JAYPEE UNIVERSITY OF INFORMATION TECHNOLOGY, WAKNAGHAT

TEST -2 EXAMINATION-APRIL-2023

COURSE CODE (CREDITS): 21B1WCE831 MAX. MARKS: 25

COURSE NAME: Disaster Risk Analysis and Management

COURSE INSTRUCTORS: Dr. Saurav/ Dr. Saurabh Srivastava MAX. TIME: 1.5 Hrs

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

1. The flooding of a river in the spring season depends on the accumulation of snow in the mountains during the past winter season. The accumulation of snow may be described as heavy, normal and light with probability 0.20, 0.50 and 0.30 respectively. If snow accumulation is heavy, the probability of flooding is 0.90, if normal, it is 0.40 and if it is light, then it is 0.10.

   a) What is the probability of flooding in the river during the following spring season?

   b) If it is flooded in the river, then what is the probability that there was light snowfall in the mountains? **[4, CO-1]**

2. For a continuous random variable X, a 100 kilogram load is equally likely to be placed anywhere along the span of the beam of 10 metre, the probability density function of the load position X, is given as; $f_X(x) = \begin{cases} c, 0 < x \leq 10 \\ 0, else \end{cases}$, where c is a constant. Draw the diagram for probability density function. Obtain the cumulative distribution function and also draw it. **[4 M, CO-1]**

3. What return period would be adopted in the design of a bridge if you are allowed to accept only 5% risk of a flood in 75 years of expected life of bridge? **[2, CO2]**

4. How will you differentiate between Risk analysis and risk assessment. Using a flow diagram discuss various steps involved in risk assessment process. **[5, CO2]**

5. What are objectives of Hazard identification? Using a flow diagram discuss various steps involved in PHA. **[5, CO3]**

6. Consider the oil and gas separator chamber. Draw a fault tree analysis showing causes of the TOP event "Flow into separator fails to be shut down due to high pressure". To prevent overpressure, two high-pressure switches, PS_1 and PS_2 are installed in the vessel. Upon high pressure, the pressure switches should send signals to a programmable logic controller (PLC). If a signal from at least one pressure switch is received by the PLC, a closure signal will be sent to the process shutdown valves, PSD_1 and PSD_2. **[5, CO3]**