JAYPEE UNIVERSITY OF INFORMATION TECHNOLOGY, WAKNAGHAT

TEST -1 EXAMINATION- 2025

B.Tech-IV Semester (CSE/IT/ECE)

COURSE CODE (CREDITS): 18B11CI414/18B11MA413 (3) MAX. MARKS: 15

COURSE NAME: Discrete Computational Mathematics / Discrete Mathematics

COURSE INSTRUCTORS: RKB*, PKP MAX. TIME: 1 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	Consider the nested intervals $I_n = \left[0, 1 - \frac{1}{n}\right], n \in N\ (naturals)$. Find their infinite union and infinite intersection. Also, if $B_n = [n, n+1], n \in N\ (naturals)$, then find $\bigcap_{n=1}^{\infty} B_n$.	CO-3	2
Q2	(a) Using Venn diagram, explicitly demonstrate all the fundamental products possible for three sets A, B and C by a suitable labelling. (b) State the principle of duality.	CO-3	3
Q3	If $H_j = 1 + \frac{1}{2} + \frac{1}{3} + \cdots + \frac{1}{j}$ then using principle of mathematical induction, prove that $\frac{d^n(x^n log x)}{dx^n} = n![log x + H_n] \quad \forall n \in N$.	CO-2	2
Q4	Define transitive closure of a relation on a set A. Verify whether the relation $R = \{(a,b), (b,b), (c,c), (c,d)\}$ on $A = \{a,b,c,d\}$ is irreflexive, and transitive or not.	CO-3	3
Q5	Show that $(D_{105}, \mid)$ is a poset, and draw its Hasse diagram.	CO-3	3
Q6	Construct truth table for $p \rightarrow \sim q$. Is it a tautology? Give an example of a contradiction.	CO-1	2