B.E/ B.Tech Degree End Semester Examinations, APRIL / MAY 2012
Information Science and Technology Branch
Sixth Semester

IT9023 – Artificial Intelligence
(Regulations 2008)

Time: 3 hr   Max Mark: 100

Answer ALL Questions

Part – A (10 X2 =20 Marks)

1. Differentiate Simple reflex and model based utility agent.
2. For an automated Taxi give PEAS formulation
3. What is the advantage of hill climbing search?
4. Which search is not optimal? Why?
5. Convert the sentence " People don't do things that will cause them to be in situations that they don't like" in predicate logic .
6. Trace the unification algorithm for f(Marcus,g(x,y)) and f(x,g(Caesar,Marcus))
7. How many models are available for the sentences (i) p v q (ii) q --> s
8. How is Ockham Razor used in learning?
9. Differentiate inductive and deductive learning.
10. How does the information transfer takes place, when the speaker intends to say " I'll shoot the wumpus if you let me share the gold".

Part-B (5 x 16 = 80 Marks)

11. i)   You are given two jugs, a 4 gallon one and a 3gallon one. Neither has any measuring markers on it. There is a pump that can be used to fill the jugs with water. How can you get exactly 2 gallons of water into the 4 gallon jug? Define the state space and derive at least one solutions from the state space . (8)

    ii) Imagine that you had been to an aquarium and seen a shark and an octopus. Using the concepts you have learnt in this course, how will you describe these to an artificial agent. The agent at the end, should be able to distinguish between a shark and an octopus.   (8)

12. a) i) Explain in detail the different dimensions of environment. Which environment and agent is best suited for iterative and bidirectional search. Explain in detail. (10)

    ii) You have a program that outputs the message "illegal input record" when fed a certain file of input records. You know that processing of each record is independent of other records. You want to discover what record is illegal. Give the initial state, goal test, successor function and cost function for this problem   (6)

                                                (OR)

    b) i) For the example below, trace the path for Greedy best search and A* algorithms. (8)
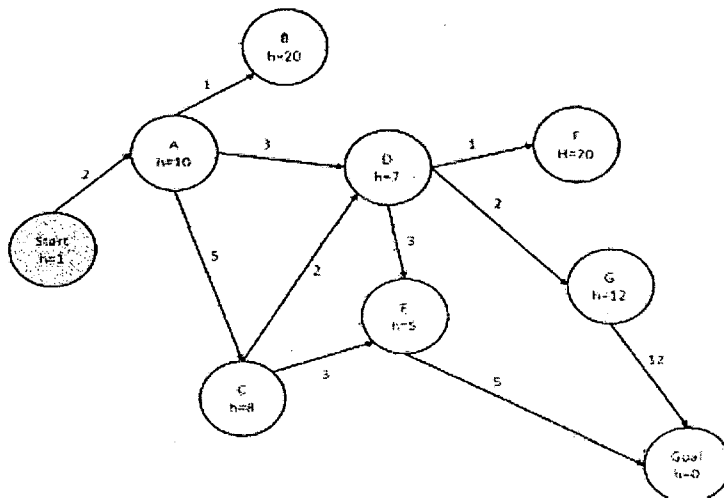
ii) Demonstrate with an example (8) :
   1) A problem, where breadth-first search would work better than depth-first search.
   2) A problem, where depth-first search would work better than breadth first search.

13. a) i) For the following map apply CSP such that no two adjacent countries have the same
   color. Use red, blue and green for colors. How many solutions are there ?   (8)
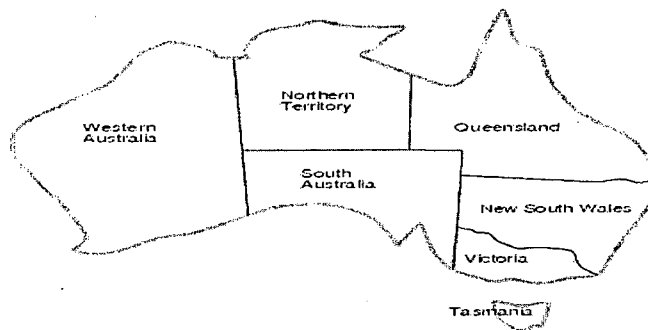
ii) With an example, explain the min max algorithm. (8)

(OR)

b) i) How is reasoning carried out for actions in a particular situation. What is a frame
   problem and give suggestions for solving this problem with an example   (8)

ii) Consider the following axioms and prove the conclusion by resolution   (8)

   • Every child loves Santa.

   • Everyone who loves Santa loves any reindeer.

   • Rudolph is a reindeer, and Rudolph has a red nose.

   • Anything which has a red nose is weird or is a clown.

   • No reindeer is a clown.

   • Scrooge does not love anything which is weird.

   (Conclusion) Scrooge is not a child.

14. a) i) Differentiate monotonic and nonmonotonic logic. Draw the dependency graph for the following equations. What happens when 'p' and 'z' is retracted one after the other? (8)

1) $(((p \wedge q) \rightarrow r) \wedge (s \rightarrow t)) \rightarrow u$
2) $((x \wedge y) \rightarrow z)$

    ii) Name and explain any two instance based learning mechanisms. Which type of learning mechanism is best suited for text books categorization in a library. Why? (8)

(OR)

b) i) In which circumstances decision trees will not help in the decision making process? Why? (4)

    ii) Design a Neuron – McCulloh Pittts model for logical AND and logical OR operations (4)

    iii) How does learning take place, when prior knowledge is incorporated. Explain with an example (8)

15. a) i) Explain the types of ambiguities present in English Language, when used for communication in natural language (8)

    ii) Give the verb subcategorization for the following sentence. (8)
" It is believed that the students who are writing the examination get good marks".

(OR)

b) i) Explain in detail on the various speech acts that agents use for communication. (8)

    ii) For the sentence, " *Someone walked slowly to the supermarket*", give a step by step procedure of top-down and bottom-up parsing. (8)

Time: 3 hrs   Max. Marks: 100

Answer ALL Questions

Part – A (10 x 2 = 20 Marks)

1. Draw data flow diagram of ARM processor
2. Write an assembly code for ARM processor to multiply content of R1 register and R2 register with out using arithmetic statement and move results to R3 register
3. Draw memory interface diagram for generating a 16k x 16 data memory with memory blocks of 8k x 8
4. Find out the value to be loaded to Timer 1 in mode 1 if 50 khz wave generated with 22mhz oscillator in 8051 (show all calculations)
5. Discuss briefly Round robin scheduling policy and compare with cyclostatic scheduling policy
6. Discuss briefly about RTOS and compare RTOS with normal OS
7. Write an embedded C program to send values -2 to 2 to port P1
8. Write a 8051 C program to toggle bits of P2 continuously forever with some delay
9. Explain briefly in-circuit emulator
10. list out real time constraints in design of embedded system

Part – B (5 x 16 = 80 Marks)

11 (i) Draw architecture diagram of 8051 micro controller and explain the working principle of this processor   (10)

(ii) Write an Assembly language program to find the number of 1's in accumulator content
(6)

12.a. Explain the steps in executing the interrupts. Give interrupt vector table and discuss in detail about six different interrupts in 8051.

(OR)

b.. Connect a 32K x 8 data and 512 x 8 program memory to 8051. Draw the connection diagram . Write the steps to program timer in mode 2 and draw the gate level diagram to count events happening outside by 8051

13.a. Explain EDF algorithm in scheduling and Schedule the following task set with fixed priority and a dynamic priority algorithms

Process	exe time	period
P1	1	4
P2	2	6
P3	3	8

(OR)

b. Discuss in detail about factors that will affect performance of RTOS due to context switching overhead with example. Discuss briefly inter process communication mechanisms in embedded systems

14a. Write an embedded C program that reads data from P1 and send its MSB bit to P0.7 while simultaneously generating two square waves one of 5KHz and another of 25Khz on pin P0.1, and P0.2. Assume XTAL=22Mhz

(OR)

b. Write an embedded C program to receive data serially and send it to P1. Read port 2 transmit data serially and give copy to P0. Assume XTAL=11.0592MHz, Set baud rate as 4800

15.a. Discuss in detail about different design issues in embedded system design
(OR)

b. Design a controller for a Traffic signal. Identify the function to implement the system and write the code for the same