Department of Computer Science & Engineering
B.Tech. (CSE), III SEM,
Assignment-1, (2023-24) Odd Semester
Discrete Structures and Theory of Logic (KCS303)

Q. No.	Questions	Marks	BL
1	Let R = {(1,2) (2,3) (3,1)} defined on A = {1,2,3}. Calculate the transitive closure of R using Warshall's algorithm.	5	BL-3
2	Prove that let =R× R (R is set of real no.) and define the following relation on A: (a, b) R (c,d) if $a^2+b^2 = c^2 + d^2$ is an equivalence relation.	5	BL-3
3	Let A={1,2,3,4}, B= {a,b,c,d} , C={x,y,z} and relation R from A to B and relation S from B to C. Let R= { (1,a) ,(2,d), (3,a), (3,b), (3,d)} and S= { (b, x) , (b,z), (c,y) , (d,z)}. i) Calculate the relation composition of R and S. ii) Prove that $(RoS)^{-1} = (S^{-1}oR^{-1})$	5	BL-3
4	Show that G= {1,-1, i, -i} where i^2= -1 is an abelian group with respect to multiplication as a binary operation	5	BL-3
5	Show that (N,+) and (N, .) are semigroup. Also show that (N, .) is monoid whereas (N, +) is not.	5	BL-3
6	Among first 500 position integers, determine the following: (a) The integers which are not divisible by 2 , nor by 3 , nor by 5. (b) The integers which are exactly divisible by one of them.	5	BL-3
7	let A= { 1,2, 3} and let R={(1,1) , (1,2) , (1,3) , (3,1), (2,3), (2,1)} be a relation on A. Draw the directed graph of R.	5	BL-3
8	Let f be a function from A to B, g be a function from B to C and h be function from C to D. Prove that ho(gof) = (hog)of	5	BL-3
9	Let G be a reduced residue system modulo 15, say, G = {1, 2, 4, 7, 8, 11, 13, 14} (the set of integers between 1 and 15 which are coprime to 15). Then G is a group under multiplication modulo 15. (*a*) Find the multiplication table of *G*. (*b*) Find 2-1, 7-1, 11-1. (*c*) Find the orders and subgroups generated by 2, 7, and 11. (*d*) Is G cyclic?	5	BL-3
10	Consider the set **Q** of rational numbers and let $*$ be the operation on **Q** defined by $a * b = a + b – ab$. (*a*) Calculate: (i) $3 * 4$; (ii) $2 * (-5)$; (iii) $7 * (1/2)$. (*b*) Is (**Q**, $*$) a semigroup? Is it commutative?	5	BL-3

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