JAYPEE UNIVERSITY OF INFORMATION TECHNOLOGY, WAKNAGHAT

TEST -2 EXAMINATION- 2025

B.Tech-IV Semester (CSE/IT)

COURSE CODE(CREDITS): 18B11CI413(2)   MAX. MARKS: 25

COURSE NAME: Modeling and Simulation Techniques

COURSE INSTRUCTORS: Dr.Vikas Baghel and Dr. Salman Talluri   MAX. TIME: 2 Hours

Note: (a)All questions are compulsory. (b) The candidate is allowed to make suitable numeric assumptions wherever required for solving problems.

Q.No	Question	CO	Marks
Q.1	Analyze the real-world applications of Poisson distribution and Normal distribution, providing an example for each and explaining their significance.	CO-2	4
Q.2	Explain the process of defining a random variable and obtaining its probability mass function (PMF) and cumulative distribution function (CDF) with an example.	CO-3	4
Q.3	Design a methodology to test whether collected data belongs to a homogeneous stochastic process. Present your approach with mathematical formulations and graphical representations.	CO-3	4
Q.4	Define the rejection-acceptance method for random number generation. Develop python code to generate random numbers using the rejection-acceptance method.	CO-3	4

Q.No	Question	CO	Marks
Q.5	A personnel manager is trying to determine whether absenteeism is greater on one day of the week than on another. His record for the past year shows the following scores. Test whether the absence is uniformly distributed over the week using Chi-square test. Record of absenteeism for one year Calculation　Monday　Tuesday　Wednesday　Thursday　Friday　Total 　Observed　　23　　18　　24　　17　　18　　100	CO-4	5
Q.6	How does passenger movement and queueing behavior vary in an airport, including check-in counters, security checks, boarding gates, and baggage claim? Create a schematic/behavioral model describing the objectives, inputs, outputs, content, assumptions, and simplifications of such a system.	CO-4	4

Chi-Square Distribution Table
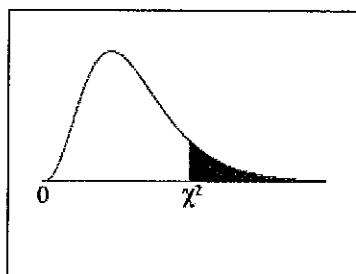
The shaded area is equal to α for $\chi^2 = \chi_\alpha^2$.

df	$\chi^2_{.995}$	$\chi^2_{.990}$	$\chi^2_{.975}$	$\chi^2_{.950}$	$\chi^2_{.900}$	$\chi^2_{.100}$	$\chi^2_{.050}$	$\chi^2_{.025}$	$\chi^2_{.010}$	$\chi^2_{.005}$
1	0.000	0.000	0.001	0.004	0.016	2.706	3.841	5.024	6.635	7.879
2	0.010	0.020	0.051	0.103	0.211	4.605	5.991	7.378	9.210	10.597
3	0.072	0.115	0.216	0.352	0.584	6.251	7.815	9.348	11.345	12.838
4	0.207	0.297	0.484	0.711	1.064	7.779	9.488	11.143	13.277	14.860
5	0.412	0.554	0.831	1.145	1.610	9.236	11.070	12.833	15.086	16.750
6	0.676	0.872	1.237	1.635	2.204	10.645	12.592	14.449	16.812	18.548
7	0.989	1.239	1.690	2.167	2.833	12.017	14.067	16.013	18.475	20.278