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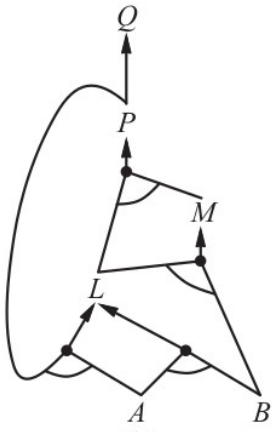
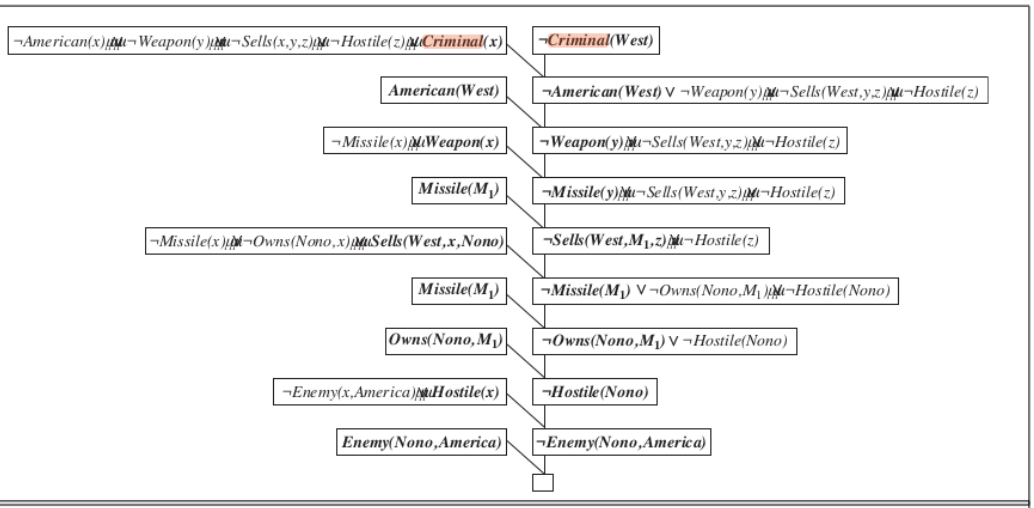
Internal Assessment Test 3 – January 2024

Sub:	**Principles of Artificial Intelligence**					Sub Code:	**21AI54**	Branch:	**AIML**
Date:	**14/03/24**	Duration:	**90 minutes**	Max Marks:	**50**	Sem/Sec:	**V-A**		**OBE**

		Answer any FIVE FULL Questions	**MARKS**	**CO**	**RBT**
1	a	*Show that A <=> B |= ~A OR B* A <=> B = (A => B) ^ (B => A) |= A => B = ~ (A \/ B)	[5]	CO3	L2
	b	*Show that (A AND B) => C |= (A->C) OR (B->C)* (A ^ B) => C=~ (A ^B) \/C = (~ A \/ ~B) V C = (~ A \/ ~B) V C V C =(~ AV C) \/ (~ B \/ C) = (A => C) \/ (B => A)	[5]		L2
2		*Define the following terms:(5 x 2 = 10)* (i) Literal: In propositional logic, a literal is either an atomic sentence or its negation. (ii) Clause: is a disjunction of literals. (iii) Conjunctive Normal Form: A proportion sentence, expressed as a conjunction of clauses is said to be in CNF. (iv) Definite Clause: Definite Clause is a disjunction of literals, of which exactly one positive (v) Horn Clause: is a disjunction of literals of which at most one is positive	[10]	CO3	L1

3	a	*Explain forward chaining and backward chaining in propositional logic.* A Forward chaining algorithm determines if a single proportion (q) is entailed by the knowledge base of definite clauses. The algorithm begins from known facts (positive literals in the knowledge base). If all premises of an implication are known, then the conclusion is added to set of known facts. The process continues until the query q is added or no further inference can be made. Backward chaining works backwards form the query. If the query is known to be true, then no work needs to be done Otherwise the algorithm finds those implications in the knowledge base whose conclusion is q. If all the premises of one of these implications can be proved true , then q is true. (Include pseudo code for higher marks)	[6]	CO3	L2
	b	*Given the following knowledge base (KB) of Horn clauses, show that KB |= Q by drawing a AND-OR graph. The KB is as follows:* *P=>Q, L AND M => P, B AND L => M, A AND P => L, A AND B => L, A, B.* $P \Rightarrow Q$ $L \wedge M \Rightarrow P$ $B \wedge L \Rightarrow M$ $A \wedge P \Rightarrow L$ $A \wedge B \Rightarrow L$ A B (a)  (b)	[4]	CO3	L3
4		*List and explain the steps in converting a first order logical expression to conjunctive normal form.* 1)Eliminate Implication (1) 2) More ~inwards (1) 3) Standardize variables (2) 4) Skolemize (2) 5) Drop universal quantifiers (2) 6)Distribute ∨ over AND (2)	[10]	CO 4	L1

5		*Consider the following knowledge base expressed in conjunctive normal form of first order logic sentences:* *¬American(x) ∨ ¬Weapon(y) ∨ ¬Sells(x, y, z) ∨ ¬Hostile(z) ∨ Criminal (x)* *¬Missile(x) ∨ ¬Owns(Nono, x) ∨ Sells(West, x, Nono)* *¬Enemy(x, America) ∨ Hostile(x)* *¬Missile(x) ∨ Weapon(x)* *Missile(M1)* *Owns(Nono, M1)* *American(West)* *Enemy(Nono, America)* *Using resolution, prove that West is a Criminal.*  **Figure 9.11** A resolution proof that West is a criminal. At each step, the literals that unify are in bold.	[10]	CO4	L4

6		*In the standard definition of Wumpus World, assume that a pit is present in a square with a probability 0.1. The expression for the probability of pit in the square [1,3] is given as:* *P(P13|known,b) = a'P(P13) Sum over frontier P(b|known,P13,frontier) P(frontier) where* *known = ~p11 AND ~p12 AND ~p21* *b = ~b11 AND b12 AND b21* *Evaluate P(P13|known,b).* P (P13/lknown, b) = alpha (0.1(0.01+0.1*0.9+0.01*0.9), 0.9 (0.01+0.01*0 .9)) = alpha (0.1(0.01+0.09+0.09)+0.9(0.01+0.09)) = alpha(0.1 x 0.19,0.9 x 0.1) = alpha(0.019,0.09) alpha = (0.109^ -1) = 9.174 =9.174 x 0.019 = 17.43%.	[10]	CO5	L3

----------All the Best----------

CO-PO Mapping																			
Course Outcomes		**Modules covered**	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**	**PSO3**	**PSO4**
CO1	Describe the Operating System Structure and Services.	**1**	3	-	-	-	-	-	-	-	-	-	-	3	-	2	-	-
CO2	Summarize the Process Management concepts like Processes, Threads, CPU Scheduling, Process Synchronization and Deadlocks	**1, 2**	3	2	2	-	-	-	-	-	-	-	-	3	-	2	-	-
CO3	Interpret the Memory Management concepts with respect to Main Memory and Virtual Memory.	**3, 4**	3	2	2	-	-	-	-	-	-	-	-	3	-	2	-	-
CO4	Discuss the Storage Management concepts like File-System Interface, File-System Implementation and Mass-Storage Structure	**4, 5**	3	2	2	-	-	-	-	-	-	-	-	3	-	2	-	-
CO5	Elucidate the Protection features in Operating System and case study in Linux OS.	**5**	3	2	2	-	-	-	-	-	-	-	-	3	-	2	-	-