. Enable students to learn the Architecture of IoT and IoT Technologies 3. Developing IoT applications and Security in IoT, Basic Electronics for IoT, Arduino IDE, Sensors and Actuators Programming NODEMCU using Arduino IDE. 				
Expected Course Outcomes:				
On the successful completion of the course, student will be able to:				
1	Understand about IoT, its Architecture and its Applications			
2	Understand basic electronics used in IoT & its role			
3	Develop applications with C using Arduino IDE			
4	Analyze about sensors and actuators			
5	Design IoT in real time applications using today's internet & wireless technologies			
Unit:1				
INTRODUCTION				
Introduction to IoT: Evolution of IoT – Definition & Characteristics of IoT - Architecture of IoT – Technologies for IoT – Developing IoT Applications – Applications of IoT – Industrial IoT – Security in IoT				
Unit:2				
BASIC ELECTRONICS FOR IoT				
Basic Electronics for IoT: Electric Charge, Resistance, Current and Voltage – Binary Calculations – Logic Chips – Microcontrollers – Multipurpose Computers – Electronic Signals – A/D and D/A Conversion – Pulse Width Modulation.				
Unit:3				
ARDUINO				
Programming Fundamentals with C using Arduino IDE: Installing and Setting up the Arduino IDE – Basic Syntax – Data Types/ Variables/ Constant – Operators – Conditional Statements and Loops – Using Arduino C Library Functions for Serial, delay and other invoking Functions – Strings and Mathematics Library Functions.				
Unit:4				
SENSORS AND ACTUATORS				
Sensors and Actuators: Analog and Digital Sensors – Interfacing temperature sensor, ultrasound sensor and infrared (IR) sensor with Arduino – Interfacing LED and Buzzer with Arduino.				

Unit:5	SENSOR IN INTERNET
Sending Sensor Data Over Internet: Introduction to ESP8266 NODEMCU WiFi Module – Programming NODEMCU using Arduino IDE – Using WiFi and NODEMCU to transmit data from temperature sensor to Open Source IoT cloud platform (ThingSpeak).	
Text Books	
1	ArshdeepBahga, Vijay Madiseti, “Internet of Things: A Hands-On Approach”, 2014. ISBN: 978-0996025515
2	Boris Adryan, DominikObermaier, Paul Fremantle, “The Technical Foundations of IoT”, Artech Houser Publishers, 2017.
Reference Books	
1	Michael Margolis, “Arduino Cookbook”, O“Reilly, 2011
2	Marco Schwartz, “Internet of Things with ESP8266”, Packt Publishing, 2016.
3	DhivyaBala, “ESP8266: Step by Step Tutorial for ESP8266 IoT, Arduino NODEMCU Dev. Kit”, 2018.
Related Online Contents [MOOC, SWAYAM, NPTEL, Websites etc.]	
1	https://onlinecourses.nptel.ac.in/noc20_cs66/preview
2	https://www.javatpoint.com/iot-internet-of-things
3	https://www.tutorialspoint.com/internet_of_things/index.htm
Course Designed By:	

Course code		DIGITAL IMAGE PROCESSING		
Core/Elective/ Supportive		Elective - III	Elective - III	
Pre-requisite		Basics of Image Processing and applications	Syllabus Version	2020-21 Onwards
Course Objectives:				
The main objectives of this course are to:				
<ol style="list-style-type: none"> 1. Learn basic image processing techniques for solving real problems. 2. Gain knowledge in image transformation and Image enhancement techniques. 3. Learn Image compression and Segmentation procedures. 				
Expected Course Outcomes:				
On the successful completion of the course, student will be able to:				
1	Understand the fundamentals of Digital Image Processing			
2	Understand the mathematical foundations for digital image representation, image acquisition, image transformation, and image enhancement			
3	Apply, Design and Implement and get solutions for digital image processing problems			
4	Apply the concepts of filtering and segmentation for digital image retrieval			
5	Explore the concepts of Multi-resolution process and recognize the objects in an efficient manner			
Unit:1				
INTRODUCTION				
Introduction: What is Digital image processing – the origin of DIP – Examples of fields that use DIP – Fundamentals steps in DIP – Components of an image processing system. Digital Image Fundamentals: Elements of Visual perception – Light and the electromagnetic spectrum – Image sensing and acquisition – Image sampling and Quantization – Some Basic relationship between Pixels – Linear & Nonlinear operations.				
Unit:2				
IMAGE ENHANCEMENT				
Image Enhancement in the spatial domain:- Background – some basic Gray level Transformations – Histogram Processing – Enhancement using Arithmetic / Logic operations – Basics of spatial filtering – Smoothing spatial filters – Sharpening spatial filters – Combining spatial enhancement methods.				
Unit:3				
IMAGE RESTORATION				
Image Restoration: A model of the Image Degradation / Restoration Process – Noise models – Restoration is the process of noise only – Spatial Filtering – Periodic Noise reduction by frequency domain filtering – Linear, Portion – Invariant Degradations – Estimating the degradation function – Inverse filtering – Minimum mean square Error Filtering – Constrained least squares filtering – Geometric mean filter – Geometric Transformations.				

Unit:4	IMAGE COMPRESSION
Image Compression: Fundamentals – Image compression models – Elements of Information Theory – Error Free compression – Lossy compression – Image compression standards.	
Unit:5	IMAGE SEGMENTATION
Image Segmentation: Detection and Discontinuities – Edge Linking and Boundary deduction – Thresholding – Region-Based segmentation – Segmentation by Morphological watersheds – The use of motion in segmentation.	
Text Books	
1	Rafael C. Gonzalez, Richard E. Woods, “Digital Image Processing”, Second Edition, PHI/Pearson Education.
2	B. Chanda, D. Dutta Majumder, “Digital Image Processing and Analysis”, PHI, 2003.
Reference Books	
1	Nick Efford, “Digital Image Processing a practical introducing using Java”, Pearson Education, 2004.
Related Online Contents [MOOC, SWAYAM, NPTEL, Websites etc.]	
1	https://nptel.ac.in/courses/117/105/117105135/
2	https://www.tutorialspoint.com/dip/index.htm
3	https://www.javatpoint.com/digital-image-processing-tutorial
Course Designed By:	