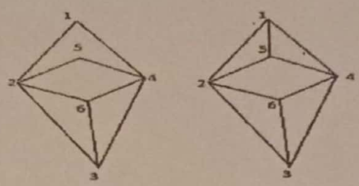
DHARMSINH DESAI UNIVERSITY, NADIAD
FACULTY OF TECHNOLOGY
COMPUTER ENGINEERING
SECOND SESSIONAL
SUBJECT: (CE-422) DISCRETE MATHEMATICS

Examination	**: B.Tech Semester –IV**	**Seat No.**	**:** 82
Date	**: 06, Feb 2024**	**Day**	**: Tuesday**
Time	**: 1.00 to 2.15 PM**	**Max. Marks**	**: 36**

INSTRUCTIONS:
1. Figures to the right indicate maximum marks for that question.
2. The symbols used carry their usual meanings.
3. Assume suitable data, if required & mention them clearly.
4. Draw neat sketches wherever necessary.

Q.1 **Do as directed.** **[12]**

CO2 U (a) Identify which of the below hasse diagrams represent Lattice. If they are not lattice, give justification. [2]



(a) (b)

CO2 R (b) Find the minimum number of students in a class such that three of them are born in the same month? [2]

CO2 U (c) Define: Totally ordered relation with example. [1]

CO3 U (d) How many edges does a complete graph with n vertices have? [1]

a) $\frac{n(n-1)}{2}$ b) n c) 2n d) n^2

CO5 R (e) Mention any two applications of generating functions. Specify names of well-known generating functions mapped to relevant combinatorics. [2]

CO5 R (f) Find closed form OGF for sequence 1 1 3 1 1 1 ... [2]

CO5 A (g) Evaluate $\binom{-2}{3}$ using any technique. [2]

Q.2 Attempt *Any THREE* from the following questions. **[12]**

CO2 N (a) Consider the POSET (P(S), ⊇). The relation R = {(a, b) | a ⊇ b}. R is defined on the power set of set S = {1, 2, 3} denoted by P(S). Draw hasse diagram for this POSET and determine whether it is lattice or not. [4]

CO2 A (b) Consider a function f: R→ R, given by f(x) = | x |, where | x | is absolute value of a number. Determine whether this function is Injective, Surjective or Bijective? [4]

CO2 R (c) Find the smallest relation containing the relation R = {(1,2), (1,4), (3,3), (4,1)} that is both reflexive and transitive. [4]

CO2 C (d) Consider the set of rational numbers. Consider relation R defined on this set. R = { (a,b) | (a-b) is integer } Prove that the relation is an equivalence relation. Also, describe the equivalence classes under this relation. [4]

Q.3 Attempt the following questions. **[12]**

CO5 R (a) Find the middle terms in the expansion of $(2x-(1/4x))^9$ [6]

CO5 A (b) Validate methodologically that the given recurrence and generating function (closed form) belong to the same sequence of terms. [6]

$a_{n+1} = 2a_n + 1$	$(n \geq 0; a_0 = 0)$	$A(x) = \frac{x}{(1-x)(1-2x)}$

OR

Q.3 Attempt the following questions. **[12]**

CO5 R (a) Find the exponential generating function for a_r, the number of r arrangements without repetition of n objects. [6]

CO5 R (b) Find the number of solutions of p1+p2+p3+p4+p5=15; Given 1≤p1≤5, 1≤p2≤5, p3≥2, p4≥2, p5≥2. [6]