

BIRLA INSTITUTE OF TECHNOLOGY, MESRA, RANCHI  
(END SEMESTER EXAMINATION)

CLASS: M.Tech  
BRANCH: ECE

SEMESTER: II  
SESSION: SP/19

SUBJECT: EC575 ARTIFICIAL INTELLIGENCE SYSTEMS

TIME: 3 Hours

FULL MARKS: 50

INSTRUCTIONS:

1. The question paper contains 5 questions each of 10 marks and total 50 marks.
  2. Attempt all questions.
  3. The missing data, if any, may be assumed suitably.
  4. Before attempting the question paper, be sure that you have got the correct question paper.
  5. Tables/Data hand book/Graph paper etc. to be supplied to the candidates in the examination hall.
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- Q.1(a) Differentiate between Informed, Uninformed and Local search. Explain briefly Depth First Search, A\* Search and Genetic Algorithm. [5]
- Q.1(b) The **missionaries and cannibals** problem is usually stated as follows. Three missionaries and three cannibals are on one side of a river, along with a boat that can hold one or two people. Find a way to get everyone to the other side of the river, without ever leaving a group of missionaries in one place outnumbered by the cannibals in that place. Formulate the problem precisely, making only those distinctions necessary to ensure a valid solution. Draw a diagram of the complete state space. Implement and solve the problem optimally using an appropriate search algorithm. [5]
- Q.2(a) What is Planning? Discuss the forward and backward progression planning with a suitable example. [5]
- Q.2(b) A monkey-and-bananas problem is faced by a monkey in a laboratory with some bananas hanging out of reach from the ceiling. A box is available that will enable the monkey to reach the bananas if he climbs on it. Initially the monkey is at A, the bananas at B and the box at C. The monkey and box have height *Low*, but if the monkey climbs onto the box he will have height *High*, the same as the bananas. The actions available to the monkey include *Go* from one place to another, *Push* an object from one place to another, *ClimbUp* onto or *ClimnDown* from an object, and *Grasp* or *Ungrasp* an object. Grasping results in holding the object if the monkey and object are in the same place at the same height. Write down the initial state description and the STRIPS style definitions of the six actions. [5]
- Q.3(a) Define constraint satisfaction problem (CSP). Formulate the CSP as a standard search algorithm. [5]
- Q.3(b) Define Linear integer Programming? Using Simplex method solve the following problem. [5]
- Maximize  $6X_1 + 5X_2$   
Subject to  
 $X_1 + X_2 \leq 5$   
 $3X_1 + 2X_2 \leq 12$   
 $X_1, X_2 \geq 0$
- Q.4(a) Explain with a suitable example the terms minimum remaining value, degree heuristic and least constraining value heuristic used in CSP. [5]
- Q.4(b) Differentiate between forward checking and Arc consistency using a suitable map coloring problem in which the adjacent region will not have same color and we have three colors, namely, green, blue and red to color the whole map. [5]
- Q.5(a) Explain the Optimal strategies of Games. [5]
- Q.5(b) Describe briefly the minimax algorithm used in Intelligent Game strategy. [5]

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