



**KIIT UNIVERSITY, BHUBANESWAR**  
**SPRING MID SEMESTER EXAMINATION-2015**  
**DIGITAL ELECTRONIC CIRCUITS**  
**[EC-2009]**

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**Full Marks: 25**

**Duration : 2Hrs**

*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) "Gray codes are cyclic but not sequential & self-complementing." Justify. [1x5]  
b) Perform following arithmetic: (i) BCD subtraction (943 - 458),  
(ii) (-21) - (-13) using 2's complement method.  
c) Show that,  $P\bar{Q} + P\bar{R} + Q\bar{R} = P + Q\bar{R}$  where P, Q and R are Boolean variables.  
d) Implement Half-Subtractor using **2:4 decoder** (having active HIGH output lines) and **one OR gate**.  
e) Why the row and column numbers of the K- map are assigned in Gray code rather than binary numerical order, explain in brief.
- (2) Obtain the minimized expression for the following 4-variable Boolean expression using K-map method and implement the minimized expression using **only NOR gates.** [5]  
$$F(W,X,Y,Z) = \sum m(0,2,5,10,11,15) + d(1,3,7)$$
- (3)a)i) What is the difference between 'Ripple carry adder' and 'Look-ahead carry adder' explain in brief. [2+2]  
ii) 'A 4-bit adder circuit could be used to convert BCD codes to Excess-3 codes'. Justify this statement using proper circuit diagram in brief.  
b) Implement XOR gate using minimum numbers of XNOR gates only. [1]
- (4)a) What is Decoder? Draw the circuit diagram and truth table of **2-4 decoder having active-LOW output terminals.** [2]  
b) Implement the given function 'F' using a **3-8 decoder having active HIGH output terminals** and **NOR gates only.** [3]

$$F(P,Q,R) = PQ + QR + PR$$

