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| **National University of Computer and Emerging Sciences, Lahore Campus** | | | | |
| C:\Users\saif\AppData\Local\Microsoft\Windows\Temporary Internet Files\Content.Word\final design.jpg | **Course:** | **Discrete Structures** | **Course Code:** | **CS1005** |
| **Program:** | **BS- CS** | **Semester:** |  |
| **Section:** | **4L** | **Total Marks:** | **25** |
| **Submission deadline:** | **25-3-2023** | **Weight** | 3.3 |
| **Assignment:2** | | **Page(s):** | 2 |
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| **Instruction/Notes:** | 1. Understanding of the problems is part of the assignments. So no query please. 2. You will get Zero marks if found any type of cheating. 3. 25 % deduction of over marks on the one day late submission after due date 4. 50 % deduction of over marks on the two day late submission after due date 5. No submission after two days. 6. **MUST BE HAND-WRITTEN AND IN-CLASS SUBMISION.** | | | |

**Question: 1**

Prove the following set identities are logically equal to each other: **[9]**

1. (A ∩ B) ∪ (A − B) = A ∩ (B ∪ (A − B))
2. ~((A ∩ B) ∪ ~B) =B ∩ ~A
3. (A−B) − (B −C) = A−B

by using i). Venn-Diagram ii). Membership Table iii). Set Identity Laws

**Question: 2 [3]**

The following functions (f, g, h) all have elements of {1,2,3,4,5}, both as their domain and their codomain. For each, determine whether it is (only) injective, (only) surjective, bijective, or neither injective nor surjective.

1. f {(1,3),(2,3),(3,3),(4,3),(5,3)}
2. g(1)=2, g(2)=3, g(3)=1, g(4)=5, g(5)=4
3. h(x)= 6-x

**Question 2: [4]**

From a function f: {3,2,1} → g: {a,b}, Write out the following: (**Also draw those functions separately**)

1. How many functions are there from f🡪g .
2. How many are injective?
3. How many are surjective?
4. How many are bijective?

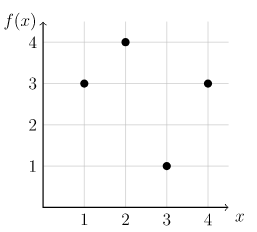
**Question 3: [6]**

For each function given below, determine whether or not the function is injective and whether or not the function is surjective. **(By using definition**)

1. f: Z→Z given by f(n)=5n−8
2. f(x)=−3x2+7 from R→R
3. f(x)=(x+1)/(x+3) from R→R

**Question 4: [2]**

Consider the function f: {1,2,3,4} → {1,2,3,4} given by the graph below.



1. Draw an arrow diagram for the above graph.
2. Is f injective? Explain
3. Is f Surjective? Explain
4. Is f a “Function”? Explain

Only Function