# B.E. COMPUTER SCIENCE AND ENGINEERING THIRD YEAR SECOND SEMESTER SUPPLEMENTARY EXAM - 2022

## ARTIFICIAL INTELLIGENCE

Full Marks: 100

Time: Three Hours

*Answer any five Questions*

*Different parts of a question must be answered together*

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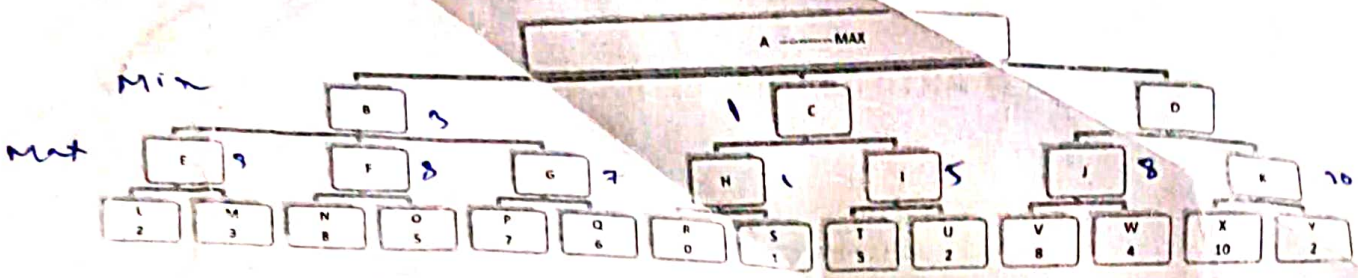
1. (a) What is 'AI' ? Discuss on four different types of intelligent entities. 4+6
   (b) What is Eliza? Discuss its limitations. 4
   (c) Compare between 'Rule based Reflex Agent' and 'Reactive and Memory Agent'. 6

2. (a) What is 'State Space Graph'? 3
   (b) Describe the criteria for evaluating search strategies? 6
   (c) Derive space and time complexities of iterative deepening search (IDS). 3+5
   (d) Discuss on the utility of depth limited search in comparison to depth first search. 3

3. (a) What is admissibility? Why is it important? 3
   (b) If h1(s) and h2(s) are both admissible heuristic functions, is h3(s) = |h1(s)-h2(s)| admissible? – Justify. 3
   (c) Can A* search more nodes than greedy search? Provide example graph/ tree in support of your answer. 4

   (d) Consider the following list of words:
   CAT COD COT COG COW DOG DOT HOG PIG
   and consider the puzzle: **Change CAT to DOG by changing only one letter at a time and only creating intermediary words that are on the above list.**
   (i) Draw the complete search tree. 4
   (ii) Number the nodes in the order visited by BFS 2
   (iii) Devise a heuristic function for this task. Is your heuristic admissible? Explain. 4

4. (a) Justify (with examples):
   (i) General Graph Search Algorithm is applicable for a wide variety of search processes.
   (ii) Heuristic search processes are better than blind search techniques. 4+4
   (b) Compare Minimax and alpha-beta pruning methods. 4
   (c) Consider the following game tree in which static scores are all from first player's point of view. Which should be his best first move? Which branches will be pruned if α-β pruning algorithm is used? The static scores at the leaf nodes from left to right are as follows:
   **2 3 8 5 7 6 0 1 5 2 9 4 10 2** 3+5




5. (a) Discuss on the disadvantages of Hill climbing process. 6
(b) How do you draw the correspondence between simulated annealing algorithm and optimization process? 4
(c) Discuss on Selection process in GA. 6
(d) Discuss on the pros and cons of mutation operator used in GA . 4

6. (a) Find the *mgu* of the following: {P( y, y, B), P(z, x ,z)} 4
(b) Convert the following *wff* into clause form.

$(\forall x)\{P(x) \rightarrow \{(\forall y)\ [P(y) \rightarrow P(f(x,y))\ ] \wedge \sim (\forall y)\ [Q(x,y) \rightarrow P(y)]\}\}$. 6

(C) Consider the following facts:

Jack, Jill and Bill are members of the City Club.
Every member of the City Club is either footballer or cricketer or both.
No cricketer likes rain.
All footballers like cloud.
Bill dislikes whatever Jill likes and likes whatever Jill dislikes.
Jill likes rain and cloud.

Use resolution to answer:

Can there be anyone who is a member of the City Club who is footballer but not cricketer? 10

7. (a) When do we call a reasoning system a "non-monotonic" one? 3
(b) What are the components of non-monotonic reasoning system? 3
(c) is it really necessary to use support lists for handling uncertainty? --- Discuss. What information (about a "node") do we obtain by looking at the support list of TMS? 3+3
(d) Write down the differences between crisp set and fuzzy set. 4
(e) Model 'Young' man using suitable membership function. Then graphically represent 'very young'. 4

8. Write short notes on: 8+8+4
(a) AND-OR Graph and its usefulness.
(b) Bidirectional Search, its formalization and Island driven search.
(c) IDA* search and its effectiveness.

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