**Lab2 B**

**Q: 1**

1. **Is D flip-flop positive or negative edge triggered?**

* Positive edge triggered.

1. **What happens when the Set switch is set to zero?**

* Set state is activated at zero and it will result in set action. Hence, Qn+1 = 1.

1. **What happens when the Reset switch is set to zero?**

* Reset state is activated at zero and it will result in reset action. Hence, Qn+1 = 0.

1. **Does it matter what the D input is when either Set or Reset is zero?**

* No, it doesn’t matter what the D input is when either Set or Reset is zero. When the Set and Reset switches are deactivated i.e. S = 1 & R = 1, then only control is passed to clock (C) and clock controls D.

**Q: 2**

**Is the JK flip-flop positive or negative edge triggered?**

Ans: Negative edge triggered.

**Q: 3**

**3-bit counter which follows the sequence 0 -> 2 -> 3 -> 4 -> 7 -> 0.**

Counter that follows the sequence: 0 🡪 2 🡪 3 🡪 4 🡪 7 🡪 0

In order to store 3 bits we need 3 flip-flops

**Inputs:** (Ja, Ka), (Jb, Kb), (Jc, Kc)

**Output:** A, B, C

|  |  |  |  |
| --- | --- | --- | --- |
|  |  |  |  |
|  |  |  |  |

|  |  |  |
| --- | --- | --- |
| **Present State** | **Next State** | **Inputs** |

**State Table:**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **C B A** | **C B A** | **Jc Kc** | **Jb Kb** | **Ja Ka** |
| 0 0 0 | 0 1 0 | 0 X | 1 X | 0 X |
| 0 0 1 | 1 1 1 | 1 X | 1 X | X 0 |
| 0 1 0 | 0 1 1 | 0 X | X 0 | 1 X |
| 0 1 1 | 1 0 0 | 1 X | X 1 | X 1 |
| 1 0 0 | 1 1 1 | X 0 | 1 X | 1 X |
| 1 0 1 | 1 1 1 | X 0 | 1 X | X 0 |
| 1 1 0 | 1 1 1 | X 0 | X 0 | 1 X |
| 1 1 1 | 0 0 0 | X 1 | X 1 | X 1 |

**Following are the K-maps for each input and output signals**

|  |  |  |  |
| --- | --- | --- | --- |
| 0 | X | X | 1 |
| 1 | X | X | 1 |

|  |  |  |  |
| --- | --- | --- | --- |
| X | 0 | 1 | X |
| X | 0 | 1 | X |

|  |  |  |  |
| --- | --- | --- | --- |
| X | X | 1 | 0 |
| X | X | 1 | 0 |

|  |  |  |  |
| --- | --- | --- | --- |
| X | X | X | X |
| 0 | 0 | 1 | 0 |

|  |  |  |  |
| --- | --- | --- | --- |
| 0 | 1 | 1 | 0 |
| X | X | X | X |

|  |  |  |  |
| --- | --- | --- | --- |
| 1 | 1 | X | X |
| 1 | 1 | X | X |