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| **AI 2002 Artificial Intelligence**  **Course Instructor**  **Ms. Mahzaib Younas** | | |
| **Time allowed = 30 min** | **Quiz 4** | **Total Marks = 25** |

**BCS Section A**

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**Question No 01:** For each English sentence below, write the FOL sentence that best expresses its intended meaning. **[10]**

1. All persons are mortal. [Use: Person (x), Mortal (x) ]
2. There exists some persons who are not mortal [Use: Person (x), Mortal (x) ]
3. Fifi has a sister who is a cat. [Use: Sister (Fifi, x), Cat (x) ]
4. All cats are Fifi’s sisters. [Use: Sister (Fifi, x), Cat (x) ]
5. For every food, there is a person who eats that food. [Use: Food (x), Person (y), Eats(y, x) ]
6. For every person, there exists a food eaten by that person. [Use: Food (x), Person (y), Eats(y, x) ]
7. Every person eats every food [Use: Person (x), Food (y), Eats(x, y) ]
8. All greedy kings are evil [Use: King (x), Greedy (x), Evil (x) ]
9. There exists some kings who are greedy and evil [Use: King (x), Greedy (x), Evil (x)]
10. Everyone has a favourite food [Use: Person (x), Food (y), Favourite(y, x) ]

**Question No 02:**

Let's imagine a scenario in a company where every employee reports to exactly one manager. How can we represent this relationship using first-order logic? **[5]**

1. **Define unary relations: [2]**
2. **Define a binary relation: [1]**
3. **Express the relationship using quantifiers: [2]**

**Question No 03:**

Let's consider a scenario where every student in a school is either a member of the math club or the science club. How can we represent this using first-order logic? **[7]**

1. **Define unary relations: [3]**
2. **Define binary relations: [2]**
3. **Express the relationship using quantifiers and logical connectives: [2]**

**Question No 04:**

Let's consider each scenario and formulate an atomic sentence to express their relationships. **[3]**

1. **Richard the Lionheart was the brother of King John. Formulate an atomic sentence using the Brother relation to express this relationship.**
2. **King John wore a crown. Using the OnHead relation, create an atomic sentence to represent this fact.**
3. **It is known that the left legs of Richard and John were different. Utilize the LeftLegOf function to construct an atomic sentence highlighting this dissimilarity.**