


# National University of Computer and Emerging Sciences, Lahore Campus

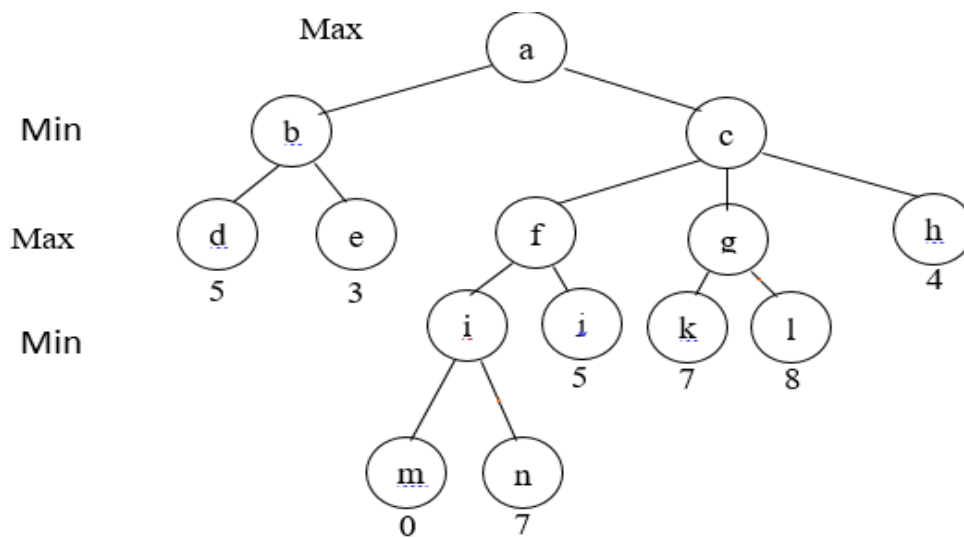
	Course Name:	Artificial Intelligence	Course Code:	AI2002
	Program:	BS (CS) BS(DS)	Semester:	Spring 2023
	Duration:	60 Minutes	Total Marks:	50
	Paper Date:	11-Apr-2023	Weightage	15
	Section:	ALL	Page(s):	5
	Exam Type:	Mid II		

Question	Q1 (CLO:2)	Q2 (CLO:3)	Q3 (CLO:2,3)	Total Marks
Marks	10	15	25	50
Obtained Marks				

Student Name: \_\_\_\_\_ Section: \_\_\_\_\_ Roll No. \_\_\_\_\_

Do not use pencil or red ink to answer the questions. In case of confusion or ambiguity make a reasonable assumption. *Attempt **all** questions on the question paper in space provided.*

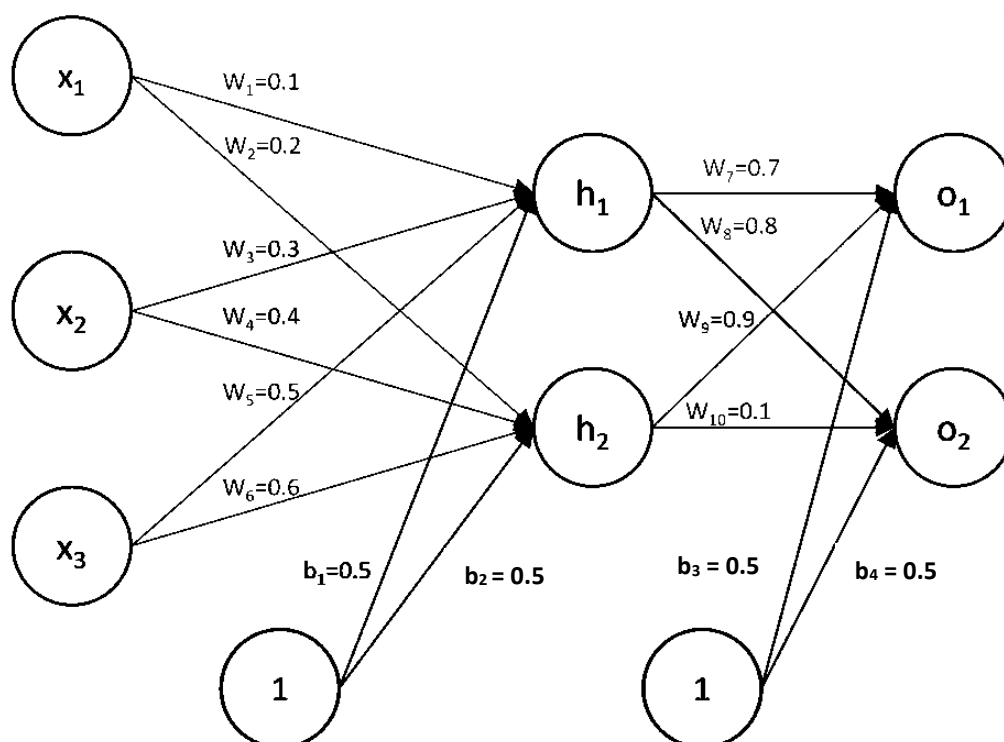
**QUESTION 1:** Perform the alpha beta pruning on the following min-max tree and show all working. **(10)**



**QUESTION 2:** Suppose there are 10 chromosomes with fitnesses as shown in table. What will be the selection probability according to the proportionate and linear rank selection methods? (5 + 10)

Chromosome No.	Fitness	Proportionate	Linear Rank
A	50		
B	25		
C	25		
D	100		
E	75		
F	125		
G	250		
H	110		
I	140		
J	100		

**QUESTION 3:** A Multi-layer feed-forward neural network with initialization of weights is given below.



- a) Do a forward pass and compute the output at  $O_1$  and  $O_2$ . Use linear activation function at hidden layer  $h_1$ , and  $h_2$  and sigmoid activation function at  $O_1$  and  $O_2$ . All biases are 0.5, the input values are  $x_1 = 1$ ,  $x_2 = 4$ ,  $x_3 = 5$  and target values are  $t_1 = 0.1$ ,  $t_2 = 0.05$ . Show all the working. (3+3)

- b) What are the general weight update equations according to delta rule for this network? (2+2)

- c) Do a backward pass (backpropagation) and compute update in weights  $\mathbf{b}_1$ ,  $\mathbf{w}_4$  and  $\mathbf{w}_{10}$ . Use learning rate  $\eta=0.01$ . Show all the working. (5+5+5)

## Rough Sheet 1