**COS10004 – Computer System**

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**LAB 3**

**4-Bit Register**

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|  |  |  |
| --- | --- | --- |
| Ox | Input Binary | Output Binary |
| 0 | 0000 | 0000 |
| 1 | 0001 | 0001 |
| 2 | 0010 | 0010 |
| 3 | 0011 | 0011 |
| 5 | 0101 | 0101 |
| A | 1010 | 1010 |
| B | 1011 | 1011 |
| C | 1100 | 1100 |
| D | 1101 | 1101 |
| E | 1110 | 1110 |
| F | 1111 | 1111 |

7.1 Name one crucial role (hardware) counters play in modern computing architectures?

- A computer has a lot of needs for counters which are designed and built into modern

processors such as to keep count of events or clock pulses etc…

7.1

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7.2 Describe in a few sentences how a ripple counter works. How does the “ripple” occur?

- A ripple counter is an asynchronous counter where only the first flip-flop is clocked by an external clock. The output of the preceding flip clocks all subsequent flip-flops-flop.

**JK Ripple Encounter**

**A picture containing diagram, plan, technical drawing, schematic

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- The counting down counter appears to be the same as the counting up counter since they share the same connection. However, the attribute of the flip flop for the counting-up counter is the falling edge, whereas the rising edge for the counting-down counter.

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external clock. All subsequent flip-flops are clocked by the output of the preceding flip-

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JK Ripple Counter

JK Counter with a common clock

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**A picture containing diagram, plan, design

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**Mode 6 Counter**

**A picture containing diagram, plan, technical drawing, schematic

Description automatically generated**

17.2 Why is handling such things important?

- Handling momentary illegal states in digital circuits is important for ensuring correct operation, maintaining data integrity, promoting stability and reliability, ensuring compatibility with other components, and following good design practices. By addressing these states, we can prevent errors, glitches, and unpredictable behaviour in the circuit while maintaining data integrity and promoting a stable and reliable operation.

**Mode 6 Counter with HEX Digit Display**

**A picture containing diagram, plan, technical drawing, schematic

Description automatically generated**