TCET

DEPARTMENT OF COMPUTER ENGINEERING (CMPN)

Choice Based Credit and Grading Scheme (Revised - 2016) - University of Mumbai

CBGS(2012)/CBCGS-2016(R)

C. Syllabus Detailing and Learning objectives

Module	Chapter	Detailed Content	Syllabus Detailing	Learning Objectives
Module 1	CH 1 **Introduction to Artificial Intelligence** (Hours -4)	Introduction, History of Artificial Intelligence, Intelligent Systems: Categorization of Intelligent System, Components of AI Program, Foundations of AI, Sub-areas of AI, Applications of AI, Current trends in AI.	**Purpose**: To make students understand Artificial Intelligence and History of Artificial Intelligence, Intelligent Systems: Categorization of Intelligent System, Components of AI Program, Foundations of AI, Sub-areas of AI, Applications of AI. **Scope –** **1. Academic Aspects-** Understanding history behind Artificial Intelligence **2. Technology Aspect-** Understand subareas and current trends **3. Application Aspect-** Understand Applications of AI	1. **recall** the fundamentals and technological aspects of Categorization of Intelligent System **(R)** 2. **describe** the various Architectures of Agent and Foundations of AI, Sub-areas of AI, Applications of AI, Current trends in AI **(U)**

			Students Evaluation – 1. Theory Questions to be asked on Components of AI Program 2. Lab experiments based on technical papers on various applications. 3. Corresponding viva questions can be asked for Applications of AI	3. **examine** Components of AI Program **(A)** 4. **analyze** problems wrt environment **(AN)** 5. **compare** types of agents **(E)**
	CH 2 **Intelligent Agents** (Hours - 4)	Agents and Environments, The concept of rationality, The nature of environment, The structure of Agents, Types of Agents, Learning Agent.	**Purpose** – This chapter gives detail of Agents and Environments, The concept of rationality, The nature of environment, The structure of Agents, Types of Agents, Learning Agent. **Scope –** **1. Academic Aspects-** Learning the insights of Agents and Environments, The concept of rationality **2. Technology Aspect-** The structure of Agents, Types of Agents **3. Application Aspect-** Types of Agents, Learning Agent. **Students Evaluation** 1. Questions on Types of Agents, Agents and Environments, The concept of rationality 2. Corresponding viva questions can be asked for types of Agents, Nature of environment	
Module 2	Chapter 3 **Problem solving** (Hours - 8)	Solving Problems by searching: Problem solving agent, Formulating problems, Example Problems. Uninformed search methods: Breadth First Search (BFS), Depth First Search (DFS) , Depth Limited Search, Depth First Iterative Deepening(DFID), Informed Search Methods:	**Purpose-** This chapter is focused on the Solving problem by Searching: Problem Solving Agent, Formulating Problems, Example Problems. Uninformed Search Methods: Breadth First Search (BFS), Depth First Search (DFS), Depth Limited Search, Depth First Iterative Deepening(DFID), Informed	1. **List** uninformed search methods. **(R)** **2.** Tabulate complexity of uninformed search methods **(R)** 3. **Express** the concept of

		Greedy best first Search, A* Search , Memory bounded heuristic search	Search Methods: Greedy best first Search, A* Search, Memory bounded heuristic Search. **Scope –** **1. Academic Aspects-** Learn to formulate example problems and solve by Searching **2. Technology Aspect-** Technology behind uninformed and informed search **3. Application Aspect-** Students should understand problems where these algorithms can be applied **Students Evaluation –** 1. Theory Questions to be asked on Solving Problems by searching 2. Lab experiments based on uninformed and informed search methods 3. Corresponding viva questions can be asked for BFS, DFS, DLS, DFID, GBFS, A* search, MBHS	Breadth First Search (BFS), Depth First Search (DFS), Depth Limited Search, Depth First Iterative Deepening (DFID. **(U)** 4. **Apply** Greedy best first search and A* algorithm on real problems **(A)** 5. **Distinguish** various uninformed search methods **(AN)** 6. **Summarize** informed and uninformed search methods (**E)**
Module 3	Chapter 3 **Problem solving** (Hours - 7)	Local Search Algorithms and Optimization Problems: Hill- Genetic algorithms. Adversarial Search: Games, Optimal strategies, The minimax algorithm, Alpha-Beta Pruning.	**Purpose-** This chapter is focused on Local Search Algorithms and Optimization Problems: Hill climbing search Simulated annealing, Local beam search, Genetic algorithms. Adversarial Search: Games, Optimal strategies, The minimax algorithm, Alpha-Beta Pruning	1. **Describe** Local Search Algorithms **(R)** **2. Summarize** Local Search Algorithms **(U)** **3. Apply** Local Search Algorithms **(A)**

			Scope - **1. Academic Aspects-** Student will study problems where regular search algorithms fail **2. Technology Aspect-** Students will learn technology behind design of computer games **3. Application Aspect-** Students shall be able to design optimization algorithms and game playing algorithms **Students Evaluation –** 1. Theory Questions to be asked on Local search and Genetic Algorithms 2. Lab experiments based on Local search, genetic algorithm, adversarial search 3. Corresponding viva questions can be asked for Hill climbing, Alpha beta pruning	**4. Compare** various Local Search Algorithms **(AN)** 5. Apply alpha beta pruning **(A)** **6.** Write solution to Hill climbing problem **(R)**
Module 4	Chapter4 - **Knowledge and Reasoning** (Hours -8)	Knowledge based Agents, The Wumpus World, The Propositional logic, First Order Logic: Syntax and Semantic, Inference in FOL, Forward chaining, backward Chaining. Knowledge Engineering in First-Order Logic, Unification, Resolution, Introduction to logic programming (PROLOG).	**Purpose –** This chapter is focused on Knowledge based Agents, The Wumpus World, The Propositional logic, First Order Logic: Syntax and Semantic, Inference in FOL, Forward chaining, backward Chaining. **Scope –** 1. **Academic Aspects-** The objective is to represent knowledge and infer from it 2. **Technology Aspect-** Students will learn PROLOG as a tool to develop LOGIC 3. **Application Aspect-** Students shall be able to infer solution using PROLOG to a no. of problems	1. **Describe** Wumpus World **(R)** **2. Distinguish** Propositional and Predicate Logic **(U)** **3. Apply** Logic to English statements **(A)** **4. Compare** various Local Search Algorithms **(AN)** **5. Conclude** from given representation **(E)** **6. Create** knowledge representation of given

			Student Evaluation - 1. Theory Questions to be asked on Logic 2. Lab experiments based on unification 3. Corresponding viva questions can be asked for Prolog	problem **(C)**
Module 5	Chapter 4 **Uncertainty** (Hours -6)	Uncertain Knowledge and Reasoning: Uncertainty, Representing knowledge in an uncertain domain, The semantics of belief network, Inference in belief network.	**Purpose –** This chapter is focused on dealing with uncertain knowledge	1. **Distinguish** Partial Order, Hierarchical and Conditional Plan **(U)** 2. **Design** Belief Network **(C)** 3. **Draw** Partial Order Plan **(AN)** 4. **Compare** Hierarchical and conditional planning **(AN)** **5. Conclude** from belief n/w **(E)** **6. Write** Baye's rule **(R)**
			Scope – **1. Academic Aspects-** Representation of uncertain knowledge for real world scenario **2. Technology Aspect-** Belief N/W **3. Application Aspect-** Problems in real world have uncertain knowledge	
			Student Evaluation - 1. Theory Questions to be asked on uncertainty 3. Corresponding viva questions can be asked for belief networks	
	Chapter 5 **Planning** (Hours -4)	The planning problem, Planning with state space search, Partial order planning, Hierarchical planning, Conditional Planning.	**Purpose –** This chapter is focused on formulating planning problem and finding solution to it	
			Scope – **1. Academic Aspects-** Students should know how to plan for solution **2. Technology Aspect-** Students should learn technology behind various types of plans **3. Application Aspect-** Students should be able to apply planning to real world problems	
			Student Evaluation – 1. Theory Questions to be asked on Planning 3. Corresponding viva questions can be asked for types	

			of planning	
Module 6	Chapter 5 **Learning** (Hours -3)	Learning: Forms of Learning, Inductive Learning, Learning, Decision Tree.	**Purpose –** This chapter is focused on formulating learning problem and finding solution to it **Scope –** **1. Academic Aspects-** Students should know how to integrate learning in system **2. Technology Aspect-** Students are able to understand decision problems **3. Application Aspect-** Students will be able to apply decision making through learning in real world **Student Evaluation –** 1. Theory Questions to be asked on Learning 2. Lab experiments based on Decision tree 3. Corresponding viva questions can be asked for types of learning	1. **Tabulate** various forms of learning **(R)** 2. **Describe** architecture of Expert system **(U)** 3. **Apply** decision tree to problem **(A)** 4. **Design** and **develop** various Natural Language Processing (NLP), Expert Systems. **(C)** **5. Compare** Expert System with Traditional System **(AN)** **6. Choose** among various forms of learning **(E)**
	Chapter 6 **Applications** (Hours -4)	Natural Language Processing (NLP), Expert System: Introduction, Phases in building Expert Systems, ES Architecture, ES vs Traditional System.	**Purpose –** This chapter is focused on studying applications of AI and learning to design them **Scope –** 1. **Academic Aspects-** The chapter focuses on Applications of AI 2. **Technology Aspect-** Students are able to learn technology behind developing an Expert system and NLP sysytem 3. **Application Aspect-** System will be able to design Expert system and NLP system	

			Student Evaluation – 1. Theory Questions to be asked on Expert system and NLP 3. Corresponding viva questions can be asked on types of Expert system and NLP stages	