BACHELOR OF ENGINEERING IN INFORMATION TECHNOLOGY
3rd YEAR 2nd SEMESTER EXAMINATION, 2018
Artificial Intelligence

Time: 3 Hours

Full Marks: 100

Answer any FIVE (20 x 5 = 100)
### ANSWER FROM EVERY GROUP

Group 1 (Answer any one) (C01)

1.
$4 + 2 + 7 + 7 = 20$

a. Give a comparative assessment of artificial intelligence approaches.

b. Justify — "No search method that makes use of heuristic functions can guarantee to find the shortest path from start to goal".

c. Consider the 3-puzzle problem shown in fig-below. Possible operators (in order) are: up, down, left, right. Assume that repeated states are not detected. Draw search tree using BFS. Would DFS find the goal?
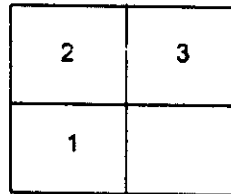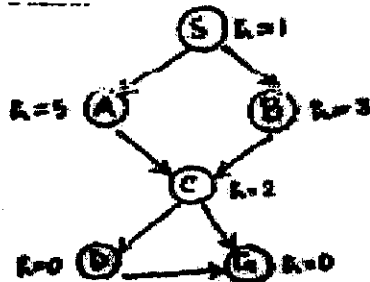

initial
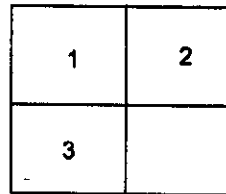
goal

d. Consider the search graph with start state S and goal state G as shown below. Draw the state space tree of the graph and apply DFS to find the goal.

2. A discrete elevator can sense the following information about its world: 20
   a. What floor the elevator is stopped at.
   b. What floors passengers in the elevator want to go to.
   c. What floors passengers outside of the elevator want rides from and whether they want to go up or down.
   d. The status of the elevator door (open or closed).

The elevator is capable of performing the following actions:
   a. Go up exactly one floor (unless it is already at the top floor).
   b. Go down exactly one floor (unless it is already at the bottom floor).
   c. Open the elevator door
   d. Close the elevator door
   e. Wait delta seconds (a fixed time sufficient for all in the elevator to get off and for all outside the elevator to get in).

Design a complete production system to control the elevator in an efficient manner. (It is not efficient, for example, to reverse the elevator direction from going up to going down either if there is someone still inside the elevator who wants to go to a higher floor or if there is someone outside the elevator who wants to get on from a higher floor).

Group 2 (Answer any one) (CO2)

1.
   $$3 + (5+3) + 3 + 3 + 3 = 20$$
   a. Discuss about the significance of Intelligent Search in AI.
   b. Discuss about Depth First Iterative Deepening Search. Compare its performances with that of Depth First and Breadth First Searches.
   c. Explain significances of g and h functions added to form the evaluation function f.
   d. How can you compare different heuristic functions designed for a particular problem?
   e. Why iterative deepening A* is sometimes preferred over A*?

2.
   $$3 + 10 + (3.5 + 3.5) = 20$$
   a. What are the differences between traditional computing and evolutionary computing?
   b. Explain different phases of the evolutionary cycle.
   c. Write short note on Mutation Probability and Crossover Probability.

Group 3 (CO3)

$$12 + 2 + 6 = 20$$

1. Represent the following sentences by predicate calculus well formed formula:
   a. Nothing in the house escaped destruction
   b. Some medicines are dangerous if taken in excessive amounts.
   c. No coat is waterproof unless it has been specially treated.
   d. A knowledgeable, inexpensive mechanic is hard to find.
   e. No one in IT 1st year owns a car.
   f. Not every integer is positive.
   g. Everything made of iron is attracted by all magnets.
   h. Every book has some author.

2. Explain why a PROLOG interpreter running a PROLOG program cannot be used to prove the negation of an atom.

3. Consider the following sentences: Any two who jointly run a company are business partners in that company. If u and w jointly run a company and w and v are business partners in that company then u and v are business partners in the same company. Jack and Bill jointly run ABC company, and Bill and Jill jointly run the same company.
   With the above sentences, write a PROLOG program to prove that 'Jack and Jill are business partners in ABC Company'.

   Or

   Consider the following sentences: Any two who are brothers are relatives. If x and z are brothers and z and y are relatives then x and y are relatives. Tony and John are brothers, and John and Mike are brothers.
   With the above sentences, write a PROLOG program to prove that "Tony and Mike are relatives".

Group 4 (CO4)

1. What is an expert system? Write down some advantages and disadvantages of expert system.
   $$4 + 6 + 6 + 4 = 20$$
2. Discuss different members of Expert System.
3. Explain various components of Rule-based Expert System.
4. Differentiate between expert systems and conventional programs.

Group 5 (Answer any four) (CO5)
Short note on

1. Alpha-beta pruning
2. Min-max search $$4 \times 5 = 20$$
3. Iterative deepening
4. NSGA2
5. Learning classifier system
6. Multiobjective Optimization