Digital Logic & Processor
End-Sem
Monsoon -2013
Nov 28, 2013

Roll number:

Name:

Seat:

Q$_1$	Q$_2$	Q$_3$	Q$_4$	Q$_5$	Q$_6$	Total

Answer all questions. Marks are indicated against each question. The answers should be given in the space provided. You may use the last page for rough work, if necessary. State your assumptions clearly if there is ambiguity with question. ***All the best!***

1. Design a 4 bit binary divider circuit, which makes use of a subtractor functional block. Given two 4 bit binary numbers, $a_3a_2a_1a_0$ and $b_3b_2b_1b_0$, outputs the quotient and remainder of the division. Show clearly the functional blocks you are using for the circuit and how they are interconnected. You can explain the overall logic through few crisp sentences. [**Hint:** *Division is achieved by repetitive subtraction. You may want to keep this problem for the end*] **[10m]**

2. Construct a BCD adder-subtractor circuit for adding or subtracting two unsigned BCD digits by the way of 10's complement. Assume 10's complement circuit block is readily available. [**10 m**]

3. Design a 4:16 decoder with 2:4 decoders alone. Explain what your circuit does with few crisp sentences. **[10 m]**

4. Let's go back to the keyboard encoder and storage problem of mid1☺. We now want to store 16 such key presses onto 16 shift registers, whose address ranges from 0 – F. The first key gets stored at the shift register whose address is 0 and the 16th key at shift register whose address is F. Further key presses get stored again from zero. Design a circuit that whenever a key is pressed stores its encoded value at the appropriate shift register. What are the blocks that you will use and why? Clearly show the connection between blocks, the various inputs to the registers, etc. **[10m]**

5. Design a sequential circuit which recognizes the sequence 10011001 in a bit stream. **[10m]**