NATIONAL INSTITUTE OF TECHNOLOGY, TIRUCHIRAPPALLI – 620015
DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING

B.Tech (CSE) - Cycle Test 2 – July – November 2021

CSPC54 – Introduction to AI and Machine Learning

Semester: V B **Max Marks: 15**
Curriculum: NITTUGCSE19 **Time: 1 hour**
Date of Exam: 16th November 2021

---

1. Construct a Decision Tree Model for the following data: (4)

Home Owner	Marital status	Job experience	Defaulted
Yes	Single	3	No
No	Married	4	No
No	Single	5	No
Yes	Married	4	No
No	Divorced	2	Yes
No	Married	4	No
Yes	Divorced	2	No
No	Married	3	Yes
No	Married	3	No
Yes	Single	2	Yes

Bob is married, doesn't own a home and has an experience of 2 years. Determine the probability of Bob being defaulted

2. Use the K-means algorithm and Euclidean distance to cluster the 8 data points into K = 3 clusters. Show the graphical visualization of the data points and the clusters. The coordinates of the data points are: x (1) = (2, 8), x(2) = (2, 5), x(3) = (1, 2), x(4) = (5, 8), x (5) = (7, 3), x(6) = (6, 4), x(7) = (8, 4), x(8) = (4, 7). You may choose your initial seed points. (4)

3. Verify the validity, unsatisfiable or not applicable scenarios of the following Propositional logic expressions using truth tables or equivalent rules with proper justifications. (2)

   - $((Smoke \wedge Heat) \Rightarrow Fire) \Leftrightarrow ((Smoke \Rightarrow Fire) \vee (Heat \Rightarrow Fire))$
   - $Big \vee Dumb \vee (Big \Rightarrow Dumb)$

4. Express each of the following sentences in First order logic. Assume predicates Parent (p,q) and Female (p) and constants Joan and Kevin. (3)
   - John has a daughter (possibly more than one and possibly sons as well)
   - Joan and Kevin have exactly one child together, a daughter
   - Joan has exactly one child.

5. For each pair give the most general unifier, if it exists and justify your argument
   - P (A,B,B) , P (x, y, z)
   - Knows (Father(y), y), Knows (x, x)