Name: **Enrolment No:**	

UPES

End Semester Examination, December 2023

Course: Discrete Mathematics — **Semester: III**

Program: BCA All Branches — **Time: 03 hrs.**

Course Code: CSEG2047P — **Max. Marks: 100**

Instructions: write short and precise answers.

SECTION A

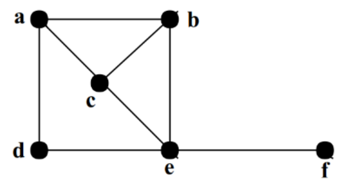
(5Qx4M=20Marks)

S. No.		Marks	CO
Q 1	Suppose a laundry bag contains many red, white, and blue socks. Find the minimum number of socks that one needs to choose in order to get two pairs (four socks) of the same colour.	**4**	**CO1**
Q 2	Is $(\neg p \wedge (p \vee q)) \rightarrow q$ a tautology.	**4**	**CO2**
Q 3	Solve $a_r + 5a_{r-1} = 9$ with initial condition $a_0 = 6$.	**4**	**CO1**
Q 4	Prove Given P = {2, 3, 4, 5, 6}, state the truth value of the statement $(\exists\, x \in P)(x + 3 = 10)$.	**4**	**CO2**
Q 5	Consider the statement "Given any positive integer, there is a greater positive integer". Symbolize this statement using and without using the set of positive integers as the universe of discourse.	**4**	**CO1**

SECTION B

(4Qx10M= 40 Marks)

S. No.		Marks	CO
Q 6	Explain the terms given below: 1. Tree 2. Binary Tree 3. Isomorphism in Graphs 4. Planar Graph 5. Cut Vertex	**2*5**	**CO4**
Q 7	Identify the given recurrence relation, $S(k)-S(k-1)-6S(k-2) = -30$ where $S(0) = 20$, $S(1) = -5$ and then solve it.	**2+8**	**CO1**
Q 8	Let R is the equivalence relation in the set A={0,1,2,3,4,5} given by R={(a,b):2 divides (a−b)}.	**10**	**CO2**

Q 9	Does the graphs given below have a Hamiltonian path? If so, find such a path. If it does not, give an argument to show why no such path exists.   **OR** Give an example of a graph that has: a. Eulerian circuit and a Hamiltonian circuit, which are distinct, b. Hamiltonian circuit but not an Eulerian circuit To prove your claim provide the paths for it as well.	**5+5**	**CO4**
SECTION-C **(2Qx20M=40 Marks)**			
Q 10	Prove that if every element in a group is its own inverse, then the group must be abelian. **OR** If a and b are any two elements of a group (G, *), then show that G is abelian if and only if $(a * b)^2 = a^2 * b^2$	**20**	**CO5**
Q 11	Give examples of a relation which is both a partial ordering relation and an equivalence relation on a set with valid arguments.	**20**	**CO3**