
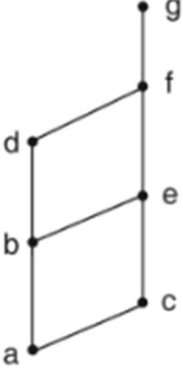


Name:			
Enrolment No:			
UPES End Semester Examination, December 2023			
Course: Discrete Mathematics (Minor) Program: B.Sc. Physics by Research Course Code: MATH4013		Semester: VII Time : 03 hrs. Max. Marks: 100	
Instructions: Answer all the questions.			
SECTION A (5Qx4M=20Marks)			
S. No.		Marks	CO
Q 1	Given the value of $p \rightarrow q$ is false, determine the value of the compound proposition $(\sim p \vee \sim q) \rightarrow q$.	4	CO1
Q 2	Let $A = \{2,3,5\}$ and $B = \{6,8,10\}$. Define a binary relation R from A to B as follows: For all $(x, y) \in A \times B$, $(x, y) \in R \Leftrightarrow x/y$ (i.e. x divides y). Write R and R^{-1} as sets of ordered pairs and find the Domain(R) and Range (R).	4	CO2
Q 3	Define the following with relevant example. (a) Upper bound. (b) Lower bound. (c) Supremum. (d) Infimum.	4	CO2
Q 4	What is Generalized Pigeonhole principle? Find the minimum number of teachers in a college to be sure that four of them were born in the same month.	4	CO3
Q 5	Obtain the prime factorization of the numbers 81, and 289.	4	CO4
SECTION B (4Qx10M= 40 Marks)			
Q 6	Check the validity of the following argument. <i>If I try hard and I have a talent, then I will become a scientist. If I become scientist, then I will be happy. Therefore, if I will not be happy, then I did not try hard or I do not have talent.</i>	10	CO1

Q 7	<p>Check whether the Poset in the following Hasse diagram is a Lattice or not.</p> 	10	CO2
Q 8	<p>Explain the ‘congruence modulo m’ relation and prove that it is an equivalence relation.</p>	10	CO4
Q 9	<p>Show that $p \rightarrow \sim r$ is a valid conclusion from the given premises $p \rightarrow q$ and $r \rightarrow \sim q$.</p> <p style="text-align: center;">(OR)</p> <p>Prove that $p \rightarrow (q \vee r) \equiv (p \rightarrow q) \vee (p \rightarrow r)$.</p>	10	CO1
<p>SECTION-C (2Qx20M=40 Marks)</p>			
Q 10	<p>By using the method of undetermined coefficients, solve the equation $y_{n+2} - 4y_{n+1} + 4y_n = n + 4^n$.</p> <p style="text-align: center;">(OR)</p> <p>Discuss Generating Function and using the Generating function technique, solve the following recurrence relation.</p> <p>$y_{n+2} - 2y_{n+1} + y_n = 2^n, y_0 = 2, y_1 = 1$.</p>	20	CO3
Q 11	<p>Explain Linear Diophantine equation and find the general solution of the equation $70x + 112y = 168$.</p>	20	CO4