JAYPEE UNIVERSITY OF INFORMATION TECHNOLOGY, WAKNAGHAT

TEST -1 EXAMINATION- FEB-2023

COURSE CODE (CREDITS): 21B1WCE831 (3)   MAX. MARKS: 15

COURSE NAME: DISASTER RISK ANALYSIS AND MANAGEMENT

COURSE INSTRUCTORS: Dr. Saurabh Srivastava, Dr. Saurav   MAX. TIME: 1 Hour

Note: All questions are compulsory. Marks are indicated against each question in square brackets. Use of scientific calculator is allowed.

Q.1 The electric power of a city is supplied by two generating plants A and B. Each of the plants has sufficient capacity to supply the average daily power requirement of the entire city. However, during peak hours of a day, the capacities of both the plants are needed; otherwise, there will be brownouts in parts of the city. Consider the following events: A:=Failure of plant A, B:=Failure of plant B with, $P(A) = 0.05, P(B) = 0.07, P(A \cap B) = 0.01$. If one of the two units should fail on a given day, what is the probability of failure of the other unit on the same day? **(CO-1)[2]**

Q.2 At a construction project, the amount of material used in a day's construction is either 100 units or 200 units, with corresponding probabilities of 0.60 and 0.40. If the amount of material required in a day is 100 units, the probability of shortage of material is 0.10, whereas if the amount of material required is 200 units, the probability of shortage of material is 0.30.

    (a) What is the probability of shortage of material in a given day?

    (b) If there is a shortage of material in a given day, what is the probability that the amount of material required that day is 100 units? **(CO-1)[2+1]**

Q.3 Suppose that the error in the reaction temperature, in °C, for a controlled laboratory experiment is a continuous random variable X having the probability density function:

$$f(x) = \begin{cases} \frac{x^2}{3}, & -1 < x < 2 \\ 0, & elsewhere \end{cases},$$

    (a) Verify that $f(x)$ is a density function.

    (b) Find $P(0 < x \leq 1)$. **(CO-1)[1+2]**

Q.4 The probability that a patient recovers from a rare blood disease is 0.4. If 15 people are known to have contracted this disease, what is the probability that:

    (a) at least 10 survive,

    (b) from 3 to 8 survive, and

    (c) exactly 5 survive? **(CO-1)[1+1+1]**

Q.5 Find the Karl Pearson's coefficient of correlation between the blow counts and compressive strength of very stiff clay for the following 10 data points in a sample:

Blow counts	4	8	11	16	17	19	21	25
Compressive strength	0.33	0.90	1.41	1.99	1.70	2.25	2.60	2.71

(CO-1)[4]