

JAYPEE UNIVERSITY OF INFORMATION TECHNOLOGY, WAKNAGHAT

TEST -3 EXAMINATIONS- 2026

B.Tech-IV Semester (CSE/IT)

COURSE CODE (CREDITS): 18B11CI414 (03)

MAX MARKS: 35

COURSE NAME: Discrete Computational Mathematics

COURSE INSTRUCTOR: SSA

MAX. TIME: 2 Hours

*Note: (a) All questions are compulsory.**(b) The candidate is allowed to make Suitable numeric assumptions wherever required for solving problems**(c) Use of calculator is not allowed*

Q.No	Question	CO	Marks
Q1	State the Pigeonhole principle. Give one suitable example to explain.	1	5
Q2	Let $A = \{1,2,3,4\}$ and $B = \{3,4,5,6\}$. Find: (a) $A \cup B$ (b) $A \cap B$ (c) $A - B$	2	5
Q3	(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.	3	3+2
Q4	Let A be the set $\{1, 2, 3\}$ and R be the relation $R = \{(1, 2), (2, 3), (3, 1)\}$. (a) Draw the diagram for the relation. (b) Determine the transitive closure of R.	4	3+2
Q5	Using truth table, examine the validity of the following argument. If I try hard and I have talent, then I will become an engineer. If I become an engineer, then I will be happy. Therefore, if I will not be happy, then I did not try hard or I do not have talent.	5	5

Q6	(a) Consider the algebraic structure $(3\mathbb{Z}, +, \cdot)$ where symbols are in their usual meaning. Verify whether given algebraic structure is a ring or not? (b) Define an integral domain. Verify whether $(\mathbb{Q}, +, \cdot)$ is an integral domain or not?	6	3+2
Q7	In a certain compression algorithm, the number of distinct binary strings of length n, denoted by a_n, that can be generated without containing two consecutive ones satisfies the recurrence relation: $a_n = a_{n-1} + a_{n-2}$; $n \geq 2, a_0 = 1$ & $a_1 = 2$. Find a closed form expression using generating function.	7	5