Q1. i) Convert the decimal number 129 in 
(a) BCD (b) Gray Code (c) Excess-3 (d) Hexadecimal 
ii) Perform \( (6)_{10} - (9)_{10} \) using 2’s complement. 
iii) Implement the OR gate Expression using NAND Gate? 
iv) What is the Race around condition? 
v) What is the difference between synchronous and 
asynchronous circuits?

SECTION – A

Q2(a) Construct the Hamming code for 1011 for even parity. 
(b) Realize & implement the 3 bit parity Checker circuit.(use 
even parity) 
(c) A seven bit hamming code is received as 1110101. What is 
the correct code? Assume the parity to be even.

Q3.(a) Simplify the given the expression using tabulation (QM) 
method. 
\[
F(A,B,C,D) = \Sigma m(2,4,8,11,15) + \Sigma d(1,10,12,13)
\]
(b) Reduce the following function using k-map technique 
\[
F(A,B,C,D) = \pi M(0,3,4,7,8,10,12,14) + \Sigma d(2,6)
\]
Q4 (a) Implement the full adder circuit using 8:1 MUX. 
(b) Design a Binary to gray code converter?

SECTION – B

Q5(a) (i) Convert S-R flip-flop into J-K flip-flop? 
(ii) Convert S-R flip-flop into T flip-flop? 
(b) What is the difference between latch and flip flop? 
Q6. Write short notes on 
A) FPGA 
B) CPLD 
C) PAL 
D) PLA

Q7(a) An asynchronous sequential logic circuit is described by the 
following excitation and output function 
\[
Y = X_1 \bar{X}_2 + (X_1 + \bar{X}_2) Y \\
Z = Y
\]
then

• Draw the logic diagram of the circuit 
• Derive the transition table & output map 
• Describe the behavior of the circuit 
(b) What is the difference between Moore & Mealy Circuits?