

**B.E Semester: VII****Mechanical Engineering****Subject Name: Artificial Intelligence and Robotics****A. Course Objective**

- To present a problem oriented in depth knowledge of Artificial Intelligence and Robotics.
- To address the underlying concepts, methods and application of different Artificial Intelligence and Robotics.

**B. Teaching / Examination Scheme**

SUBJECT		Teaching Scheme				Total Credit	Evaluation Scheme					Total Marks
CODE	NAME	L	T	P	Total		THEORY		IE	CIA	PR. / VIVO	
		Hrs	Hrs	Hrs	Hrs		Hrs	Marks	Marks	Marks	Marks	
ME706-A	Artificial Intelligence and Robotics	4	0	0	4	4	3	70	30	20	0	120

**C. Detailed Syllabus****1. Scope of AI**

Games theorem, natural language processing, vision and speech processing, robotics, expert systems, AI techniques- search knowledge, abstraction.

**2. Problem solving**

State space search; Production systems, search space control: depth first, breadth-first search, heuristic search - hill climbing, best-first search, branch and bound. Problem Reduction, Constraint Satisfaction End, Means-End Analysis

**3. Knowledge Representation**

Predicate Logic: unification, modus ponens, resolution, dependency directed backtracking.

Rule based Systems: forward reasoning, conflict resolution, backward reasoning, use of no backtracks.

Structured Knowledge Representation: semantic net slots, exceptions and default frames, conceptual dependency, scripts.

**4. Handling uncertainty and learning:**

Non-monotonic reasoning, probabilistic reasoning, use of certainty factors, fuzzy logic, Concept of learning, learning automation, genetic algorithm, learning by inductions, neural network.

**5. Robotics:**

Robot Classification, Robot Specification, notation

Direct and Inverse Kinematics: Co-ordinates Frames, Rotations, Homogeneous Coordinates

**D. Lesson planning**

SR.NO	DATE/WEEK	UNIT NO	%WEIGHTAGE	TOPIC NO
1	1 <sup>ST</sup> , 2 <sup>ND</sup> , 3 <sup>RD</sup>	1	20	1
2	4 <sup>TH</sup> , 5 <sup>TH</sup> , 6 <sup>TH</sup>	2	20	2
3	7 <sup>TH</sup> , 8 <sup>TH</sup> , 9 <sup>TH</sup>	3	20	3
4	10 <sup>TH</sup> , 11 <sup>TH</sup> , 12 <sup>TH</sup>	4	20	4
5	13 <sup>TH</sup> , 14 <sup>TH</sup> , 15 <sup>TH</sup>	5	20	5

#### **E. Instructional Method & Pedagogy**

1. At the start of course, the course delivery pattern , prerequisite of the subject will be discussed
2. Lecture may be conducted with the aid of multi-media projector, black board, OHP etc. & equal weightage should be given to all topics while teaching and conduction of all examinations.
3. Attendance is compulsory in lectures and laboratory, which may carries five marks in overall evaluation.
4. One/Two internal exams may be conducted and total/average/best of the same may be converted to equivalent of 30 marks as a part of internal theory evaluation.
5. Assignment based on course content will be given to the student for each unit/topic and will be evaluated at regular interval. It may carry an importance of ten marks in the overall internal evaluation.
6. Surprise tests/Quizzes/Seminar/Tutorial may be conducted and having share of five marks in the overall internal evaluation.

#### **F. Students Learning Outcomes**

- The student can identify different areas of Artificial Intelligence and Robotics.
- Can find the applications of all the areas in industry.

#### **G. Recommended Study Materials**

1. E. Rich and K. Knight, “Artificial intelligence”, MH, 2nd ed., 1992.
2. N.J. Nilsson, “Principles of AI”, Narosa Publ. House, 2000.
3. Robin R Murphy, Introduction to AI Robotics PHI Publication, 2000
4. D. W. Patterson, “Introduction to AI and Expert Systems”, PHI, 1992.
5. R. J. Schalkoff, “Artificial Intelligence - an Engineering Approach”, McGraw Hill Int. Ed., Singapore, 1992.
6. George Lugar, .AI-Structures and Strategies for and Strategies for Complex Problem solving, 4/e, 2002, Pearson Educations.