SEMESTER II			
Core IX – Digital Image Processing			
Code: 19PCCC21	**Hrs/Week: 5**	**Hrs/Sem: 75**	**Credits: 4**

Vision

To interpret images mathematically and process them for the extraction of data using matlab

Mission

To equip the students with the knowledge of fundamental concepts and techniques in basic digital image processing and their applications to solve real life problems.

Course Outcome:

CO. No.	Upon completion of this course, students will be able to	PSO addressed	CL
CO-1	calculate the Fourier transforms of standard functions both from the definition and by using tables.	2	Ap
CO-2	design and implement the different transforms like Fourier transform and Z transform.	2	Cr
CO-3	write given function in terms of sine and cosine in Fourier series and also to get knowledge in Fourier Transforms.	2	Re
CO-4	solve finite difference equations using Z- transform using MATLAB	1	Ap
CO-5	review the fundamental concepts of a digital image processing system.	3	Re
CO-6	analyze images in the frequency domain using various transforms.	2	Re
CO-7	interpret Image compression, segmentation and representation standards	3,4	An
CO-8	understand image filtering for use in various applications	1	Un

SEMESTER II			
Core IX – Digital Image Processing			
Code: 19PCCC21	**Hrs/Week: 5**	**Hrs/Sem: 75**	**Credits: 4**

Unit I- Introduction

Introduction – steps in image processing, Image acquisition, representation, sampling and quantization, relationship between pixels. – color models – basics of color image processing.

Unit II - Image Enhancement

Image enhancement in spatial domain – some basic gray level transformations – histogram processing – enhancement using arithmetic , logic operations – basics of spatial filtering and smoothing.

Unit III - Image Enhancement

Image enhancement in Frequency domain – Introduction to Fourier transform: 1- D, 2 –D DFT and its inverse transform, smoothing and sharpening filters.

Unit IV - Image Restoration

Image restoration: Model of degradation and restoration process – noise models – restoration in the presence of noise- periodic noise reduction.. Image segmentation: Thresholding and region based segmentation.

Unit V - Image Compression

Image compression: Fundamentals – models – information theory – error free compression – Lossy compression: predictive and transform coding. JPEG standard.

Text Book:

1. R.C. Gonzalez, R.E.Woods, 2002, Digital Image processing, 2nd Edition, Pearson Education.

Books for Reference:

1. T.Veerarajan : Transforms and Partial Differential Equations (Updated Edition) .
2. Rafael C. Gonzalez, Richard E. Woods: Digital Image Processing, Pearsons Education, third edition.
3. RajkumarBansal , Ashok Kumar Goel , Manoj Kumar Sharma : MATLAB and its Applications in Engineering, Pearsons Publications.

SEMESTER – I			
Core II - J2EE			
Code : 19PCSC12	**Hrs / Week : 5**	**Hrs / Sem : 75**	**Credits : 4**

Vision: To acquire knowledge on the usage of recent platforms in developing web applications

Mission:

- Enhancing the students skills to design and develop interactive, client-side, server-side executable web applications.
- Able to apply the skill learnt for projects.

Course Outcome:

CO. No.	Upon completion of this course, students will be able to	PSO addressed	CL
CO-1	identifying a high-level overview of the J2EE architecture	2	Re
CO-2	identify the services and components which comprise the J2EE specification	2	Re
CO-3	explain how J2EE technology applications are packaged	1,2	Un
CO-4	illustrate Web application development using Web Components Servlet and JSP	1,5,8	Un
CO-5	summarize the features of Servlet and frameworks used in web applications development	5	Un
CO-6	understand design applications using Straut and Hibernate and Spring	1,6	Un
CO-7	finding new applications from existing beans in Enterprise beans.	1,8	An
CO-8	summarizing the types of Enterprise beans	2	Un
CO-9	recognizing the Hibernate framework in the development of Java application.	1,5	Re

SEMESTER – I			
Core II - J2EE			
Code : 19PCSC12	**Hrs / Week : 5**	**Hrs / Sem : 75**	**Credits : 4**

Unit I

J2EE introduction – J2EE Architecture (J2EE Tiers , Containers , Roles) –J2EE Servers and services –Services of EJB Container – J2EE Technology – Packaging – Web services – Advantages of J2EE Applications

Unit II

Enterprise Bean introduction – Benefits of Enterprise Beans - Types of Enterprise Beans – Session Bean – Entity Bean – Message-Driven Bean – The Contents of a Enterprise Bean – The Life Cycles of Enterprise Beans.

Unit III

Servlet - Servlet Lifecycle - Servlet API -Object model of Servlet framework - Understanding web.xml, servlet tags and directory structure of web application - GenericServlet and HttpServlet, ServletConfig & ServletContext - Handling Form data with get and post request - Initializing a servlet - Request Dispatcher, Redirecting Request - Session Management -Filters in servlet -programs in servlet to read all parameters from form, database handling program, reading cookies values. JSP - What is JSP page? Compare it with servlet - Lifecycle of JSP page - JSP syntax using Directive, Declaration , Expression , Scriplet, Comment - Using javabean and Action Tag in JSP - JSP implicit objects - Using JSP standard tag library (JSTL) - Session management - Exception handling - Custom tag - Transferring Control to Another Web Component - Using JDBC in JSP -Programs in JSP -Integrating JSP with JQuery, Bootstrap, Angular JS, JSON.

Unit IV

Basic of Struts2 - Understanding MVC architecture - Struts2 framework - Understanding default-stack - comparing struts with other framework - Working with Struts2 Actions - Introducing Struts 2 actions - Packaging your actions - Implementing actions Adding workflow with interceptors - Why intercept requests? - Interceptors in action - Surveying the built-in Struts 2 interceptors - Declaring interceptors - Building your own interceptor Data transfer: OGNL and type conversion - Data transfer and type conversion: common tasks of the web application domain - OGNL and Struts 2 - Built-in type converters - Customizing type conversion Validation framework - RequiredFieldValidator Class - RequiredStringValidator Class - ExpressionValidator Class - Email Validator Class - RegexFieldValidator Class - DateRangeFieldValidator Class Struts

Unit V

Hibernate - Introduction to Hibernate - Understanding ORM (Object Relational Mapping) - Understanding Transient, Persistent and Detached Object states - Issues while writing manual JDBC code - Hibernate and JPA (Java Persistence API) - Writing persistence classes -Steps to work with Hibernate - Handling CRUD operations in Hibernate - Mapping Inheritance between classes with tables in database -HQL -One to One and One to One mapping in Hibernate- Core Spring -Springing into action -Wiring beans. -Advanced wiring. -Aspect oriented Spring - Spring in Web and Backend -Building spring web application -JDBC with spring / Hibernate with spring.

Text Book:

1. Elliotte Rusty Harold, " Java Network Programming", O'Reilly publishers, 2000

Books for Reference:

1. Ed Roman, "Mastering Enterprise Java Beans", John Wiley & Sons Inc., 1999.
2. Hortsmann & Cornell, "CORE JAVA 2 ADVANCED FEATURES, VOL II", Pearson Education, 2002.
3. Patrick Naughton, "COMPLETE REFERENCE: JAVA2", Tata McGraw-Hill, 2003.
4. Struts 2 in Action , Manning publication , Donald Brown, Chad Michael Davis, and Scott Stanlick Spring in Action , Craig Walls , Manning Dreamtech press
5. Pure JSP by James Goodwill Techmedia SAMS publication
6. Hibernate in Action Manning publication , Christian Bauer and Gavin King Java Servlet Programming O'Reilly Publication-Author: Jason Hunter.
7. Struts 2 Black Book James Holmes "Struts: The Complete Reference, " 2nd Edition 2007 McGraw Hill Professional
8. Patrick Peak And Nick Heudecker, Patrick Peak, Nick Heudecker Hibernate Quickly, " 2007 Dreamtech
9. Subrahmanyam Allamaraju and Cedric Buest , "Professional Java Server Programming (J2EE 1.3 Edition), ", Shroff Publishers & Distributors Pvt Ltd.

SEMESTER –I			
Core V- Neural Networks			
Code:19PCSC15	**Hrs/week:4**	**Hrs/Sem: 60**	**Credits: 4**

Vision:

To make the students understand neural networks and thereby relate to artificial intelligence and machine learning

Mission:

- Learn about network models
- Understand fault diagnosis in neural nets

Course Outcome:

CO No.	Upon completion of this course, students will be able to	PSO addressed	CL
CO-1	understand basic architecture of neural networks	1	Un
CO-2	understand basic learning algorithms	3	Un
CO-3	understand the classification taxonomy of NN	4	Un
CO-4	compare and analyse the training algorithms	4	An
CO-5	apply NN models to find solutions	4,6	Ap
CO-6	analyse the use of Associative memory	1	An
CO-7	learn to diagnose the cause and rectification of faults	4	Re
CO-8	compare different network models	4	An

SEMESTER –I			
Core V- Neural Networks			
Code:19PCSC15	**Hrs/week:4**	**Hrs/Sem: 60**	**Credits: 4**

Unit I: Introduction to Neural Networks

Introduction, Humans and Computers, Organization of the Brain, Biological Neuron, Biological and Artificial Neuron Models, Characteristics of ANN, McCulloch-Pitts Model, Historical Developments, Potential Applications of ANN.

Unit II: Essentials of Artificial Neural Networks

Artificial Neuron Model, Operations of Artificial Neuron, Types of Neuron Activation Function, ANN Architectures, Classification Taxonomy of ANN – Connectivity, Learning Strategy (Supervised, Unsupervised, Reinforcement),Learning Rules.

Unit III: Single Layer Feed Forward Networks

Introduction, Perceptron Models: Discrete, Continuous and Multi-Category,Training Algorithms: Discrete and Continuous Perceptron Networks, Limitations of the Perceptron Model.

Unit IV: Multi- Layer Feed Forward Networks

Credit Assignment Problem, Generalized Delta Rule, Derivation of Backpropagation (BP) Training, Summary of Backpropagation Algorithm, Kolmogorov Theorem, Learning Difficulties and Improvements.

Unit V: Associative Memories

Paradigms of Associative Memory, Pattern Mathematics, Hebbian Learning, Architecture of Hopfield Network: Discrete and Continuous versions, Storage and Recall Algorithm, Stability Analysis. Neural network applications: Process identification, control, fault diagnosis.

Text Book:

1. Laurene Fausett, "Fundamentals of Neural Networks" , Pearson Education, 2004.

Books for Reference:

1. Simon Haykin, "Neural Networks- A comprehensive foundation", Pearson Education, 2003.
2. S.N.Sivanandam, S.Sumathi,S. N. Deepa "Introduction to Neural Networks using MATLAB 6.0", TATA Mc Graw Hill, 2006.
3. S. Rajasekharan and G. A. Vijayalakshmi pai, "Neural Networks, Fuzzy logic, Genetic algorithms: synthesis and applications", PHI Publication, 2004.
4. Timothy J. Ross, " Fuzzy Logic With Engineering Applications", Tata McGraw-Hill Inc. 2000

SEMESTER – II			
Core VI - Distributed Database Management System			
Code : 19PCSC21	**Hrs / Week : 4**	**Hrs / Sem : 60**	**Credits : 4**

Vision : To build the background of database systems by deepening the understanding of the theoretical and practical aspects of the database technologies, showing the need for distributed database technology to tackle deficiencies of the centralized database systems and finally introducing the concepts and techniques of distributed database including principles, architectures, design, implementation and major domain of application.

Mission :

- Identify the introductory distributed database concepts and its structures.
- Describe terms related to distributed object database design and management.
- Produce the transaction management and query processing techniques in DDBMS.
- Relate the importance and application of emerging database technology.

Course Outcome

CO. No.	Upon completion of this course, students will be able to	PSO addressed	CL
CO-1	understand what is Distributed DBMS	4	Un
CO-2	understand various architectures of DDBMS	4	Un
CO-3	apply various fragmentation techniques in a given problem	4	Ap
CO-4	understand the steps of query processing	4	Un
CO-5	finding how optimization techniques are applies to Distributed Database	4,6	An
CO-6	learn and understand various Query Optimization Algorithms	3	Un
CO-7	understand Transaction Management & Compare various approaches to concurrency control in Distributed database	6	Un
CO-8	understand various algorithms and techniques for deadlock and recovery in Distributed database	3	Un

SEMESTER – II			
Core VI - Distributed Database Management System			
Code : 19PCSC21	**Hrs / Week : 4**	**Hrs / Sem : 60**	**Credits : 4**

Unit I : Introduction

Distributed Data Processing, Distributed Database Systems, Promises of DDBSs, Complicating factors - Distributed DBMS Architecture Models- Autonomy, Distribution,
Heterogeneity DDBMS Architecture – Client/Server, Peer to peer, MDBS

Unit II: Data Distribution Alternatives:

Design Alternatives – localized data, distributed data Fragmentation – Vertical, Horizontal (primary & derived), hybrid, general guidelines, correctness rules
Distribution transparency – location, fragmentation, replication - Impact of distribution on user queries.

Unit III: Query Processing

Query Processing Problem, Layers of Query Processing Query Processing in Centralized Systems – Parsing & Translation, Optimization, Code generation, Example Query Processing in Distributed Systems – Mapping global query to local .
Optimization of Distributed Queries: Query Optimization, Centralized Query Optimization, Join Ordering Distributed Query Optimization Algorithms.

Unit IV: Distributed Transaction Management & Concurrency Control

Transaction concept, ACID property, Objectives of transaction management, Types of transactions, Objectives of Distributed Concurrency Control, Concurrency Control anomalies, Methods of concurrency control, Serializability and recoverability, Distributed Serializability, Enhanced lock based and timestamp based protocols, Multiple granularity, Multi version schemes, Optimistic Concurrency Control techniques

Unit V : Distributed Deadlock & Recovery Deadlock concept, Deadlock in Centralized systems

Deadlock in Distributed Systems – Detection, Prevention, Avoidance, Wait-Die Algorithm, Wound-Wait algorithm Recovery in DBMS - Types of Failure, Methods to control failure, Different techniques of recoverability, Write- Ahead logging Protocol, Advanced recovery techniques- Shadow Paging, Fuzzy checkpoint, ARIES, RAID levels, Two Phase and Three Phase commit protocols.

Text Book:

1. Principles of Distributed Database Systems, Ozsu, Pearson Publication

Books for Reference:

1. Rahimi & Haug, Wiley, Distributed Database Mangement Systems,
2. Chanda Ray, Distributed Database Systems, Pearson Publication
3. Sachin Deshpande, Distributed Databases, Dreamtech
4. A. Silberschatz, H.F. Korth and S. Sudharshan, 2006, Database System Concepts,5thEdition, Tata McGraw Hill, New Delhi.

SEMESTER- II			
Core VII – .Net Framework Programming			
Code: 19PCSC22	**Hrs / week :5**	**Hrs / Sem: 75**	**Credits :4**

Vision:

Create and deploy database driven applications and services

Mission:

- Learn to use controls in programming
- Learn to develop user friendly applications

Course Outcome:

CO No.	Upon completion of this course, students will be able to	PSO addressed	CL
CO-1	set up a programming environment for ASP.net programs	1	Ap
CO-2	creating ASP.Net applications using standard .net controls	1	Cr
CO-3	develop a data driven web application	1,4	Ap
CO-4	connecting to data sources and managing them	1,4	Ap
CO-5	maintain session and controls related information for user used in multi-user web applications	1	Ap
CO-6	understand the fundamentals of developing modular application by using object oriented methodologies	1,4	Re
CO-7	learn to diagnose the cause of errors and handle it	1	Ap
CO-8	create and deploy ASP.NET web applications	1,4,6,8	Cr

SEMESTER- II			
Core VII – .Net Framework Programming			
Code: 19PCSC22	**Hrs / week :5**	**Hrs / Sem: 75**	**Credits :4**

Unit I

Introduction to Visual Basic .NET : Window forms – working with controls – working with dialog boxes –MDI- Drag and drop operation – variables – Controlling Program flow.- Procedures in VB.Net-Accessing a Database.

Unit II

Introducing ASP.Net – Getting started with ASP.Net applications: Web forms – creating ASP.Net Webform applications – Using ASP.Net Webforms for server controls : Beginning with server controls – Taking a closer look at web controls – Illustrating Basic web controls – Working with Validation Controls : The compare Validator – The Range Validator – Regular Expression Validator – Custom validator –Validation Summery control – Multiple validation control.

Unit III

Developing ASP.Net Server controls : Developing ASP.Net server controls – Creating and using Web User Control – Creating ASP.Net Pages to web user control – Using Rich Web controls: Calendar web server control.

Unit IV

Debugging ASP.Net Web Applications: Tracing ASP.Net Applications – Handling Errors in ASP.Net applications – Using ADO.Net with ASP.Net: ADO.Net – ADO.Net Object model .

Unit V

Welcome to C# - Working with variables, Operators and Expressions – Writing methods applying scope – using decision statements-Using Iteration Statements – Managing Errors and Exceptions – Creating and Managing Classes – Using Arrays and Collections

Text Book:

1. Mridula Parihar, Yesh Sinhal and Nitin Pandey, “Visual Studio .Net Programming”, PHI, 2002.

Books for Reference:

1. John Sharp, Jon Jagger, “Microsoft Visual C# .Net Step by Step”, PHI, 2005.
2. Nitin Pandey, “Microsoft Asp.NET”, PHI, 2002.
3. “ASP.NET Made Simple” BPB Publictaions, First Edition, 2001.
4. Kiric Allen Evans, Ashwin Kamanna, Joel and Muller, “XML and ASP.NET”, Pearson Education, First Indian Reprint, 2002.
5. Andrew Trolsen, “C# and the .NET Platform”, APress, Second Print, 2006.

SEMESTER- II			
Core X – Advanced Computer Networks			
Code: 19PCSC24	**Hrs / week :4**	**Hrs / Sem: 60**	**Credits :4**

Vision

To give exemplary graduate education in information networking, information security, and mobility.

Mission

- To understand modern computer networks
- to familiarize routing algorithms
- to detect the technical problems in networking

Course Outcome:

CO.No	Upon completion of this course, students will be able to	PSO Addressed	CL
CO-1	solve technical problems in ARQ protocols, MAC protocols and Routing Algorithm.	3,7	Ap
CO-2	demonstrate the working of HUB and Switches.	7	Ap
CO-3	examine the Performance of ARQ Protocols, Ethernet LAN, Token Ring, RIP, TCP and UDP.	7	Ap
CO-4	identify the networking technologies and associated network standards.	7	An
CO-5	solve technical problems in ARQ protocols, MAC protocols and Routing Algorithm.	3,7	Ap
CO-6	construct the route discovery algorithm to determine the shortest path in an internet represented as a weighted graph.	5,7	Ap
CO-7	understand network architecture	7	`Un
CO-8	implementation of protocols like TCP, UDP and IP using OPNET and NS-2	5,7	Ap

SEMESTER- II			
Core X – Advanced Computer Networks			
Code: 19PCSC24	**Hrs / week :4**	**Hrs / Sem: 60**	**Credits :4**

Unit I

Layered Network Architecture and Network Topologies:

Introduction - Evolution of data Networks – Switching Techniques – Categories of networks - ISO/OSI Reference Model – TCP/IP Model,Network Topologies.

Unit II

Internetworking devices and Data Link Layer:

Repeaters – Hubs – Switches – Bridges: Transparent and Source Routing– Routers.Logical Link Control – Error Detection Techniques – ARQ protocols – Framing – HDLC –Point to Point protocol. Medium Access Control – Random access Protocols – Scheduling approaches to MAC.

Unit III

Local Area Networks& Wide Area Networks and Network Layer:

Ethernet- Token Bus/Ring , FDDI – Virtual LAN ,WAN Technologies – Frame Relay, ATM, Wireless LAN. Internetworking – IP Addressing – Subnetting – IPv4 and IPv6– Routing – Distance Vector and Link State Routing – Routing Protocols.

Unit IV

Transport Layer and Services:

Connection oriented and Connectionless Service – User Datagram Protocol – Transmission Control Protocol – Congestion Control – QoS parameters.

Unit V

Application Layer and Contemporary Issues:

Domain Name System – Simple Mail Transfer Protocol – File Transfer Protocol – Hypertext Transfer Protocol - World Wide Web.Contemporary Issues

Text Book:

1. Alberto Leon-Garcia, “Communication Networks” Tata McGraw-Hill 2012.

Books for Reference:

1. Robert Gallager, “Data Networks”, Prentice Hall, 2009.
2. W. Stallings, Data and Computer Communications, Prentice Hall, 2007
3. Fred Halsall, Data communications, “Computer Networks and Open systems”, Addison Wesley 2006.
4. BhushanTrivedy, Computer Networks, Oxford university press,2012.

SEMESTER – I			
Core Practical - I J2EE Lab			
Code : 19PCSCR1	**Hrs / Week : 4**	**Hrs / Sem : 60**	**Credits : 2**

1. Write a Servlet to display “Hello World” on browser.
2. Write a Servlet to display all the headers available from request.
3. Write a Servlet to display parameters available on request
4. Write a Servlet to display all the attributes available from request and context
5. Write a Servlet which displays a message and also displays how many times the message has been displayed (how many times the page has been visited).
6. Assume that the information regarding the marks for all the subjects of a student in the last exam are available in a database, Develop a Servlet which takes the enrollment number of a student as a request parameter and displays the marksheet for the student.
7. Develop a Servlet which looks for cookies for username and password, and forwards to a home.jsp in case the cookies are valid and forwards to login.jsp, in case the cookies are not found or the cookies are not valid.
8. Develop a Servlet to authenticate a user, where the loginid and password are available as request parameters. In case the authentication is successful, it should setup a new session and store the user's information in the session before forwarding to home.jsp, which displays the user's information like full name, address, etc.
9. Write a simple JSP page to display a simple message (It may be a simple html page).
10. Write a JSP page, which uses the include directive to show its header and footer.
11. Create a Java class called Product with the following properties: name, description, price. Create a listener that notifies (through System.out) whenever a user adds a product to a shopping cart (i.e. adds an object to the session object) or removes it again. Hint: check out the class HttpSessionAttributeListener. Make it print the name and price of the object (hint: access the session through the HttpBindingEvent object). Also, let the listener print the total price of all objects saved in the session so far (one way to accomplish this could be to keep a collection of all objects saved to the session – or just their keys – in the listener or an associated class).
12. Create a servlet filter that logs all access to and from servlets in an application and prints the following to System.out: a. the time the request was received b. the time the response was sent c. how much time it took to process the request d. the URL of the resource requested e. the IP address of the visitor
13. Develop a interest calculation application in which user will provide all FACULTY OF COMPUTER APPLICATIONS information in HTML form and that will be processed by servlet and response will be generated back to the user.
14. Develop an application to demonstrate how the client (browser) can remember the last time it visited a page and displays the duration of time since its last visit. (Hint: use Cookie)
15. Develop an application to keep track of one user across several servlet invocations within the same browser session.

SEMESTER- II			
Core Practical III – Data Mining Lab (R Lab)			
Code: 19PCSCR3	**Hrs / week :4**	**Hrs / Sem: 60**	**Credits :2**

Using R programming language write programs for the following concepts:

1.Vectorization

2. Control structures

3. Functions

4. Scoping Rules

5. Loop functions

6. Graphics and visualization

7. Grammar of data manipulation (dplyr and related tools)

8. Debugging/profiling

9. Statistical simulation