|  |  |
| --- | --- |
| No. of Pages | **2** |
| No. of Questions | **4** |

**Department of Computer Science and Engineering**

**MIDTERM EXAMINATION Summer 2016**

**CSE260: Digital Logic Design**

**Total Marks: 80 Time Allowed: 1:15 hour**



* Answer ALL questions



**Question No. 1**  20 marks

1. State the range of an 8 bit 2’s complement system.
2. Represent +73 and -35 using an 8 bit **1’s complement number system**, **2’s complement number system** and in **sign-magnitude number** system.
3. Using the binary numbers found above or otherwise, subtract -35 from 73 using the **2’s complement method** of subtraction.
4. Using appropriate justifications, comment on whether your answer in part (c) is an overflow or not.

**Question No. 2**  20 marks

In a programming contest, there are 3 judges who mark a contestant out of 9 in total. Each judge can give any mark from 0 to 3. There are maximum 3 negative marking for errors, one can have negative marks from 0 to 3. Provided the judges will give their marks in binary numbers, there is 3 bonus mark for participation, you are required to design a circuit that will add up all the marks obtained by the contestant with bonus marking out of 12. At the end it will also show how much mark the contestant has got.

Clue: You can use as many full adders, 3 bit, 5 bit parallel adders and 4 bit adder cum subtractor you need

**Question No. 3**  20 marks

1. Simplify the expression [**(abc’d + abc’d’ + ab’ce )’ . (ab’ce’ + ac’e + ac’e’)’]’** using Boolean algebra simplification.
2. Construct AND, OR and NOT gates using only NOR gates.

**Question No. 4**  20 marks

An elevator has the following sensors:

**G = 1**, if the gate is closed, 0 otherwise

**L = 0**, if the elevator is not loaded (has no people or material on it)

**D = 1**, if the elevator is in demand (someone has called the elevator to a floor)

**M = 0**, if the elevator is not moving

The outputs to the system will be as follows:

A=1, Alarm will be turned on if

1. The gate is not closed and the elevator is moving
2. The elevator is moving but not in demand or loaded
3. The gate is not closed and the elevator is loaded and moving
4. The elevator is not loaded, not moving, and in demand
5. Using the description of the circuit above, construct the truth table for the system.
6. Use k-maps to obtain simplified equations for the outputs.
7. Using the equations found in part (b), draw the circuit.

##### THE END