**Elective-I**

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| **Title of the subject** | **Code** |
| 1. **Artificial Intelligence & Neural Networks**
 | **(13CS11E1)** |  |  |
| 1. **Image Processing**
 | **(13CS11E2)** |  |  |
| 1. **Advanced Operating Systems**
 | **(13CS11E3)** |  |  |
| 1. **Adhoc & Sensor Networks**
 | **(13CS11E4)** |

**Elective- II**

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| **Title of the subject** | **Code** |
| 1. **Cloud Computing**
 | **(13CS12E1)** |
| 1. **Mobile Computing**
 | **(13CS12E2)** |
| 1. **Software Quality Assurance & Testing**
 | **(13CS12E3)** |
| 1. **Web Technologies**
 | **(13CS12E4)** |

**13CS11E1 - ARTIFICIAL INTELLIGENCE & NEURAL NETWORKS**

Hours /week : 3 Hrs Sessional Marks : 40

Credits : 3 End Examination Marks : 60

**UNIT- I**

Introduction: AI problems, foundation of AI and history of AI intelligent agents: Agents and Environments, the concept of rationality, the nature of environments, structure of agents, problem solving agents, problem formulation.

**UNIT- II**

Searching: Searching for solutions, uniformed search strategies - Breadth first search, depth first Search. Search with partial information (Heuristic search) Greedy best first search, A\* search Game Playing: Adversial search, Games, minimax algorithm, optimal decisions in multiplayer games, Alpha-Beta pruning, Evaluation functions, cutting of search.

**UNIT- III**

Knowledge Representation & Reasoning logical Agents, Knowledge - Based Agents, the Wumpus world, logic, propositional logic, Resolution patterns in propositional logic, Resolution, Forward & Backward Chaining.

Characteristics of Neural Networks, Historical Development of Neural Networks Principles, Artificial Neural Networks: Terminology, Models of Neuron, Topology

**UNIT- IV**

Basic Learning Laws, Pattern Recognition Problem, Basic Functional Units, Pattern Recognition Tasks by the Functional Units. Feedforward Neural Networks:
Introduction, Analysis of pattern Association Networks, Analysis of Pattern Classification Networks, Analysis of pattern storage Networks, Analysis of Pattern Mapping Networks.

**UNIT-V**

Feedback Neural Networks: Introduction, Analysis of Linear Autoassociative FF Networks, Analysis of Pattern Storage Networks.

Competitive Learning Neural Networks & Complex pattern Recognition: Introduction, Analysis of Pattern Clustering Networks, Analysis of Feature Mapping Networks, Associative Memory.

**Text Books :**

1. Artificial Intelligence - A Modern Approach. Second Edition, Stuart Russel, Peter Norvig, PHI/ Pearson Education.
2. Artificial Neural Networks B. Yagna Narayana, PHI

**References :** 1. Artificial Intelligence , 2nd Edition, E.Rich and K.Knight (TMH).

2. Artificial Intelligence and Expert Systems - Patterson PHI.

3. Expert Systems: Principles and Programming- Fourth Edn, Giarrantana/ Riley, Thomson.

4. PROLOG Programming for Artificial Intelligence. Ivan Bratka- Third Edition - Pearson Education.
5. Neural Networks Simon Haykin PHI
6. Artificial Intelligence, 3rd Edition, Patrick Henry Winston., Pearson Edition.

**13CS11E2 - IMAGE PROCESSING**

Hours /week : 3 Hrs Sessional Marks : 40

Credits : 3 End Examination Marks : 60

**UNIT-I**

Introduction: Examples of fields that use digital image processing, fundamental steps in digital image processing, components of image processing system. Digital Image Fundamentals: A simple image formation model, image sampling and quantization, basic relationships between pixels.

**UNIT – II**

Image enhancement in the spatial domain: Basic gray-level transformation, histogram processing, enhancement using arithmetic and logic operators, basic spatial filtering, smoothing and sharpening spatial filters, combining the spatial enhancement methods .

**UNIT – III**

Image restoration: A model of the image degradation/restoration process, noise models, restoration in the presence of noise–only spatial filtering, Weiner filtering, constrained least squares filtering, geometric transforms; Introduction to the Fourier transform and the frequency domain, estimating the degradation. Color Image Processing: Color fundamentals, color models, pseudo color image processing

**UNIT – IV**

 Image Compression: Fundamentals, image compression models, error-free compression, loss predictive coding, image compression standards. Morphological Image Processing: Preliminaries, dilation, erosion, open and closing, hit or miss transformation, basic morphologic algorithms.

**UNIT – V**

Image Segmentation: Detection of discontinuous, edge linking and boundary detection, thresholding, region–based segmentation. Object Recognition : Patterns and patterns classes, recognition based on decision–theoretic methods, matching, optimum statistical classifiers, neural networks, structural methods – matching shape numbers, string matching.

**Text books:**

1. Digital Image Processing, Rafeal C.Gonzalez, Richard E.Woods, Second Edition, Pearson Education/PHI.

**References:**

1. Image Processing, Analysis, and Machine Vision, Milan Sonka, Vaclav Hlavac and Roger Boyle, Second Edition, Thomson Learning.
2. Introduction to Digital Image Processing with Matlab, Alasdair McAndrew, Thomson Course Technology
3. Computer Vision and Image Processing, Adrian Low, Second Edition, B.S.Publications
4. Digital Image Processing using Matlab, Rafeal C.Gonzalez, Richard E.Woods, Steven L. Eddins, Pearson Education.
5. Digital Image Processing, William K. Prat, Wily Third Edition
6. Digital Image Processing and Analysis, B. Chanda, D. Datta Majumder, Prentice Hall of India, 2003

**13CS11E3 - ADVANCED OPERATING SYSTEMS**

Hours /week : 3 Hrs Sessional Marks : 40

Credits : 3 End Examination Marks : 60

**UNIT-I**

**Distributed systems:** Introduction, Hardware concepts, Software concepts and Design issues. Layered protocols, Asynchronous transfer mode networks, Client server model, Remote procedure call and Group communication.

**UNIT-II**

**Synchronization:** Clock synchronization, Mutual exclusion, Election algorithms, Atomic transactions, Deadlocks in distributed systems. Processes and processors in Distributed Systems: Threads, System models, Processor allocation, Scheduling in distributed systems.

**UNIT-III**

**Processes and processors in Distributed Systems:** Fault tolerance, Real-time distributed systems. **Distributed file systems:** Design, Implementation: File usage, System Structure, Caching, Replication. **Distributed shared memory:** Introduction, shared memory concept.

**UNIT-IV**

**Distributed shared memory:** Consistency models, Page-based distributed shared memory. **Case Study Amoeba:** Introduction, Objects and capabilities, Process management, Memory management, Communication and Servers.

**UNIT-V**

**Case Study MACH:** Introduction, Process management, Memory management, Communication. **Case Study DCE:** Introduction, Threads, Remote procedure call, Time Service, Directory Service, Security Service, Distributed File System.

**TEXT BOOKS:**

1. Tanenbaum A S, Distributed Operating Systems, Pearson Education, 2005.

**REFERENCES :**

1. Sinha P K, Distributed Operating Systems: Concepts and Design, Prentice-Hall of India Pvt Ltd, 2005.

2. Coulouris G, Dollimore J, and Kindberg T, Distributed System Concepts and Design, 4th Edition, Pearson Education, 2005.

**13CS11E4 - ADHOC & SENSOR NETWORKS**

Hours /week : 3 Hrs Sessional Marks : 40

Credits : 3 End Examination Marks : 60

**UNIT-I**

AD-HOC MAC: Introduction – Issues in Ad-Hoc Wireless Networks. MAC Protocols – Issues, Classifications of MAC protocols, Multi channel MAC & Power control MAC protocol.

**UNIT-II**

AD-HOC NETWORK ROUTING & TCP: Issues – Classifications of routing protocols – Hierarchical and Power aware. Multicast routing – Classifications, Tree based, Mesh based. Adhoc Transport Layer Issues. TCP Over Ad Hoc – Feedback based, TCP with explicit link, TCP-BuS, Ad Hoc TCP, and Split TCP.

**UNIT-III**

WSN -MAC: Introduction – Sensor Network Architecture, Data dissemination, Gathering. MAC Protocols – self-organizing, Hybrid TDMA/FDMA and CSMA based MAC.

**UNIT-IV**

WSN ROUTING, LOCALIZATION & QOS: Issues in WSN routing – OLSR, AODV. Localization – Indoor and Sensor Network Localization. QoS in WSN.

**UNIT-V**

Necessity for Mesh Networks – MAC enhancements – IEEE 802.11s Architecture – Opportunistic routing – Self configuration and Auto configuration – Capacity Models – Fairness – Heterogeneous Mesh Networks – Vehicular Mesh Networks.

**REFERENCES :**

1. *Ad Hoc Wireless Networks – Architectures and Protocols* by C.Siva Ram Murthy and B.Smanoj, Pearson Education, 2004.
2. *Wireless Sensor Networks* by Feng Zhao and Leonidas Guibas, Morgan Kaufman Publishers, 2004.
3. *Ad Hoc Mobile Wireless Networks* by C.K.Toh, Pearson Education, 2002.
4. *Wireless Mesh Networking* by Thomas Krag and Sebastin Buettrich, O’Reilly Publishers, 2007.

**13CS12E1 - CLOUD COMPUTING**

Hours /week : 3 Hrs Sessional Marks : 40

Credits : 3 End Examination Marks : 60

**UNIT-I**

UNDERSTANDING CLOUD COMPUTING: Cloud Computing – History of Cloud Computing – Cloud Architecture – Cloud Storage – Why Cloud Computing Matters – Advantages of Cloud Computing – Disadvantages of Cloud Computing – Companies in the Cloud Today – Cloud Services.

UNIT-II

DEVELOPING CLOUD SERVICES: Web-Based Application – Pros and Cons of Cloud Service Development – Types of Cloud Service Development – Software as a Service – Platform as a service – Web Services – On-Demand Computing – Discovering Cloud Services Development Services and Tools – Amazon Ec2 – Google App Engine – IBM Clouds

UNIT-III

CLOUD COMPUTING FOR EVERYONE: Centralizing Email Communications – Collaborating on Schedules – Collaborating on To-Do Lists – Collaborating Contact Lists – Cloud Computing for the Community – Collaborating on Group Projects and Events – Cloud Computing for the Corporation.

UNIT-IV

USING CLOUD SERVICES: Collaborating on Calendars, Schedules and Task Management – Exploring Online Scheduling Applications – Exploring Online Planning and Task Management –

Collaborating on Event Management – Collaborating on Contact Management – Collaborating on Project Management – Collaborating on Word Processing - Collaborating on Databases – Storing and Sharing Files.

UNIT-V

OTHER WAYS TO COLLABORATE ONLINE: Collaborating via Web-Based Communication Tools – Evaluating Web Mail Services – Evaluating Web Conference Tools – Collaborating via Social Networks and Groupware – Collaborating via Blogs and Wikis.

**Text Books:**

1. Michael Miller, *Cloud Computing: Web-Based Applications That Change the Way You Work and Collaborate Online*, Que Publishing, August 2008.
2. Haley Beard, *Cloud Computing Best Practices for Managing and Measuring Processes for On-demand Computing, Applications and Data Centers in the Cloud with SLAs*, Emereo Pty Limited, July 2008.

**13CS12E2 - MOBILE COMPUTING**

Hours /week : 3 Hrs Sessional Marks : 40

Credits : 3 End Examination Marks : 60

**UNIT-I**

Introduction to Mobile Communications and Computing: Mobile Computing (MC): Introduction to MC, novel applications, limitations, and architecture.
GSM: Mobile services, System architecture, Radio interface, Protocols, Localization and calling, Handover, Security, and New data services.

**UNIT-II**

Mobile Network Layer : Mobile IP (Goals, assumptions, entities and terminology, IP packet delivery, agent advertisement and discovery, registration, tunneling and encapsulation, optimizations), DynamicHost Configuration Protocol (DHCP),Mobile Transport Layer : Traditional TCP, Indirect TCP, Snooping TCP, Mobile TCP, Fast retransmit/fast recovery, Transmission /time-out freezing, Selective retransmission, Transaction oriented TCP.

**UNIT-III**

Database Issues: Hoarding techniques, caching invalidation mechanisms, client server computing with adaptation, power-aware and context-aware computing, transactional models, query processing, recovery, and quality of service issues.

**UNIT-IV**

Data Dissemination: Communications asymmetry, classification of new data delivery mechanisms, push-based mechanisms, pull-based mechanisms, hybrid mechanisms, selective tuning (indexing) techniques.

**UNIT–V**

Mobile Ad hoc Networks (MANETs): Overview, Properties of a MANET, spectrum of MANET applications, routing and various routing algorithms, security in MANETs.

**Text books :**

1.Jochen Schiller, *Mobile Communications*, Addison-Wesley. (Chapters 4,7,9,10,11), second edition, 2004.

2. Stojmenovic and Cacute, *Handbook of Wireless Networks and Mobile Computing*, Wiley, 2002, ISBN 0471419028. (Chapters 11, 15, 17, 26 and 27)

**References :**

1. Reza Behravanfar, *Mobile Computing Principles: Designing and Developing Mobile Applications with UML and XML* , ISBN: 0521817331, Cambridge University Press, October 2004,

2. Adelstein, Frank, Gupta, Sandeep KS, Richard III, Golden , Schwiebert, Loren, *Fundamentals of Mobile and Pervasive Computing* , ISBN: 0071412379, McGraw-Hill Professional, 2005.

3. Hansmann, Merk, Nicklous, Stober, *Principles of Mobile Computing*, Springer, second edition, 2003.

4. Martyn Mallick, *Mobile and Wireless Design Essentials*, Wiley DreamTech, 2003

**13CS12E3 - SOFTWARE QUALITY ASSURANCE & TESTING**

Hours /week : 3 Hrs Sessional Marks : 40

Credits : 3 End Examination Marks : 60

**UNIT-I**

Introduction to software quality - challenges – objectives – quality factors – components of SQA – contract review – development and quality plans – SQA components in project life cycle – SQA defect removal policies – Reviews

**UNIT-II**

Basics of software testing – test generation from requirements – finite state models – combinatorial designs - test selection, minimization and prioritization for regression testing – test adequacy, assessment and enhancement

**UNIT-III**

Testing strategies – white box and black box approach – integration testing – system and acceptance testing – performance testing – regression testing - internationalization testing – ad-hoc testing – website testing – usability testing – accessibility testing Test plan – management – execution and reporting – software test automation – automated testing tools

**UNIT-IV**

Hierarchical models of software quality – software quality metrics –function points - Software product quality – software maintenance quality – effect of case tools – software quality infrastructure – procedures – certifications – configuration management – documentation control.

**UNIT–V**

Project progress control – costs – quality management standards – project process standards – management and its role in SQA – SQA unit

**References :**

1. *Software quality assurance – from theory to implementation* by Daniel Galin, Pearson education, 2009.
2. *Foundations of software testing* by Aditya Mathur, Pearson Education, 2008
3. *Software testing – principles and practices* by Srinivasan Desikan and Gopalaswamy Ramesh, Pearson education, 2006
4. *Software testing* by Ron Patton, second edition, Pearson education, 2007
5. *Software Quality Theory and Management* by Alan C Gillies, Cengage Learning*, Second edition, 2003*

**13CS12E4 - WEB TECHNOLOGIES**

**Hours / Week : 4 Sessional Marks : 40**

**Credits : 4 End Examination Marks : 60**

**UNIT - I**

HTML Common Tags - List, Tables, images, forms, Frames, Cascading Style sheets. Introduction to Java Scripts, Objects in Java Script, Dynamic HTML with Java Script.

XML: Document type definition, XML Schemas, Document Object model, Presenting XML, Using XML Processors: DOM and SAX

**UNIT – II**

Introduction to Servlets: Lifecycle of a Servlet, JSDK, The Servlet API, The javax.servlet Package, Reading Servlet parameters, Reading initialization parameters.

More on Servlets: The javax.servelet HTTP package, Handling Http Request & Responses, Using Cookies-Session Tracking, Security Issues.

**UNIT – III**

Introduction to JSP: The Problem with Servlet. The Anatomy of a JSP Page, JSP Processing. JSP Application Design with MVC architecture. AJAX.

JSP Application Development: Generating Dynamic Content, Using Scripting Elements, Implicit JSP Objects, Conditional Processing. Accessing a Database from a JSP Page Application.

**UNIT – IV**

Displaying Values Using an Expression to Set an Attribute, Declaring Variables and Methods Error Handling and Debugging Sharing Data between JSP pages, Requests, and Users Passing Control and Date between Pages.

**UNIT – V**

Introduction to Perl, PHP, ASP, ASP.Net, VBScript

**TEXT BOOKS**

1. Jeffrey C Jackson, “Web Technologies: Computer Science Perspective, 2006

**REFERENCE BOOKS**

1. Web Programming, building internet applications, Chris Bates 2nd edition, WILEY Dreamtech

2. Java Server Pages by Hans Bergsten, SPD O’Reilly

3. Servlets and java server Pages - volume 1: core technologies , Marty Hall and Larry Brown Pearson