KIIT UNIVERSITY, BHUBANESWAR
AUTUMN MID-SEMESTER EXAMINATION – 2016
DIGITAL ELECTRONICS (EC-2009), BRANCH:CSE & IT

Full Marks: 25 **Duration: 2 hours**

- ***Answer any FIVE questions including question No.1 which is compulsory.***
- ***The figures in the margin indicate full marks.***
- ***Candidates are required to give their answers in their own words as far as practicable and all parts of a question should be answered at one place only.***

1. a) Perform following arithmetic: (i) **BCD Subtraction** (858-749) [1x5]

(ii) (**-13**) **-** (**-6**) using **2's complement** method

b) Why the row and column values of the **K-Map** are ordered in **Gray code** rather than binary numerical order, explain in brief.

c) With the help of a **4X1 MUX**, implement a **NOT** gate.

d) If we transmitted a 7-bit **even parity hamming code** through a noisy channel and at the receiver we obtained '1110110'. Decode the correct 4-bit data word.

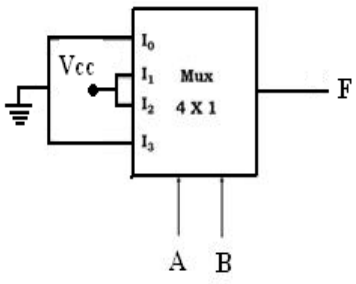
e) Implement a **1 Bit Magnitude Comparator** in a **decoder** circuit.

2. Obtain a minimized expression for the following Boolean function using **K-map** and implement the minimized expression using minimum number of **NAND gates** only. [5]

$$\mathbf{F(A,B,C,D) = \sum m\,(2,3,7,8,10,13)+d(9,11,15)}$$

3. a) Implement a **Full-Subtractor** in a **Low Enable Decoder** Circuit. [3]

b) Identify the Boolean function **F(A,B)** implemented with MUX [2]



4. a) Design a **2-bit Priority Encoder** where the input priorities are defined as $\mathbf{D_1>D_3>D_0>D_2}$; where all $\mathbf{D_i}$**'s** are inputs to the priority encoder. [4]

b) Verify the following functions are **commutative but not associative**: [1]

i) NOR ii) NAND

5. a) In a room, there are **3 electric lamps**. For sufficient light intensity, **at least two lamps** must be **turned on at the same time**. Design a circuit using **3x8 Decoder (Active High)** and basic gates, which enables an alarm when light intensity in the room is **not sufficient.** [3]

   b) Show that **(X + Y' + XY)(X + Y')(X'Y) = 0** [2]

6. a) Draw and explain a combined **4-bit adder/subtractor** block using full adders and **XNOR** gates only. [3]

   b) Define **minterms and maxterms**. Prove that minterms and maxterms are complement of each other [2]