

**B.TECH. (CSE/CS/CE)**  
**SEVENTH SEMESTER (DETAILED SYLLABUS)**

<b>Artificial Intelligence (BCS701)</b>		
<b>Course Outcome (CO)</b>		<b>Bloom's Knowledge Level (KL)</b>
<b>At the end of course, the student will be able to understand</b>		
CO 1	Understand the fundamentals of Artificial Intelligence, intelligent agents, and various approaches to problem-solving in AI.	K2
CO 2	Apply uninformed and informed search strategies, heuristics, and optimization techniques to solve classical AI problems and games.	K3
CO 3	implement logical reasoning techniques using propositional and first-order logic, including inference strategies and knowledge representation methods.	K4
CO 4	Analyze uncertainty in knowledge representation using probabilistic reasoning, fuzzy logic, and basic neural network concepts.	K4
CO 5	Evaluate and demonstrate AI applications in areas such as natural language processing (NLP), robotics, multi-agent systems, and Explainable AI (XAI) through real-world problem examples.	K5
<b>DETAILED SYLLABUS</b>		<b>3-0-0</b>
<b>Unit</b>	<b>Topic</b>	<b>Proposed Lecture</b>
I	<b>Introduction to Artificial Intelligence &amp; Intelligent Agents:</b> Definition and scope of AI, History and applications of AI, Characteristics of Intelligent Agents, Types of agents and environments, Agent architecture, Problem Solving Approach to Typical AI problems, Problem-solving agents. Example problems and approaches.	<b>08</b>
II	<b>Problem Solving &amp; Search Strategies:</b> Uninformed Search Strategies: BFS, DFS, Iterative Deepening, Informed Search Strategies: Greedy Best-First Search, A* Search, Heuristics and Optimization, Hill Climbing, Simulated Annealing, Constraint Satisfaction Problems, Game Playing: Min-max, Alpha-Beta Pruning, Stochastic & Partially Observable Games.	<b>08</b>
III	<b>Knowledge Representation &amp; Reasoning:</b> Propositional and First Order Logic, Syntax, Semantics, and Inference, Knowledge-based agents: Wumpus world, Logic Programming using Prolog, Forward and Backward Chaining, Resolution, Ontological Engineering and Reasoning.	<b>08</b>
IV	<b>Uncertainty &amp; Learning Techniques:</b> Introduction to uncertainty and probabilistic reasoning, Bayes' Rule, Bayesian Networks, Fuzzy logic and handling imprecision, Neural Networks (basics only): Perceptron, Backpropagation (intro level), Fundamentals of Machine Learning in AI context, Introduction to supervised and unsupervised learning.	<b>08</b>
V	<b>Applications of AI &amp; Multi-Agent Systems:</b> Natural Language Processing, Machine Translation, Information Retrieval and Extraction, Robotics: Perception, Planning, and Motion, Speech Recognition, Software Agents: Architecture, Communication, Trust, Multi-agent Negotiation and Reputation. <b>Explainable AI (XAI)</b> – Importance of interpretability, techniques for explaining black-box models, trust in AI, case studies in NLP and vision.	<b>08</b>
<b>Recommended Textbooks:</b>		
1. Stuart Russell & Peter Norvig, <i>Artificial Intelligence: A Modern Approach</i> , 4th Edition, Pearson, 2022 2. Ivan Bratko, <i>Prolog: Programming for Artificial Intelligence</i> , 4th Edition, Addison-Wesley 3. Nils J. Nilsson, <i>The Quest for Artificial Intelligence</i> , Cambridge University Press 4. David Poole & Alan Mackworth, <i>Artificial Intelligence: Foundations of Computational Agents</i> , Cambridge Press		

<b>Cloud Computing (BCS071)</b>		
<b>Course Outcome (CO)</b>		<b>Bloom's Knowledge Level (KL)</b>
<b>At the end of course, the student will be able to understand</b>		
CO 1	Describe architecture and underlying principles of cloud computing.	K3
CO 2	Explain need, types and tools of Virtualization for cloud.	K2
CO 3	Describe Services Oriented Architecture and various types of cloud services.	K2
CO 4	Explain Inter cloud resources management cloud storage services and their providers Assess security services and standards for cloud computing.	K2
CO 5	Analyze advanced cloud technologies.	K6
<b>DETAILED SYLLABUS</b>		<b>3-1-0</b>
<b>Unit</b>	<b>Topic</b>	<b>Proposed Lecture</b>
<b>I</b>	<b>Introduction To Cloud Computing:</b> Definition of Cloud – Evolution of Cloud Computing – Underlying Principles of Parallel and Distributed Computing – Cloud Characteristics – Elasticity in Cloud – On- demand Provisioning.	<b>08</b>
<b>II</b>	<b>Cloud Enabling Technologies Service Oriented Architecture:</b> REST and Systems of Systems – Web Services – Publish, Subscribe Model – Basics of Virtualization – Types of Virtualization – Implementation Levels of Virtualization – Virtualization Structures – Tools and Mechanisms – Virtualization of CPU – Memory – I/O Devices –Virtualization Support and Disaster Recovery.	<b>08</b>
<b>III</b>	<b>Cloud Architecture, Services And Storage:</b> Layered Cloud Architecture Design – NIST Cloud Computing Reference Architecture – Public, Private and Hybrid Clouds – IaaS – PaaS – SaaS – Architectural Design Challenges – Cloud Storage – Storage-as-a-Service – Advantages of Cloud Storage – Cloud Storage Providers – S3.	<b>08</b>
<b>IV</b>	<b>Resource Management And Security In Cloud:</b> Inter Cloud Resource Management – Resource Provisioning and Resource Provisioning Methods – Global Exchange of Cloud Resources – Security Overview – Cloud Security Challenges – Software-as-a-Service Security – Security Governance – Virtual Machine Security – IAM – Security Standards.	<b>08</b>
<b>V</b>	<b>Cloud Technologies And Advancements Hadoop:</b> MapReduce – Virtual Box — Google App Engine – Programming Environment for Google App Engine — Open Stack – Federation in the Cloud – Four Levels of Federation – Federated Services and Applications – Future of Federation.	<b>08</b>

**Text books:**

1. Kai Hwang, Geoffrey C. Fox, Jack G. Dongarra, "Distributed and Cloud Computing, From Parallel Processing to the Internet of Things", Morgan Kaufmann Publishers, 2012.
2. Rittinghouse, John W., and James F. Ransome, —Cloud Computing: Implementation, Management and Security, CRC Press, 2017.
3. Rajkumar Buyya, Christian Vecchiola, S. ThamaraiSelvi, —Mastering Cloud Computing, Tata Mcgraw Hill, 2013.
4. Toby Velte, Anthony Velte, Robert Elsenpeter, "Cloud Computing – A Practical Approach, Tata Mcgraw Hill, 2009.
5. George Reese, "Cloud Application Architectures: Building Applications and Infrastructure in the Cloud: Transactional Systems for EC2 and Beyond (Theory in Practice), O'Reilly, 2009.