ANURAG Engineering College
(An Autonomous Institution)
### II B.Tech II Semester Supplementary Examinations, December – 2024
DISCRETE MATHEMATICS
(COMPUTER SCIENCE AND ENGINEERING, INFORMATION TECHNOLOGY & ARTIFICIAL INTELLIGENCE AND MACHINE LEARNING)

Time: 3 Hours   Max. Marks: 60

Section – A (Short Answer type questions)   (10 Marks)
Answer All Questions

		Course Outcome	B.T Level	Marks
1.	Write down the negate of the proposition: " all students live in the hostels"	CO1	L1	1M
2.	What are the two types of quantifiers?	CO1	L1	1M
3.	Define power set of a set. Give an example	CO2	L1	1M
4.	Define relation and list out the operations on relations	CO2	L1	1M
5.	List out the axioms of Boolean algebra	CO3	L1	1M
6.	What is a lattice and sub lattice?	CO3	L1	1M
7.	Define permutation.	CO4	L1	1M
8.	In how many ways can the letter of the word "ORANGE" be arranged so that the consonants occupy only even positions?	CO4	L1	1M
9.	State Euler's formula	CO5	L1	1M
10.	Define Chromatic number.	CO5	L1	1M

Section B (Essay Questions)
Answer all questions, each question carries equal marks.   (5 X 10M = 50M)

			Course Outcome	B.T Level	Marks
11.	A)	i) obtain the conjunctive normal form of $[Q\lor(P\land R)\land\sim(P\lor R\land Q)]$	CO1	L2	5M
		ii) Prove that $(P\lor Q)\lor\neg P$ is a tautology			5M

OR

			Course Outcome	B.T Level	Marks
	B)	Verify the validity of the following argument: "Every living thing is a plant or an animal. John's gold fish is alive and it is not a plant. All animals have hearts. Therefore John's gold fish has a heart".	CO1	L3	10M

			Course Outcome	B.T Level	Marks
12.	A)	If R be a relation in the set of integers Z defined by $R=\{(x,y): x\in Z, y\in Z, (x-y)$ is divisible by $6\}$ Then verify whether R is an equivalence relation or not.	CO2	L2	10M

OR

			Course Outcome	B.T Level	Marks
	B)	Prove that the relation "congruence modulo m" given by $R=\{(x, y) \mid x - y$ is divisible by m $\}$ Over the set of positive integers is an equivalence relation.	CO2	L3	10M

			Course Outcome	B.T Level	Marks
13.	A)	Determine whether the posets represented by the following Hasse-diagram is lattice or not.	CO3	L2	10M
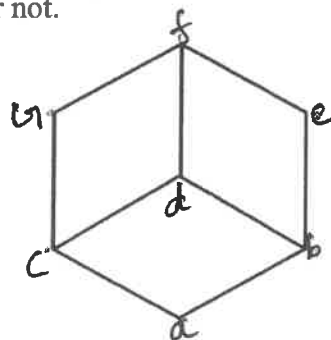
OR

B) Verify whether the set {1, 2, 3, 4, 5} is a group under   CO3   L3   10M
   i) Addition modulo 6   ii) Multiplication modulo 6

14. A) Determine the coefficients of :   CO4   L2   10M
    i) x^6y^3 in the expansion of $(x+y)^9$
    ii) $x^2y^3z^2$ in the expansion of $(x+y+z)^7$
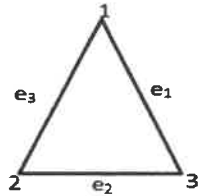
OR

B) A women has 20 close relatives and she wishes to invite 7 of them   CO4   L3   10M
   to dinner. In how many ways she can invite them in each of the
   following situations:
   i) There is no restriction on the choice
   ii) Two particular persons will not attend separately
   iii) Two particular persons will not attend together

15. A) i) Find the adjacency matrix of the following digraph: CO5   L2   5M
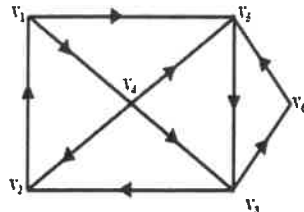
   ii) Find the incidence matrix of the following graph: 5M

OR

B) Find the chromatic number for following graphs   CO5   L2   10M