RAJKIYA ENGINEERING COLLEGE, AMBEDKAR NAGAR, UP

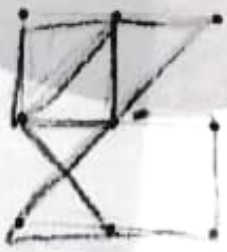
1st Sessional Examination December -2023 (Odd Semester)

Subject Name: Discrete Structures & Theory of Logic **Subject Code: BCS-303**

Max Marks: 20 **Time: 1.5 Hours**

Branch & Year: B.Tech (IT) Second year **Roll No:** 2 2 0 1 3 7 0 1 3 5

Section 1: Attempt **any five** Questions. All Questions carry equal marks. (5*4=20)

Q. No.	Questions	CO	Bloom's Taxonomy Level
1	Give an example of a relation R on A= {1, 2, 3} such that: (a) R is both symmetric and antisymmetric. (b) R is neither symmetric nor antisymmetric. (c)R is transitive but $R \cup R^{-1}$ is not transitive	CO1	K3, K4
2	Consider G= {1, 5, 7, 11} under multiplication modulo 12. (a) Find the order of each element (b) Is G cyclic (c) Find all subgroups of G.	CO1	K3, K4
3	Consider permutations $\sigma = \begin{pmatrix}1&2&3&4&5&6\\2&5&6&1&3&4\end{pmatrix}$ and $\tau = \begin{pmatrix}1&2&3&4&5&6\\6&4&3&1&2&5\end{pmatrix}$ in S_6 Find (a)$\tau\sigma$ (b) σ^2 (c) σ^{-1}	CO2	K1, K2
4	Let S= {a, b, c, d, e, f, g} be ordered as in Fig. below, and let X= {c, d, e}. a. Find the upper and lower bounds of X b. Identify sup(X), the supremum of X, and inf(X), the infimum of X, if either exists. 	CO1	K3, K4
5	Let p denote "He is rich" and let q denote "He is happy." Write each statement in symbolic form using p and q. (a)If he is rich, then he is unhappy. (b) He is neither rich nor happy. (c) It is necessary to be poor in order to be happy. (d) To be poor is to be unhappy.	CO2	K1, K2
6	Consider each graph in Fig. below. Which of them are traversable, that is, have Euler paths? Which are Eulerian, that is, have and Euler circuit? For those that do not, Explain why.   	CO5	K2, K6