May 2023
(B.Tech.) Program: Information Technology Scheme II
Examination: TY   Semester: VI
Course Code: ITC604   and   Course Name: Artificial Intelligence and Data Science - I
Date of Exam: 19/05/2023   Duration: 2.5 Hours   Max. Marks: 60

Instructions:
(1) All questions are compulsory.
(2) Draw neat diagrams wherever applicable.
(3) Assume suitable data, if necessary.

Ques. No.	Question	Max. Marks	CO	BT level
Q1)	**Solve any six questions out of eight:**	**12**		
i)	Describe the Structure of Intelligent Agents.	2	CO1	U
ii)	Sketch the process of Heuristic function for an 8-puzzle problem.	2	CO2	A
iii)	Demonstrate various levels of knowledge-Based Agents.	2	CO3	A
iv)	Sketch the Lifecycle of Data Science Process.	2	CO4	A
v)	Illustrate Properties of differential privacy.	2	CO5	A
vi)	Define the term Global and Local Optima in detail.	2	CO6	U
vii)	Sketch the basic building block of a Learning Agent.	2	CO2	A
viii)	Demonstrate Black Box and White Box attacks.	2	CO5	A
Q2)	**Solve any four questions out of six.**	**16**		
i)	Explain the different types of the Agent Environments.	4	CO1	U
ii)	Solve the following 8-puzzle problem using BFS. Initial State Goal State	4	CO2	A
iii)	Translate the following sentences into First Order Predicate Logic Form: • It is a crime for an American to sell weapons to the enemy of America. • Country Nono is an enemy of America. • Nono has some missiles. • All of its missiles were sold to Nono by Colonel West. • Missile is a weapon. • Colonel West is an American. • Not all students like both Mathematics and Science. • Every student who takes French passes it.	4	CO3	A
iv)	Sketch and explain the steps in Developing a Machine Learning application for a	4	CO4	A

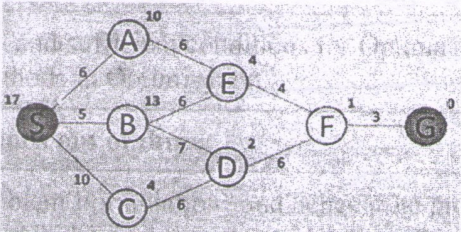|	May 2023		
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	given dataset considering "Course Recommendation System".			
v)	Demonstrate Adversarial Machine Learning with respect to Model Poisoning and Evasion Attack techniques.	4	CO5	A
vi)	Discuss the necessary and sufficient conditions for Optima and hence explain Gradient Descent Methods in Optimization.	4	CO6	U
Q3)	**Solve any two questions out of three:**	**16**		
i)	Explain the term "Problem Formulation" and hence state problem formulation of "Missionaries and Cannibals" problem along with State Space Representation.	8	CO1	U
ii)	Illustrate the Logistic Regression and Support Vector Machine.	8	CO4	A
iii)	Use Fast Gradient Sign Method to defend against Adversarial attacks in Machine Learning with the help of one example.	8	CO5	A
Q4)	**Solve any two questions out of three.**	**16**		
i)	Apply the A* algorithm on the following figure. Explicitly write down the queue at each step. Report the solution cost.	8	CO2	A
ii)	Assume the following facts: • John likes all kinds of food. • Apple and vegetable are food • Anything anyone eats and is not killed is food. • Anil eats peanuts and still alive • Harry eats everything that Anil eats. Prove by resolution that: John likes peanuts.	8	CO3	A
iii)	Discuss the operating principles of PSO, Bird Flocking and Fish Schooling.	8	CO6	U