JAYPEE UNIVERSITY OF INFORMATION TECHNOLOGY, WAKNAGHAT

TEST -1 EXAMINATION- FEB-2023

COURSE CODE(CREDITS):18B11CI413(02) MAX. MARKS: 15

COURSE NAME:Modeling and Simulation Techniques

COURSE INSTRUCTORS: MAX. TIME: 1 Hour

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Note: All questions are compulsory. Marks are indicated against each question in square brackets.

Q1. Messages arrive at a switchboard in a Poisson manner at an average rate of six per hour. Find the probability for events:

(a) Exactly two messages arrive within one hour

(b) No message arrives within one hour

(c) At least three messages arrive within one hour. **[CO-2, Marks-03]**

Q2. A bag contains six blue balls and four red balls. Balls are randomly drawn from the bag, one at a time, until a red ball is obtained. If we assume that each drawn ball is replaced before the next one is drawn, what is the probability that the experiment stops after exactly five balls have been drawn? **[CO-2, Marks-01]**

Q3. If a random variable X has a Poisson distribution with mean 5, then calculate the value of the expression $E[(X+2)^2]$ **[CO-2, Marks-02]**

Q4. If a random variable X that takes values $+1$ and -1 with probability 0.5 each, then compute the values of the cumulative distribution function $F(x)$ at $x = -1$ and $x = +1$. **[CO-2, Marks-01]**

Q5. Consider the following probability mass function (pmf) of random variable X:

$$p(x,q) = \begin{cases} q & if\ X = 0 \\ 1-q & if\ X = 1 \\ 0 & otherwise \end{cases}$$

If $q = 0.4$, then compute the variance of X. **[CO-2, Marks-02]**

Q6. If a coin is tossed 5 times, using binomial distribution find the probability of:

(a) Exactly 2 heads

(b) At least 4 heads.

(c) At most 2 heads. **[CO-2, Marks-03]**

Q7. Discuss the following characteristics of the simulation model with the help of suitable example: (a) Linear and Non-linear (b) Static and dynamic (c) Deterministic and stochastic **[CO-1, Marks-03]**