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THE NATIONAL INSTITUTE OF ENGINEERING, MYSURU – 8
(An Autonomous Institute affiliated to VTU, Belagavi)

Eighth Semester B.E Degree Examination, May 2018

EC0442 — **Artificial Intelligence**

Time: 3 Hrs — Max. Marks: 100

Note: Answer all the questions.

Q. No.	Cognt. Level	COs	Questions	Marks
1. a)	L1	CO1	Briefly explain about i) Semantic Nets and its representations? ii) What are the four fundamentals of representation?	7
b)	L2	CO1	Draw a goal tree for a water jug problem. We have 5L jug and a 3L jug and using these two jugs collect a 4L water in the 5L jug? i) Write the rules first and ii) Then solve the GOAL TREE.	4+4=8
2. a) b) c)	L2	CO2	Write briefly about the following Blind searches – (DFS and BFS) with an example for each. Beam search, principle behind beam search with example. Hill climbing search with an example.	 5 5 5
			OR	
2. d)	L4	CO2	You are playing a new simulation game called PM quest: The Legend of Lost International Credibility. In this game you play a charismatic incoming PM who must make a choice on various issues in order to save your country. You realize that you can model a game free from AI class, as shown in Fig. Q. 2(d). Static values are shown underneath leaf nodes. (Ignore the numbers in parentheses) Based on the Fig. Q. 2(d) i) What are the max values of A, B, C and D. ii) Write the static evaluations you performed in sequence Previous attempt to find MINMAX was taking too much time so you decided to do Alpha-beta pruning instead. iii) Which of the nodes did you skip while performing Alpha-beta? What is the value of A? (Need to see the evaluations done on the graph/diagram).	5*3=15
3. a)	L2	CO3	How does constraint propagation work. Explain the concept using SUDOKU, write the attributes, domain and the constraint rules.	7

b)	L4	CO3	Solve the 4-Queen problem in a 4 × 4 chess board, write the algorithm to solve and tabulate your results.	8

Propagation queue	Value assigned or propagate	Values eliminated from neighbor	Backtrack? (Y/N)

OR

3. c)	L4	CO3	The NIE Time Travel Society (NIE TTS) has invited seven famous historical figures to NIE TTS convention. You were asked to schedule based on some rules not to disappoint any convention attendees. Following rules have been identified. (Schedule between 1PM and 4PM). 1) The list of guest lecture consists of Alan Turing Ada lovelace, Niels Bohr, Marie Curie, Socrates, Pythagoras and Isacc Newton. 2) Turing has to get home early to help win world war II, so he can only be assigned to the 1PM slot. 3) The course VIII students want to see the physicists: Bohr, Curie and Newton. 4) The programming students want to see mathematicians: Lovelace, Pythagoras and Newton. 5) The members of the Numerology club wants to see the ancient Greeks-Numerologist-Pythagoras and Socrates. 6) Visiting Ladies champions wants to see the female speakers: Lovelace and curie. 7) The CME students wants to see the British Speakers: Turing, Lovelace and Newton. 8) Finally, you decide that you will be happy if and only if you belong to one or more of the above groups) You decide to schedule using depth-first search with forward checking (constraint propagation through domains reduced to size 1 / singleton)	15

T	1PM
L	
B	
C	
S	
P	
N	

4.	L4	CO4	The Mahishmathi King Bahubali have hired you to help them identify potential dangers during their frequent expeditions to conquer new territories bagga warriors and attempt to rescue devasena. You decide to use nearest neighbors to classify new enemies that Bahubali might encounter, based on their positions on a map. In the map, friendly kings or prince are marked as squares and enemies are marked as monster icons.	

a)			On the given graph Fig. Q. 4(a) draw the decision boundaries produced by 1 nearest neighbors.	3
b)			The graph Fig. Q. 4(b) shows two new enemies, marked with question mark symbols and labeled A and B. Show how these will be classified, using 3 nearest neighbors and 5 nearest neighbors in Fig. Q. 4(b).	4
c)	L2	CO4	What is Occam's razor? Information theory has given the average disorder what is it? Write the formula mention what the variables represent. Calculate the disorder taking Height as ID Tree	8

Name	Height	Result Tanned?
Sarah	Average	Sun burned
Dana	Tall	None
Alex	Short	None
Annie	Short	Sun burned
Emoly	Average	Sun burned
Rete	Tall	None
John	Average	None
Katte	Short	None

5. a)	L1	CO5	Write briefly about the following i) Pooling in CNN ii) Auto-encoding.	4
b)	L4	CO5	Using the graph in Fig. Q. 5(b) find the weights of X and Y that goes into neuron A, B and D based on the graph given and also find the Thresholds (T) for all the nodes based on the graph: Find the values of the question(?) mark, you need to find the values that fit the neurons. And also what logic applies @ node C and E.	11
6. a)	L2	CO6	Briefly explain support vector machine (SVM), evaluate the margin between the gutters.	7
b)	L3	CO6	You want to use the support vector machines (SVM) to help detect steganography. Based on several features of each image, you train a linear classifier on regular images and altered images. The altered images are marked below with '+' and regular images are marked with '–'. Use Fig. Q. 6(b) to work for this problem. Draw the decision boundary found by the linear SVM. Three vectors lie in the gutters defined by your decision boundary. Two of them are support vectors and one is not (that is, one has an alpha of zero). Circle the support vectors. What is the value of vector $\vec{w}$ and b for $(h(x) = \vec{w}x + b)$	8
7. a)	L1	CO1	Write briefly about rule-based system.	2
b)	L1	CO2	Mention the 5 points of methodology.	3
c)	L1	CO4	How to isolate suspicious relations using FIXIT (true-success suspicious relations only)	2
d)	L1	CO6	How does boosting help, explain with example?	3

Figures for Questions

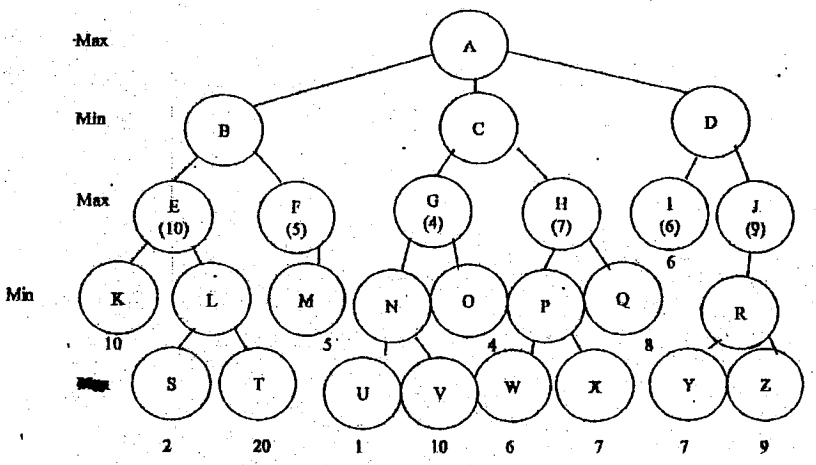

Fig. 2(d)

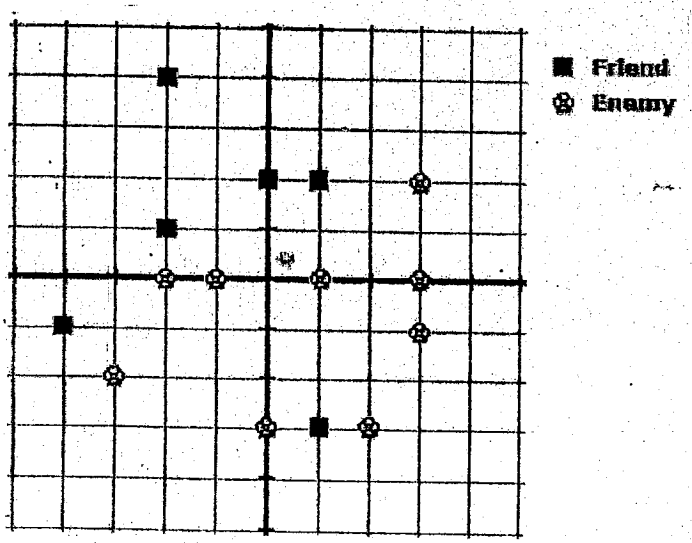

Fig. 4(a)

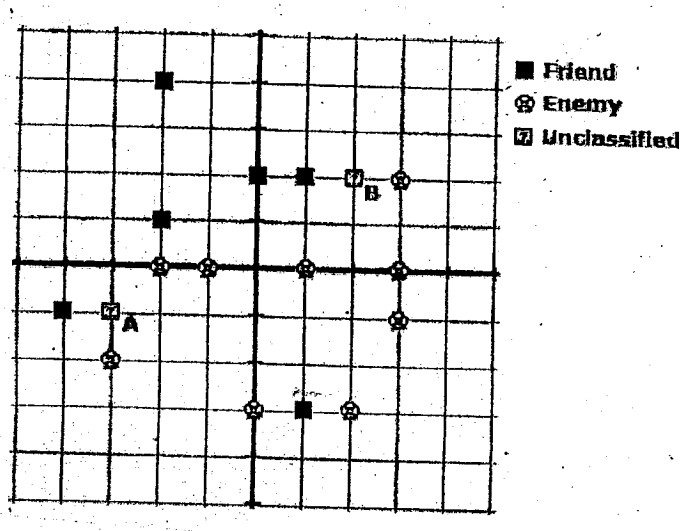

Fig. 4(b)

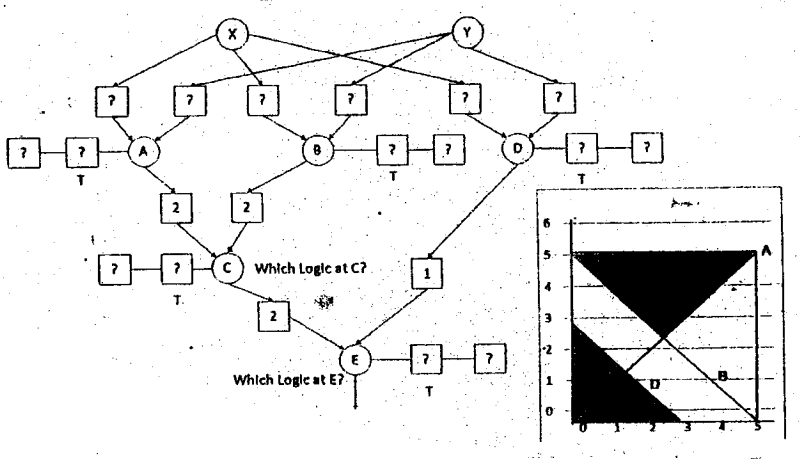

Fig. 5(b)

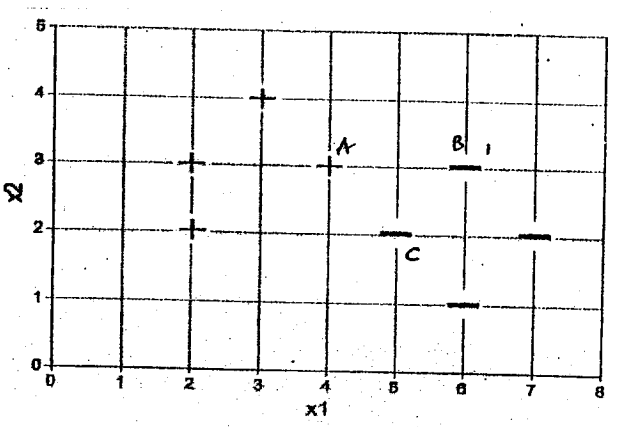

Fig. 6(b)