JAYPEE UNIVERSITY OF INFORMATION TECHNOLOGY, WAKNAGHAT

TEST -2 EXAMINATION- 2025

B.Tech-VIII Semester

COURSE CODE (CREDITS): 21B1WCE831 (3) MAX. MARKS: 25

COURSE NAME: DISASTER RISK ANALYSIS AND MANAGEMENT

COURSE INSTRUCTORS: DR. SAURAV MAX. TIME: 1.5 Hour

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
Q1	(a) Explain the Risk Assessment Process and illustrate the steps with a flow diagram. (b) Compare and contrast various hazard identification methods, specifically PHA, JSA, and FMECA, in terms of their strengths and limitations.	3	7
Q2	Compute the return period would you adopt in the design of a project as a Disaster management expert if you are allowed to accept only 7% risk of natural hazard like flood in 30 years of expected life of that project? Determine will be the probability that exactly one flood of above design capacity will happen in 30 years of expected life of that project?	3	4
Q3.	Data covering a period of 95 years for a natural hazard flood given a standard deviation of 2371 units and mean of the data is 7598 units. Applying Gumbell's method determine the flood data you will adopt for a project as a disaster management student that has a return period of 400 years. If confidence for the estimate of the above flood data is 80% then calculate limits of flood data based on the confidence percentage. Given S_n= 1.2020 and Y_n= 0.5589. For 80% confidence f (c) = 1.282	3	7

Q4.	An oil and gas separator vessel receives a mixture of high-pressure oil, gas, and water. To prevent overpressure in the vessel due to a blockage in the gas outlet, two high-pressure switches (PS1 and PS2) are installed. These switches send signals to a programmable logic controller (PLC), which in turn triggers the closure of process shutdown valves (PSD1 and PSD2). **(a)** Develop a fault tree analysis (FTA) for the top event: "Failure to shut down flow into the separator when high pressure occurs." Clearly illustrate the fault tree using appropriate logic gates and basic events. **(b)** Explain how common-cause failures (CCF) can be incorporated into the fault tree. Provide an example relevant to the system. **(c)** Discuss the significance of FTA in risk assessment for industrial process safety. How does it help in identifying and mitigating hazards?	**3**	**7**