Subject Name	L	T	P	Credit
Artificial Intelligence	3	0	0	3

Objectives:

1. To learn about AI problem, Production Systems and their characteristics.
2. To understand the importance of search and the corresponding search strategies for solving AI problem.
3. To introduce to Planning, Natural Language Processing and Expert Systems.

Unit-1

Introduction to Artificial Intelligence: Artificial Intelligence, AI problems, AI techniques, defining the problem as a State Space search, Problem characteristics, Production systems.

Search Techniques: Issues in the design of search programs, Un-informed search, BFS, DFS; Heuristic search techniques: Generate-and- Test, Hill Climbing, Best-first search, A* Algorithm, Problem reduction, AO * algorithm, Constraint satisfaction, Means-Ends analysis.

Unit-2

Knowledge representation using rules: Procedural Vs Declarative knowledge, Logic programming, Forward Vs Backward reasoning, Matching techniques, Partial matching, RETE matching algorithm. AI programming languages: Overview of LISP and PROLOG, Production system in Prolog.

Unit -3

Symbolic logic: Propositional logic, First Order Predicate logic: Representing instance and is-a relationships, Computable functions and predicates, Unification & Resolution, Natural deduction; Structured representations of knowledge: Semantic Nets, Partitioned Semantic Nets, frames, Conceptual dependency, Conceptual graphs, scripts.

Unit -4

Reasoning under Uncertainty: Introduction to Non-monotonic reasoning, Truth maintenance systems, Logics for non-monotonic reasoning, Statistical reasoning: Bayes 90 theorem, Certainty factors and rule-based systems, Bayesian probabilistic inference, Bayesian networks, Dempster- Shafer theory, Fuzzy logic: Crisp sets ,Fuzzy sets, Fuzzy logic control, Fuzzy inferences & Fuzzy systems.

Natural Language Processing: Steps in the Natural Language Processing, Syntactic processing and Augmented transition nets, Semantic analysis, NLP Understanding systems; Planning: Components of a planning system, Goal stack planning, Non-linear planning using Constrait Posting, Hierarchical planning, Reactive systems.

Unit-5

Experts Systems: Overview of an expert system, Architecture of an expert systems, Different types of expert systems- Rule based, Frame based, Decision tree based, Case based, Neural Network based, Black Board architectures, Knowledge acquisition and Validation techniques, , Knowledge system building tools, expert system shells.

Outcomes:

1. The Student understands AI problem characteristics, state space approach for solving AI problem, Production System framework.
2. The student learns several optimal search strategies and the use of heuristics.
3. The student learns relational, inferential, inheritable and procedural knowledge and the corresponding knowledge representation approaches.

4. The student is introduced to applying AI problem solving approaches to natural language processing, planning and expert systems

Text books:

1. “Artificial Intelligence”, Elaine Rich and Kevin Knight, Tata Mcgraw-Hill Publications
2. “Introduction To Artificial Intelligence & Expert Systems”, Patterson, PHI publications
3. Russell, Stuart and Norvig, Peter, “Artificial Intelligence: A Modern Approach”.

Reference books:

1. Artificial Intelligence, George F Luger, Pearson Education Publications
2. Artificial Intelligence: A modern Approach, Russell and Norvig, Printice Hall
3. Artificial Intelligence, Robert Schalkoff, Mcgraw-Hill Publications
4. Artificial Intelligence and Machine Learning, Vinod Chandra S.S., Anand Hareendran S.

Subject Name	L	T	P	Credit
Digital Image Processing	3	0	0	3

Objectives:

- Develop an overview of the field of image processing.
- Understand the fundamental algorithms and how to implement them.
- Prepare to read the current image processing research literature.
- Gain experience in applying image processing algorithms to real problems.

Unit-1

Digital image fundamentals
Introduction, Origin, Steps in Digital Image Processing, Components, Elements of Visual Perception, Image Sensing and Acquisition, Image Sampling and Quantization, Relationships between pixels, color models.

Unit-2

Image transformation
Image transformations, Introduction to Fourier transforms, Discrete Fourier transforms, Fast Fourier transform, Walsh transformation, Hadmord transformation, Discrete Cosine Transformation.

Unit -3

Image enhancement
Spatial Domain: Gray level transformations – Histogram processing – Basics of Spatial Filtering–Smoothing and Sharpening Spatial Filtering – Frequency Domain: Introduction to Fourier Transform – Smoothing and Sharpening frequency domain filters – Ideal, Butterworth and Gaussian filters.

Unit -4

Image restoration and segmentation
Image encoding and segmentation, Encoding: Mapping, Quantizer, and Coder. Error free compression, Lossy Compression schemes. JPEG Compression standard. Detection of discontinuation by point detection, Line detection, edge detection, Edge linking and boundary detection, Local analysis, Global processing via Hough transforms and graph theoretic techniques.

Unit-5

Morphological image processing

Mathematical morphology- Binary, Dilation, crosses, Opening and closing, simple methods of representation, Signatures, Boundary segments, Skeleton of a region, Polynomial approximation

Outcomes:

Upon successful completion of this course, students will be able to discuss digital image fundamentals, apply image enhancement and restoration techniques, use image compression and segmentation Techniques, and represent features of images.

Text books:

1. Rafael C. Gonzales, Richard E. Woods, “Digital Image Processing”, Third Edition, Pearson Education, 2010.

Reference books:

1. Rafael C. Gonzalez, Richard E. Woods, Steven L. Eddins, “Digital Image Processing Using MATLAB”, Third Edition Tata Mc Graw Hill Pvt. Ltd., 2011.
2. Anil Jain K. “Fundamentals of Digital Image Processing”, PHI Learning Pvt. Ltd., 2011.
3. Willliam K Pratt, “Digital Image Processing”, John Willey, 2002.
4. Malay K. Pakhira, “Digital Image Processing and Pattern Recognition”, First Edition, PHI Learning Pvt. Ltd., 2011.

Subject Name	L	T	P	Credit
Distributed systems	2	1	2	4

Objectives:

To understand the basic concepts of Distributed System, Architecture and Issues in designing Distributed System. To understand in detail about the Basic Concept of Distributed Share Memory and Distributed Data Base Management System.

Unit-1

Introduction to distributed systems

Architecture for Distributed System, Goals of Distributed system, Hardware and Software concepts, Distributed Computing Model, Advantages & Disadvantage distributed system, Issues in designing Distributed System.

Unit-2

Distributed Share Memory And Distributed File System

Basic Concept of Distributed Share Memory (DSM), DSM Architecture & its Types, Design & Implementations issues In DSM System, Structure of Share Memory Space, Consistency Model, and Thrashing. Desirable features of good Distributed File System, File Model, File Service Architecture, File Accessing Model, File Sharing Semantics, File Catching Scheme, File Application & Fault tolerance. Naming: - Features, System Oriented Names, Object Locating Mechanism, Human Oriented Name.

Unit -3

Inter Process Communication And Synchronization

API for Internet Protocol, Data Representation & Marshaling, Group Communication, Client Server Communication, RPC- Implementing RPC Mechanism, Stub Generation, RPC Messages. Synchronization: - Clock Synchronization, Mutual Exclusion, Election Algorithms:- Bully & Ring Algorithms.

Unit -4

Distributed Scheduling And Deadlock

Distributed Scheduling, Issues in Load Distributing, Components for Load Distributing Algorithms, Different Types of Load Distributing Algorithms, Task Migration and its issues.
Deadlock Issues in deadlock detection & Resolutions, Deadlock Handling Strategy, Distributed Deadlock Algorithms.

Unit-5

Distributed Multimedia & Database system

Distributed Data Base Management System(DDBMS), Types of Distributed Database, Distributed Multimedia:- Characteristics of multimedia Data, Quality of Service Managements.

Case Study of Distributed System:- Amoeba, Mach, Chorus.

Outcomes:

- Understanding the key points of distributed computing
- Overview of various distributed systems implementation.
- Understanding of internal architecture of distributed systems.

Text books:

1. Sinha, Distributed Operating System Concept & Design, PHI
2. Coulouris & Dollimore, Distributed System Concepts and Design, Pearson Pub

Reference books:

1. Singhal & Shivratari, Advance Concept in Operating System, McGraw Hill
2. Attiya & Welch, Distributed Computing, Wiley Pub.

List of Practicals :

1. Case Study – CORBA.
2. Implementation of Deadlock through Simulation.
3. Write the Programs for Remote Procedure call.
4. Write a Program to Increment a Counter in Shared Memory.
5. Implementation of Election Algorithm.
6. S/W Simulation for Clock Synchronization in Distributed System using Lamport's Algorithm.
7. Implementation of Banker's Algorithm for avoiding Deadlock
8. Case Study on.
   a) Inventory Management
   b) Supply Chain Management
   c) Reservation System
   d) University Counseling
   e) Online Chain Management.

Subject Name	L	T	P	Credit
Human Values and Professional Ethics	2	0	0	2

Objectives:

- To help students distinguish between values and skills, and understand the need, basic guidelines, content and process of value education.
- To facilitate the development of a holistic perspective among students towards life and profession as well as towards happiness and prosperity based on a correct understanding of the human reality and the rest of existence.
- To facilitate students in applying the understanding of harmony in existence in their profession and lead an ethical life.

Unit-1

Human Values

Morals, values and Ethics – Integrity – Work ethic – Service learning – Civic virtue – Respect for others – Living peacefully – Caring – Sharing – Honesty – Courage – Valuing time – Cooperation – Commitment – Empathy – Self confidence – Character – Spirituality – Introduction to Yoga and meditation for professional excellence and stress management.

Unit-2

Engineering Ethics

Senses of "Engineering Ethics" – Variety of moral issues – Types of inquiry – Moral dilemmas – Moral Autonomy – Kohlberg"s theory – Gilligan"s theory – Consensus and Controversy – Models of professional roles – Theories about right action – Self-interest – Customs and Religion – Uses of Ethical Theories

Unit -3

Engineering as a Social Experimentation

Engineering as Experimentation – Engineers as responsible Experimenters – Codes of Ethics – A Balanced Outlook on Law.

Unit -4

Safety, Responsibilities and Rights

Safety and Risk – Assessment of Safety and Risk – Risk Benefit Analysis and Reducing Risk – Respect for Authority – Collective Bargaining – Confidentiality – Conflicts of Interest – Occupational Crime – Professional Rights – Employee Rights – Intellectual Property Rights (IPR) – Discrimination.

Unit-5

Global Issues

Multinational Corporations – Environmental Ethics – Computer Ethics – Weapons Development – Engineers as Managers – Consulting Engineers – Engineers as Expert Witnesses and Advisors – Moral Leadership –Code of Conduct – Corporate Social Responsibility

Outcomes:

- After completion of this course, the student should be able to apply ethics in society, discuss the ethical issues related to engineering and realize the responsibilities and rights in the society.
- Distinguish between ethical and unethical practices, start working out the strategy to actualize a harmonious environment wherever they work.

Text books:

1. R. R. Gaur, R Sangal, G P Bagaria, 2009, A Foundation Course in Human Values and Professional Ethics.
2. Prof. K. V. Subba Raju, 2013, Success Secrets for Engineering Students, Smart Student Publications, 3rd Edition
3. Mike W. Martin and Roland Schinzinger, “Ethics in Engineering”, Tata Mc Graw Hill, New Delhi, 2003.
4. Govindarajan M, Natarajan S, Senthil Kumar V. S, “Engineering Ethics”, Prentice Hall of India, New Delhi, 2004.

Reference books:

1. Charles B. Fleddermann, “Engineering Ethics”, Pearson Prentice Hall, New Jersey, 2004.
2. Charles E. Harris, Michael S. Pritchard and Michael J. Rabins, “Engineering Ethics – Concepts and Cases”, Cengage Learning, 2009
3. Ivan IIlich, 1974, Energy & Equity, The Trinity Press, Worcester, and HarperCollins, USA
4. E. F. Schumancher, 1973, Small is Beautiful: a study of economics as if people mattered. Blond & Briggs, Britain.
5. A Nagraj, 1998 Jeevan Vidya ek Parichay, Divya Path Sansthan, Amarkantak.
6. Sussan George, 1976, How the Other Half Dies, Penguin Press, Reprinted 1986, 1991.
7. P. L. Dhar, R. R. Gaur, 1990, Science and Humanism, Commonwealth Publishers.
8. A. N. Tripathy, 2003, Human Values, New Age International Publishers.

Subject Name	L	T	P	Credit
Object Oriented and Analysis	2	1	2	4

Objectives:

To understand the basic concepts of OOAD and the student should be able to familiarize the Object-Oriented Analysis and Design (OOAD) concepts for developing Object Oriented Projects.

Unit-1

Introduction to object oriented systems

Introduction to object oriented systems, Classes, Objects, Abstraction, Inheritance, Polymorphism, Encapsulation, Message Sending, Association, Aggregation, Iterative development and the Unified Process (UP), UP phases: Inception, Elaboration, Construction and Transition, Object oriented metrics

Unit-2

Domain models

System design life cycle, object oriented S/W development process model, Object Oriented Analysis, Object Modeling Technique (OMT): object model, function model, relationship among models, object diagrams, state diagrams, data flow diagrams, analysis.

Unit -3

Object oriented design

Overview of object design, Combination the models, Designing algorithms, design optimization, Implementation of control, Adjustment, Design of association, object representation, physical packaging, documenting design decision, comparison of use-case driven approach.

Unit -4

Patterns and frameworks

Patterns and Frameworks, Introduction to Patterns, GoF Patterns, Creational Patterns, Structural Patterns, Behavioral Patterns, Software Architectural patterns, The Observer Pattern, The Template, Method Pattern, Factory Patterns: Factory Method and Abstract Factory, The Singleton Pattern , The Iterator Pattern , The Composite Pattern , The Facade Pattern , The State and Strategy patterns.

Unit-5

Unified modeling language

Unified Modeling Language (UML): Class diagram sequence diagram Use case diagram, Collaboration, diagram, state, chart diagram, Activity diagram, component diagram, deployment diagram, Object oriented Database: Relational Vs object oriented database, the architecture of object oriented database, query language for Object Oriented database.

Outcomes:

1. Ability to analyze and model software specifications.
2. Ability to abstract object-based views for generic software systems.

Text books:

1. "Applying UML and Patterns: An Introduction to object-oriented Analysis and Design and iterative development", by Craig Larman, Pearson Education. (1998)
2. "Object oriented Analysis and design using UML", Jeya mala, Tata McGraw Hill
3. "Object oriented Analysis and design", Atul Kahate, Tata McGraw Hill

Reference books:

1. Satzinger, Jackson and Burd, "Object oriented Analysis and design with the Unified Process", CENGAGE Learning.
2. Michael Blaha and J. Rumbugh, "Object oriented Modeling and design with UML", Pearson Education
3. O'Docherty, "Object Oriented Analysis and Design Understanding, System Development with UML2.0", Wiley India.

Subject Name	L	T	P	Credit
Soft Computing	2	1	2	4

Objectives:

To understand the various soft computing frame works, be familiar with design of various neural networks, be exposed to fuzzy logic, learn genetic programming

Unit-1

Soft Computing:

Soft computing, Differences between soft computing and hard computing, Soft Computing constituents. Characteristic of soft computing. Some applications of soft computing techniques. Fuzzy logic: Definition, Applications. Genetic Algorithms: Definition, Applications. Neural Networks: Definition, Applications. Hybrid Systems: Definition, Types.

Unit-2

Fuzzy Sets and Fuzzy Logic:

Introduction to Classical Sets and Fuzzy Sets, Classical set and Fuzzy sets, Operations and Properties. Fuzzy Relations,Equivalence and Tolerance, Membership Functions, Fuzzification, Membership Value Assignment. Fuzzy to Crisp Conversion, Lambda Cuts for Fuzzy Sets and Fuzzy Relations, Defuzzification Methods, Fuzzy Arithmetic, Fuzzy Logic and Approximate Reasoning.

Unit -3

Neural Networks:

What is Neural Network, Biological Neural Networks, McCulloch Pitt model, Learning rules and various activation functions, Supervised Learning algorithms: Perceptron (Single Layer, Multi-layer), Linear separability, Delta learning rule, Back Propagation networks, Architecture of Back propagation(BP) Networks, Un-Supervised Learning algorithms: Introduction to Associative Memory, Adaptive Resonance theory, Hebbian Learning, Self Organizing Maps, Learning Vector Quantization.

Unit -4

Genetic algorithm:

Fundamentals, basic concepts, working principle, encoding, fitness function, reproduction, Genetic modeling: Inheritance operator, cross over, inversion & deletion, mutation operator, Bitwise operator, Generational Cycle, Convergence of GA, Applications & advances in GA, Differences & similarities between GA& other traditional methods.

Unit-5

Hybrid Systems:

Sequential Hybrid Systems, Auxiliary Hybrid Systems, Embedded Hybrid Systems, Neuro-Fuzzy Hybrid Systems, Neuro-Genetic Hybrid Systems, Fuzzy-Genetic Hybrid Systems. Fuzzy Associative Memories, ANFIS: Adaptive Neuro-Fuzzy Inference Systems.

Outcomes:

Upon completion of the course, the student should be able to: Apply various soft computing frame works, design of various neural networks, use fuzzy logic, apply genetic programming and discuss hybrid soft computing.

Text books:

1. J.S.R.Jang, C.T. Sun and E.Mizutani, “Neuro-Fuzzy and Soft Computing”, Pearson Education 2004.
2. S.N.Sivanandam and S.N.Deepa, “Principles of Soft Computing”, Wiley India Pvt Ltd, 2011.

Reference books:

1. S.Rajasekaran and G.A.Vijayalakshmi Pai, “Neural Networks, Fuzzy Logic and Genetic Algorithm: Synthesis & Applications”, Prentice-Hall of India Pvt. Ltd., 2006.
2. George J. Klir, Ute St. Clair, Bo Yuan, “Fuzzy Set Theory: Foundations and Applications” Prentice Hall, 1997.
3. David E. Goldberg, “Genetic Algorithm in Search Optimization and Machine Learning” Pearson Education India, 2013.
4. James A. Freeman, David M. Skapura, “Neural Networks Algorithms, Applications, and Programming Techniques, Pearson Education India, 1991.
5. Simon Haykin, “Neural Networks Comprehensive Foundation” Second Edition, Pearson Education, 2005.

List of Practicals :

1. WAP to implement Union, Intersection and Complement operations.
2. WAP to implement Artificial Neural Network.
3. WAP to implement Activation Functions.
4. WAP to implement FIS Editor.
5. WAP to implement Adaptive prediction in ADALINE NN.
6. Generate ANDNOT function using McCulloch-Pitts neural net.
7. Generate XOR function using McCulloch-Pitts neural net.
8. WAP to store the vector,find the weight matrix with no self-connection. Test this using a discrete Hopfield net.
9. WAP to implement Hebb Network
10. WAP to calculate the weights for given patterns using heteroassociative neural net.