Seventh Semester

ARTIFICIAL INTELLIGENCE- (BCS07001)

Course Objective:

The objective of the course is to learn different forms of logic, deal with inconsistencies and uncertainties of logic, familiar with informed and uniformed searching techniques, study different matching techniques, and learn pattern recognition and expert systems.

Module I

Introduction to AI, production system, production rules, State-space problem, Problem Solving by Intelligent search: BFS, DFS, Iterative Deepening Search, Hill Climbing, Simulated Annealing, heuristic Search: A*,AO* , Adversary Search: MIN-MAX Algorithm, Alpha-Beta Cut-off algorithm.

Module II

Propositional Logic, Theorem Proving by Propositional Logic, Resolution principle, Predicate Logic, wff conversion to clausal form, Dealing with Imprecision and Uncertainty: Probabilistic Reasoning, Dempster-Shafer Theory for Uncertainty Management.

Module III

Machine Learning: Supervised learning, unsupervised learning, Reinforcement learning, Artificial Neural Net, perceptron model, feed-forward neural network, Back propagation.

Module IV

Fundamentals: Components, degrees of freedom, joints, reference frames, characteristics Mathematical modelling of a robot: Mapping between frames, Description of objects in space, Transformation of vectors.

Module V

Direct Kinematic model: Mechanical Structure and notations, Description of links and joints, Kinematic modelling of the manipulator, Denavit-Hartenberg, Kinematic relationship between adjacent links, Manipulator Transformation matrix, Inverse Kinematics: Manipulator workspace, Solvable of inverse kinematic model, Manipulator Jacobian, Jacobian inverse, Application of robotics : path planning of mobile robot.

Text book:

1. Fu, Gonzales and Lee, Robotics, McGraw Hill
2. *Robotics* and Control Mittal and Nagrath Tata McGraw-Hill Education
3. *Artificial Intelligence and Soft Computing*: Behavioral and Cognitive Modeling of the Human Brain, Amit Konar, CRC Press
4. Artificial Intelligence, Dan W Patterson, Prentice Hall of India
5. S. Russel and P. Norvig, "Artificial Intelligence – A Modern Approach", Second Edition, Pearson Education

Reference Books:

1. Robert Shilling, Fundamentals of Robotics-Analysis and control, Prentice Hall of India
2. Artificial Intelligence, Nils J.Nilsson, ELSEVIER.
3. E.Rich and K.Knight, Artificial Intelligence, - TMH

Course Outcome:

CO1: To learn different forms of logic

CO2: Deal with inconsistencies and uncertainties of logic

CO3: Be familiar with informed and uniformed searching techniques

CO4: To study different matching techniques

CO5: To learn pattern recognition and expert systems

Course Articulation Matrix

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	1	2	2	-	-	-	-	-	-	-	-
CO2	2	2	2	1	-	-	-	-	-	-	-	-
CO3	2	1	2	3	-	-	-	-	-	-	-	-
CO4	3	2	2	2	-	-	-	-	-	-	-	-
CO5	1	2	2	1	-	-	-	-	-	-	-	-

1: Slight (Low) 2: Moderate (Medium) 3: Substantial (High) -: No Correlation

Program Articulation Matrix row

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO	2.2	1.4	2	1.8	-	-	-	-	-	-	-	-

INTERNET & WEB PROGRAMMING (BCS07002)

Course Objective:

The objective of the course is to compare and Contrast HTML, DHTML, CSS, JavaScript, XML and other Web technologies, implement JavaScript Language to perform functionalities at client side application areas which include Banking, develop Graphical User Interface applications in Java by importing Applets and AWT, assess and evaluate the role of "WEBSERVERS" for the management and delivery of electronic information, design well formed JSP and Servlets Documents, and develop Web based applications by Servlets and JSP to have an interactive applications such as Client Server Architecture.

Module I

Internet Architecture: Internet overview, evolution of internet. Internet components: Local Area Networks, Access Networks, Core Networks, Routers, Transmission infrastructure, ISPs. TCP/IP model, TCP/IP vs OSI model. HTML: HTML Overview, Structure of HTML Documents, Document Types, HTML Elements and attributes. Anchor Attributes, Image Tag and its attributes, Image and Anchors, Table.

Module II

Image Map: Attributes, Client Side Image Maps and Server Side Maps.
HTML Layout: Background, colors and text, Tables, Frames, Layers, Page content Division <Div>, <SPAN>. CSS: Style Sheet Basic, Properties, Positioning with Style Sheet.
Forms: <FORM> Elements, Form controls. Dynamic HTML.

Module III
Java Script: Introduction, Client-Side JavaScript, Server-Side JavaScript, JavaScript Objects, JavaScript Security. Operators: Assignment Operators, Comparison Operators, Arithmetic Operators, Increment, Decrement, Unary Negation, Logical Operators, String Operators, Special Operators, Conditional operator, Comma operator, delete, new, this, void.

Statements: Break, comment, continue, delete, do … while, export, for, for…in, function, if…else, import, labelled, return, switch, var, while.

Module IV

JavaScript (Properties and Methods of Each) :Array, Boolean, Date, Function, Math, Number, Object, String, regExp. Document and its associated objects, document, Link, Area, Anchor, Image, Applet, Layer.
Events and Event Handlers: General Information about Events, Defining Event Handlers, event.

Module V
Server Side Programming: Common Gateway Interface (CGI), Active Server Pages.

Internet applications: FTP, Telnet, Email, Chat. World Wide Web: HTTP protocol. Search Engines. E-commerce and security issues including symmetric and asymmetric key, encryption and digital signature, and authentication. Emerging trends, Internet telephony, and virtual reality over the web, etc. Intranet and extranet, firewall.

Text Books:

1. Computer Networking: A Top-Down Approach Featuring the Internet by Kurose and Ross.
2. Web Design the Complete Reference by Thomas Powell, Tata McGrawHill.

Reference Books:

1. HTML The Complete Reference by Thomas Powell, Tata McGrawHill.
2. JavaScript the Complete Reference, Second Edition by Thomas Powell, Fritz Schneider. Tata McGrawHill.

Course Outcome:

CO1: Analyze internet architecture and implement HTML.
CO2: Implement CSS, forms and dynamic HTML.
CO3: Implement JavaScript Language to perform functionalities at client side application areas which include Banking.
CO4: Develop Graphical User Interface applications in Java by importing Applets and AWT.
CO5: Assess and evaluate the role of "WEBSERVERS" for the management and delivery of electronic information.

Course Articulation Matrix

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	1	3	-	2	-	-	1	1	-	2	-	3
CO2	2	3	-	1	-	-	-	1	-	1	-	2
CO3	2	3	-	2	-	-	-	1	-	2	-	3
CO4	2	3	-	1	-	-	-	3	-	1	-	3
CO5	1	3	-	1	-	-	-	3	-	2	-	3

1: Slight (Low) 2: Moderate (Medium) 3: Substantial (High) -: No Correlation

Program Articulation Matrix row for this Course

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO	1.6	3	-	1.4	-	-	0.2	1.8	-	1.6	-	2.8

Professional Elective - IV

IMAGE PROCESSING (BCSPE701)

Course Objective:

The objective is to study of digital images, bits and bytes, raster scan format, quantization, understanding of scaling, translation, rotation, sums and differences, study of contrast and grey levels, histograms, Gaussian and other non-linear stretches, understanding of topography and shaded relief displays, contours, parallax and stereo, perspective viewing and anaglyphs, and study on image morphing, false color images, principle components analysis.

Module-I

Introduction: What Is Digital Image Processing? The Origins of Digital Image Processing. Examples of Fieldsthat Use Digital Image Processing. Fundamental Steps in Digital Image Processing. Componentsof an Image Processing System. Image Sampling and Quantization.Some Basic Relationships between Pixels.Linear and Nonlinear Operations.

Module-II

Image Enhancement in the Spatial DomainSome Basic Gray Level Transformations.Histogram Processing.Enhancement Using Arithmetic/Logic Operations.Basics of Spatial Filtering.Smoothing Spatial Filters. SharpeningSpatial Filters.Combining Spatial Enhancement Methods.

Module-III

Image Enhancement in the Frequency Domain: Introduction to the Fourier Transform and the Frequency Domain. Smoothing Frequency- Domain Filters. Sharpening Frequency Domain Filters. Homo-morphic Filtering.

Module-IV

Morphological Image Processing and Image Segmentation: Dilation and erosion, opening and closing, Hit-or-Miss transformations, basic morphological algorithms, Detection of discontinues, edge linking and boundary detection, thresh holding,

region –based segmentation.

Module-V

Use of Image Processing in Pattern Recognition: Introduction to the tools of Matlab and Open CV. Case study on Object Identification, Biometrics and Content Based Image retrieval.

Text Books:

1. Rafael C Gonzalez and Richard E Woods, Digital Image Processing, Pearson Education, 2002.
2. Anil K Jain, Fundamental of Digital Image Processing, Prentice Hall of India, 2004.

Reference Books:

1. William K Pratt, Digital Image Processing PIKS Scientific Inside, 4th Edition, Wile.
2. Vipul Singh, Digital Image Processing With Matlab&LabView, Reed Elsevier India Pvt Ltd, 2013.

Course Outcome:

CO1: Study of digital images, bits and bytes, raster scan format, quantization

CO2: Understanding of scaling, translation, rotation, sums and differences

CO3: Study of contrast and grey levels, histograms, Gaussian and other non-linear stretches

CO4: Understanding of topography and shaded relief displays, contours, parallax and stereo, perspective viewing and anaglyphs

CO5: Study on image morphing, false color images, principle components analysis

Course Articulation Matrix

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	3	3	2	2	1	1	1	-	-	-	1
CO2	3	3	3	2	2	1	1	1	-	-	-	1
CO3	3	3	3	2	2	1	1	1	-	-	-	1
CO4	3	3	3	2	2	1	1	1	-	-	-	1
CO5	3	3	3	2	2	1	1	1	-	-	-	1

1: Slight (Low) 2: Moderate (Medium) 3: Substantial (High) -: No Correlation

Program Articulation Matrix row for this Course

	PO	PO	PO	PO	PO	PO	PO	PO	PO	PO1	PO1	PO1
Cours	3	3	3	2	2	1	1	1	-	-	-	1

PARALLEL AND DISTRIBUTED COMPUTING (BCSPE702)

Course Objective:

The objective is to gain knowledge in issues for constructing the distributed systems, examine how the message oriented communication can be done in a Distributed system to achieve the synchronous and asynchronous communication, implement the suitable clock Synchronization algorithms to manage the resources in a distributed operating system environment, compare the client and data centric consistency models to improve performance and scalability in terms of memory, and analyze issues dealing with recovery failure and able to implement Distributed file system in Network file system.

Module I

Need for Parallel Computers, Models of Computation, Analyzing Parallel Algorithms, Expressing Parallel Algorithms, Matrix Vector Multiplication, Matrix Matrix Multiplication.

Module II

Database Query Processing, 15 Puzzle Problem, Parallel Discrete Event Simulation, Image Dithering, Dense LU Factorization.

Module III

Hyper Quick Sort, Merge Sort, Bitonic Merge Sort, Odd Even Transposition, Enumeration Sort, Sorting on the CRCW Model, CREW Model and EREW Model, MPI and PVM.

Module IV

Introduction to Distributed Systems, Routing Algorithms, Destination-Based Routing, The All-Pairs Shortest-Path Problem, The Netchange Algorithm, Routing with Compact Routing Tables, Hierarchical Routing.

Module V

Fault Tolerance in Distributed Systems, Fault Tolerance in Asynchronous and Synchronous Systems, Failure Detection, Stabilization.

Text Books

1. G. Tel, Introduction to Distributed Algorithms, 2nd Edition, Cambridge University Press, 2000.
2. AnanthGrama, Anshul Gupta, George Karypis, Vipin Kumar, Introduction to Parallel Computing, Second Edition, Addison Wesley, 2003.

Reference Books:

1. F. T. Leighton, Introduction to Parallel Algorithms and Architectures: Arrays, Trees, Hypercubes, M K Publishers, San Mateo California, 1992.
2. B. Wilkinson, M. Allen, Parallel Programming Techniques and Applications using Networked Workstations and Parallel Computers, Prentice Hall, 2005.
3. Michael J. Quinn, Parallel Computer Theory and Practice, McGraw Hill, Second Edition, 1994.
4. S. G. Akl, The Design and Analysis of Parallel Algorithms, PHI, 1989.

Course Outcome:

CO1: Gain knowledge in issues for constructing the distributed systems

CO2: Examine how the message oriented communication can be done in a Distributed system to achieve the synchronous and asynchronous communication

CO3: Implement the suitable clock Synchronization algorithms to manage the resources in a distributed operating system environment.

CO4: Compare the client and data centric consistency models to improve performance and scalability in terms of memory.

CO5: Analyze issues dealing with recovery failure and able to implement Distributed file system in Network file system

Course Articulation Matrix

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	1	3	-	2	-	-	1	1	-	2	-	3
CO2	2	3	-	1	-	-	-	1	-	1	-	2
CO3	2	3	-	2	-	-	-	1	-	2	-	3
CO4	2	3	-	1	-	-	-	3	-	1	-	3
CO5	1	3	-	1	-	-	-	3	-	2	-	3

1: Slight (Low) 2: Moderate (Medium) 3: Substantial (High) -: No Correlation

Program Articulation Matrix row for this Course

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO	1.6	3	-	1.4	-	-	0.2	1.8	-	1.6	-	2.8

DATA MINING (BCSPE703)

Course Objective:

The objective is to learn Data Mining overview, Data Warehouse and OLAP Technology, Data Mining Primitives, System Architectures, Mining Association Rules in Large Databases, Classification and Prediction, Classification by Back propagation, Categorization of Major Clustering Methods, and Applications and Trends in Data Mining.

Module I

Data Mining Overview :What Defines a Data Mining Task? Task-Relevant Data, The Kind of Knowledge to be Mined, KDD, Data Preprocessing – Data Integration and Transformation, Data Reduction,Data Mining Primitives, System Architectures.

Module II

Mining Association Rules in Large Databases, Association Rule Mining, Market Basket Analysis: AssociationRule Mining, Basic Concepts, Association Rule Mining A Road Map, Mining Association Rules from FrequentItemsets, Mining Multilevel Association Rules from Transaction Databases, Multilevel Association Rules,Approaches to Mining Multilevel Association Rules, Mining Distance-Based Association Rules, Association Mining and Correlation Analysis.

Module III

Classification and Prediction – What is Classification? What Is Prediction? Issues Regarding Classification andPrediction, Classification by Decision Tree Induction, Bayesian Classification, Bayes Theorem, Classification byBack propagation, A Multilayer Feed-Forward Neural Network, MLP, Classification Based of Concepts from Association Rule Mining, k-NearestNeighbor Classifiers, Fuzzy Set Approaches, Linear and Multiple Regression,Nonlinear Regression, Classifier Accuracy evaluation methods.

Module IV

Cluster Analysis – What Is Cluster Analysis, Types of Data in Cluster Analysis, A Categorization of MajorClustering Methods, Classical Partitioning Methods: k-Means and k-Medoids, Hierarchical Methods, Agglomerative and Divisive Hierarchical Clustering, ClusteringUsing Wavelet Transformation, Clustering High-Dimensional Space, Model-Based Clustering Methods, Fuzzy C-Means clustering, Cluster evaluation metrics.

Module V

Case study on Data Mining techniques in engineering applications: Brain Tumor detection, Time series data analysis, Fraud detection, Sentiment analysis, Market Profit Analysis etc. (Some recent research papers on the above may be used for case study.)

Text Book:

1. Data Mining: – Concepts and Techniques by Jiawei Han and MichelineKamber, -- Morgan Kaufmann Publisher (Elsevier)
2. Data Mining Concepts, Models, Methods and Algorithms ByMehmedKantardzic Wiley Interscience, IEEE Press.

Course Outcome:

CO1: To understand the concepts of Data Mining
CO2: To design the data mining decisions using the association rule mining
CO3: To analyze different supervised techniques: Prediction and Classifications
CO4: To apply the unsupervised data mining techniques for clustering
CO5: To evaluate data mining techniques while solving real world problems

Course Articulation Matrix

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	3	3	1	-	-	-	-	1	-	-	2
CO2	2	2	3	1	-	-	-	-	1	-	-	1
CO3	3	1	3	1	-	3	-	-	1	-	-	1
CO4	3	2	3	3	-	-	-	-	1	-	-	1
CO5	3	2	3	1	-	-	-	-	-	-	-	-

1: Slight (Low) 2: Moderate (Medium) 3: Substantial (High) -: No Correlation

Program Articulation Matrix row

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO	2.8	2	3	2.2	-	0.6	-	-	0.8	-	-	1

Sessional

INTERNET AND WEB PROGRAMMING LAB (BCS07003)

Course Objective:

The objective is to be familiar with HTML and PHP, embedding audio and video files in HTML, develop server side scripting, and learning CGI scripting using PERL or C.

1. Web design environment : HTML elements coding and testing
2. Cascading style sheet
3. Implementation of website navigation
4. Implementation of table elements
5. Implementation of textual linking
6. Implementation of page templates
7. Implementation of frames and frame elements
8. Implementation of web typography
9. Implementation of graphics and coloring
10. Server side and client side scripting (PHP and JavaScript)
11. Mini project on website design using active and dynamic contents

Course Outcome:

CO1: Be familiar with HTML and PHP

CO2: Embedding audio and video files in HTML

CO3: Develop server side scripting

CO4: Learn CGI scripting using PERL or C

Course Articulation Matrix

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	1	3	-	2	-	-	1	1	-	2	-	3
CO2	2	3	-	1	-	-	-	1	-	1	-	2
CO3	2	3	-	2	-	-	-	1	-	2	-	3
CO4	2	3	-	1	-	-	-	3	-	1	-	3

1: Slight (Low) 2: Moderate (Medium) 3: Substantial (High) -: No Correlation

Program Articulation Matrix row for this Course

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO	1.6	3	-	1.4	-	-	0.2	1.8	-	1.6	-	2.8