

JAYPEE UNIVERSITY OF INFORMATION TECHNOLOGY, WAKNAGHAT

TEST -1 EXAMINATION- 2026

B.Tech-VI/VIII Semester (CSE/IT)

COURSE CODE (CREDITS):25B1WCI640/19B1WCI887

MAX. MARKS: 15

COURSE NAME: Reinforcement Learning

COURSE INSTRUCTOR: Saurav Singh

MAX. TIME: 1 Hour

Note: (a) All questions are compulsory.

(b) The candidate is allowed to make Suitable numeric assumptions wherever required for solving problems

(c) Use of calculators is allowed

Q.No	Question	CO	Marks												
Q1	<p>A random variable X has PDF:</p> $f_X(x) = \begin{cases} c(1-x^2), & -1 \leq x \leq 1 \\ 0, & \text{otherwise} \end{cases}$ <p>1. Find the value of C. 2. Compute $P(X) < 0.5$.</p>	CO2	3												
Q2	<p>Two random variables X and Y have joint PDF:</p> $f_{X,Y}(x,y) = \begin{cases} 4xy, & 0 < x < 1, 0 < y < 1 \\ 0, & \text{otherwise} \end{cases}$ <p>1. Are X and Y Independent? Justify mathematically. 2. Find $P(X+Y < 1)$.</p>	CO2	3												
Q3	<p>Two discrete random variables X and Y have the following joint PMF:</p> <table border="1" style="margin-left: 20px;"> <tr> <td>(X \ Y)</td> <td>0</td> <td>1</td> <td>2</td> </tr> <tr> <td>0</td> <td>(k)</td> <td>(2k)</td> <td>(k)</td> </tr> <tr> <td>1</td> <td>(2k)</td> <td>(3k)</td> <td>(2k)</td> </tr> </table>	(X \ Y)	0	1	2	0	(k)	(2k)	(k)	1	(2k)	(3k)	(2k)	CO2	4
(X \ Y)	0	1	2												
0	(k)	(2k)	(k)												
1	(2k)	(3k)	(2k)												

	<ol style="list-style-type: none"> 1. Find the value of k. 2. Obtain the marginal PMFs of X and Y. 3. Compute the conditional PMF $P(X Y=1)$ 4. Determine whether X and Y are independent. Justify mathematically. 		
Q4	<p>In the context of a Reinforcement Learning Agent for a Tic-Tac-Toe game, identify and describe:</p> <ol style="list-style-type: none"> 1. The state space and the size of the state space. 2. The action space for the Tic-Tac-Toe agent. 3. Formulate an appropriate reward function for the Tic-Tac-Toe agent and justify your choice. 4. The state transition probability function for the Tic-Tac-Toe environment. 5. A policy function for the agent and explain how it guides the agent's behavior during the game. 	CO1	5

JUIT TEST-1 EXAMINATION FEB-2020